The Campus Ecology Research Project: An Environmental Education Case Study

by

Daniel Filipp Einstein

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Dedication

To my family: Miriam Grunes and Emmaray Sequoia.

To my grandparents: Emil Trnka and Erna Kempenich Einstein.

Hope.

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I am indebted to many fine people for their help designing the Campus Ecology Research Project. Thank you for your patience and good humor.

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Abstract

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This thesis details the planning, implementation, and formative evaluation stages of the Campus Ecology Research Project (CERP), an innovative undergraduate environmental education teaching model. The model was developed as an educational response to the global ecological crisis and the hopelessness and despair that this daunting problem has engendered among university students.

CERP engages holistic, transdisciplinary and experiential pedagogical perspectives in pursuit of its mission: teaching students research and action skills that support environmentally responsible campus management. A project liaison brings together faculty, staff and students to identify campus environmental issues and make recommendations for improved management practices and policies. By confining the scope of inquiry to campus issues, the program directs students toward small scale problems, with the intent of achieving empowering "small wins." The CERP designer further asserts that the research and action process--from problem identification to problem resolution--will lead to the development of an environmentally literate citizenry.

A case study method is employed to describe the model's development and pilot implementation as a component of the Fall 1992 Institute for Environmental Studies certificate program capstone seminar (IES 600). Seminar participants provided evaluative commentary for the study. This data was then used to establish a context for a discussion of the structure, process and skill content dimensions of the seminar. The study concludes with suggestions for improving the model, either as part of a future IES 600 seminar or an alternative academic venue.

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Chapter One

1. Introduction

1.1. Thesis Structure

1.1.1. Purpose of Study

This study tells the story of the Campus Ecology Research Project (CERP), an innovative environmental education teaching model designed by the author. The model was developed as an educational response to the global environmental crisis and the powerlessness and despair that this daunting problem has engendered among university students. The CERP model provides students with small scale and local problem solving situations whereby they develop the knowledge, skills and motivation necessary to become environmentally literate and responsible citizens.

The first use of the model took place in the Fall semester of 1992 as part of the Institute for Environmental Studies capstone undergraduate certificate seminar--also known as IES 600. This study outlines the model's underlying philosophical and pedagogical concepts, details some of the process landmarks in the model's development, and finally, provides a formative assessment of the first CERP pilot. It is the author's intent that this document serve not only as a record of events, but as a reference for future attempts at implementation and enhancement of the model.

1.1.2. Methods

A case study framework is used to examine the development, implementation and evaluation phases of the IES 600/CERP pilot program. A case study, with its emphasis on exploration, description and explanation of a phenomenon of interest is particularly well suited for this type of empirical review--given my primary interest in gaining a better understanding of how well the model performed and why it performed the way it did. Whereas in a conventional experimental study, the researcher might seek to separate the subject from the context of the research and examine only a few variables, case studies take a comprehensive approach, looking at the interplay between the phenomenon of interest and its context.[1] In this CERP pilot case study we will examine an environmental education experience (phenomenon of interest) as played out on the campus of a large public university (context).

A great advantage to this methodological approach, given the formative stage of this model, is that it permits the reader (especially those with an interest in expanding on the pedagogic themes of the model) a chance to participate in refining the model. By providing an image rich in details and textures, reviewers are invited to draw their own conclusions regarding the outcomes of the pilot. In so doing, this public review process may benefit others who may choose to implement a CERP based program.

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[1] Yin, R. K. 1994. Case Study Research: Design and Methods. 2nd. Edition. Thousand Oaks: Sage Publications.

A variety of both qualitative and quantitative data collection instruments were used in this case study. Students, teaching staff and participating administrators were interviewed or joined in focus group discussions. Students were also provided with course critiques and comment cards, as well as pilot evaluation questionnaires. Additional data were gathered from program artifacts, such as course handouts, and the final group report.

Because the author played critical roles in all phases of CERP development, from program designer, to participant observer during the implementation phase, and finally as the evaluator of the pilot program, some reviewers may declare that the study design is intrinsically flawed due to subjective bias. "How can an objective description be presented under these conditions?" they might ask. But this is the wrong question , for this study is not meant to present a singular truth about the CERP pilot--for I believe that no such a singular objective truth exists. Instead I am presenting a description of a program and an evaluation data set from which others may draw their own conclusions and interpretations. This study is *my* perspective based on *my* understanding of events, organized so as to be a useful tool in advancing the goal of ecological literacy among university students. Anthropologist Margaret Mead's observation that "We may have to *give up the pretense of objectivity and admit that what we properly need is enlightened* subjectivity" captures the essence of this perspective.

1.1.3. Study Questions and Proposition

The CERP model is designed around an intricate web of ideas, attitudes, beliefs, and hopes. How these notions interact with the model will be become more apparent as the study unfolds. However, the following proposition is my attempt to capture, as succinctly as possible, the essential ideology of the Campus Ecology Research Project:

> "Campus based experiential issue investigations provide a valuable context for learning the skills necessary for developing an environmentally literate citizenry."

In the pages that follow, I will provide a narrative that details how this proposition was made operational. In so doing, these study questions will be explored:

1. How can environmental research and action skill development activities be incorporated into an undergraduate curriculum?
2. How useful/not useful were these teaching activities and why was this?
3. How can the teaching activities be improved/enhanced?

1.1.4. Study Outline

Chapter 1 establishes the perspectives that informed the direction of the CERP design. A model design mission statement and goals are outlined. Chapter 2 provides a review of the field of environmental education and identifies teaching models that influenced the development of CERP. Chapter 3 outlines the model's design and implementation phases. Chapter 4 details pilot program evaluation results and offers some commentary and recommendations for program enhancement. Chapter 5 provides a summary and some thoughts on future directions.

1.2. Context of Study

For nearly 20 years I have been studying, teaching and directing environmental education programs. During this time I have taught at all grade levels (elementary, university and adult education) and drawn on a variety of teaching strategies including acclimatization, field based nature study, classroom lectures, and conservation work programs. Throughout, I have had this nagging feeling that while I was "teaching" the names of trees, how pollution was killing our planet, or why energy conservation was critical to world security, what my students were "learning" was not always useful in ways that would allow them to address these issues in their own lives--so as to make a positive difference. I found that all too often I was "selling" knowledge, awareness and concern about the state of the planet and the students were "buying" hopelessness and despair--the opposite of my intent. I wanted my efforts to result in building an empowered citizenry ready to literally change the way they lived their lives. What seemed to be missing from the educational experiences I was leading was a strategy for combining both the knowledge to understand a problem and the skills to act on its resolution.

The CERP model is my response to this challenge. At the outset, it will be useful to briefly explore some of the philosophical perspectives on pedagogy and epistemology that helped to shape the design process. In this way, the reader can begin to appreciate how resolving environmental conflicts must be preceded by infusing new ways to understand the problems of education and the challenges of being a university student in an era of ecological uncertainty.

1.2.1. Addressing Big Messy Problems at the Right Scale

Earth is in mortal danger. The symptoms of a moribund planet are found everywhere: species extinction, a poisoned atmosphere, desertification and mass starvation. Clean water so essential to sustain life, has in places been so degraded as to preclude the survival of even the most adaptive life forms. Scientists have recorded the decline of entire ecosystems--at ever accelerating rates. Human population growth, natural resource depletion and global climate change have already changed our lives--forever.[2] It is not however, the central purpose of this study to prove that serious, if not dire, threats to biological survival on this planet exist. That an environmental crisis exists is taken as prima facie. The essential question then is not "Does a crisis exist?" but "How can we go about understanding the environmental crisis in ways that lead to feasible and desirable solutions?"

The enormity of the problems that conspire to create the environmental crisis often thwart our efforts to understand it. Indeed, the complexity and magnitude of the crisis can be so intimidating that even concerned and well informed individuals feel that their efforts are futile.[3] A strategy for determining

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[2] World Commission on Environment and Development. 1987. Our Common Future. New York: Oxford University Press.

[3] Wiebe, G.D. 1973. "Mass media and man's relationship to his environment." Journalism Quarterly. 50:426-432.

the best approach to dealing with the crisis is needed--an approach that can help identify the most appropriate scale at which to dedicate our efforts.

General Systems theories and dialects such as Hierarchy Theory, as well as the new family of deterministic models proposed by Chaos Theory, offer powerful tools that can help to untangle complex issues such as the environmental crisis--while at the same time affirming the uncertain and unpredictable nature of large complex issues. Unlike mechanistic perspectives on problem solving which capriciously separate problems into component parts, these theorists would view the environmental crisis as a messy "problematic situation" operating simultaneously at multiple large and small scales.[4] Addressing the environmental crisis as a multiple scaled problematic situation rather than "a single problem" is a deliberate semantic distinction that recognizes an amalgamation of definitional boundaries that are often abstract, difficult to measure and sometimes nearly impossible to comprehend due to their magnitude. Furthermore, these ideas assert that perturbations created by small entities in an system have the power to transform large entities in an upscale cascading effect.[5] Equipped with these holistic and humbling perspectives we can begin to identify an appropriate entry point into the problematic situation where our efforts will have meaningful effect.

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[4] Checklund, P. 1985. Systems Thinking, Systems Practice. Chichester: John Wiley and Sons.

[5] Gleick, J. 1987. Chaos. New York: Viking Press.

The selection of an appropriate scale at which to operate needs to be explicit. In so doing, the discourse between problem solvers can be specific and yet remain adaptable and flexible as possible explanations are developed for why the situation operates as it does.[6] The desired outcome of this type of inquiry is not ironclad certitude as to good or bad answers, but approaches the crisis with the question: How can we scale the problem so it can be defined and understood in a way that leads to useful solutions? With this perspective in mind, I have decided to scale my study at the level of the organization--specifically the UW-Madison campus.[7]

In many respects the campus community is analogous to a mid-sized city (or a state or a nation...) with all the political, economic and social functions of its urban counterpart. Members of the campus community live and work in distinct residential, commercial and industrial districts: they travel on their own transportation network, they maintain a system of self government, they operate their own energy generating facilities and they consume large quantities of natural resources. The campus community has most of the attributes that contribute to the environmental crisis yet at a scale that is more manageable and therefore useful for teaching environmental literacy skills. But most significantly, at the university level we have an excellent opportunity to influence the attitudes and actions of

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[6] Allen, T.F.H., V. Ahl. 1992. A Primer on Hierarchy Theory.

[7] Miller, J.G. 1978. Living Systems. New York: McGraw Hill.

future leaders and professionals who will take their places in critical decision making positions in the teaching, business, government and activist communities.

1.2.2. Alternative Ways of Teaching: Experiential, Holistic and Transdisciplinary

This study explores how university level environmental education might be used to provide the skills and motivation necessary to, at a minimum, avert further damage to the planet. The overarching challenge for educators will be how to develop the necessary curricula to achieve the shifts in human behavior necessary to reach this goal. While universities have the resources and motivated students with which to shape future activists and environmental leaders, the current pedagogical framework may impede this process. An examination of dominant epistemologies reveals a need for an alternative strategy for teaching in a changed world.

The process of teaching conducted in universities often reflects the dominant Western contemporary perspectives of mechanistic, positivist, and reductionist paradigms. These frameworks tend to segregate the cognitive, affective and psychomotor domains.[8] By divorcing knowledge from action and values we have arrived at a condition where destructive human behavior can be "rationally" explained and condoned.[9]

Cartesian and Newtonian perspectives may no longer be as appropriate as in the past when the consequences of our actions were relatively contained and small scale.

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[8] Iozzi, L.A. 1989. "What Research says to the educator: Environmental education and the affective domain." Journal of Environmental Education. 20(3):3-9.

Since their time the human/environment interface has grown exponentially more complex--especially since the Industrial Revolution. With the advent of powerful technologies humans can now convert diverse forests into agricultural monocultures, tap ancient water reservoirs to make the desert bloom, or pump wastes high into the atmosphere drawing on an "out of sight/out of mind" philosophy. The scale and speed with which we degrade the ability of the planet to sustain life, while no longer rational, persists in part because tools we use to understand our actions are no longer appropriate to the task. As Albert Einstein, reflecting on the world after the Bomb commented: "Everything has changed save the way we think." A different approach to *knowing* and *understanding* must be explored.

The pedagogic perspective taken here favors experiential, holistic, and transdisciplinary education. Students need a chance to go beyond the confines of the classroom and laboratory (where the setting by definition is often abstract and "context free") to enter into the wide world where they can experience the full spectrum of life's offerings--in all it's contradictions and fuzziness. Education need not stand for static and sterile knowledge, disjointed from experience. Rather it should be about wisdom (the limits and uses of knowledge) and understanding (the meaning of knowledge) in the context of real issues. This is what education is for.[10]

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[9] Cantrill, J. G. 1992. "Understanding environmental advocacy: Interdisciplinary research and the role of cognition." Journal of Environmental Education. 24(1):35-42.

[10] Orr, D.W. 1991. "What is education for?" In Context. 27: 52-55.

The education we offer students should engage their hands, heads, and hearts. The process of learning should proceed as Life does: full of wonder, pleasure and awe, messiness, complexity and uncertainty. This holistic perspective should be reflected in both the content and the process of the educational experience. The way we teach should reflect the way we experience the world--with our entire beings not just our heads.

Blending the arbitrary academic divisions of the university will also be key to preparing a new generation of environmentally responsible citizens equipped with the ability to see, feel and act on problems. A transdisciplinary approach, where students can combine the skills and knowledge currently confined to narrow academic fields, will be critical to this transformation. An ecologically literate citizen must be able to meld scientific knowledge with an understanding of the political, social and economic consequences of environmental decisions.

Lastly, the entire campus community would benefit from the relaxation of the operational divisions that define and limit the internal organization of the university. There is much knowledge and experience that faculty, staff and students can share with each other if given the chance. Currently, these three groups function in separate realms--hierarchically arranged among and within each other. This segregation, while superficially efficient, limits the possibilities for creative and synergistic efforts that might lead to dealing more responsibly with environmental management issues on campus.

While staff is charged with the task of making many operational decisions, they often do not have the best and most current information. Faculty on the other hand may have the skills and information that would make better and easier decisions, but they have

little time or access to the staff decision makers. The role of bridging this gap could be filled by students; they have the time and interest to investigate issues and develop recommendations. Working with faculty to help define the problem and guide the research, students could make valuable contributions to campus environmental decision making.

1.2.3. Knowledge, Values and Problem Definitions

The role of the academy is often assumed to include the generation and transmission of knowledge. There are qualitative and quantitative dimensions to this mission that warrant examination in the context of our program design effort. Not only is it assumed that knowledge is always good, but that more knowledge will lead to better, faster or simpler decisions. Often the opposite is true.

While it is the academy's role to transfer knowledge so as to prepare professional decision makers it is not always true that this knowledge makes for the best outcomes. We should not forget that well educated scientists, engineers and politicians are among those who led us into this mess in the first place.[11] Thus, being well educated, of itself, is no guarantee that responsible environmental decisions will be made. This is understandable when we recognize that the knowledge these professionals use to make their decisions is inextricably overlaid with implicit personal values. It is these values,

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[11] Orr, D.W. 1992. Ecological Literacy: Education and the Transition to a Postmodern World. Albany, New York: State University Press. p. 150.

informed by attitudes and expressed as behaviors, that need to be included in any discussion of how to educate environmentally responsible citizens.

Indeed, philosopher John Passmore has cleverly captured the situation in his declaration that: "Ecological problems are not really problems of ecology."[12] Ecological problems do not emerge of their own accord: we need not look too hard to find a human decision at the root of all environmental issues. It follows then that an examination of human behavior and values will prove a most valuable strategy for developing ways to understand and act on the crisis. Seeking ways to clarify our values and understand their influence on how we use knowledge must therefore be an integral component in the educational process.

Mediating the conflicts, that will undoubtedly emerge as a result of this values clarification process, need not be seen as a distraction in the effort to educate students. It is clearly not the case that only neutral, disengaged investigations, operating within an objective empirical code can achieve meaningful knowledge and understanding. As Eisner observes: "Objectivity is an epistemological impossibility, an empty mind sees nothing."[13]

In addition to challenging the underlying qualitative values embedded in the "cult" of knowledge it will be useful to examine how the generation of new knowledge, rather than elucidate a problem, can create unanticipated complications. David Orr, a noted

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[12]Passmore, J. 1974. Man's Responsibility for Nature: Ecological Problems and Western Traditions. New York: Charles Scribner's Sons. In Jickling, B. 1988. "Environmental education and environmental advocacy: The need for a proper distinction." Building Multicultural Webs Through Environmental Education. North American Association for Environmental Education. p. 143.

professor of environmental studies at Oberlin College, manages to make this point succinctly when he implores: "ignorance is not a solvable problem." To put it in cruder terms, the more we know the stupider we get. Every time we invent new knowledge or technology to apply to our problems we end up ratcheting the problem in an upward spiraling effect--leading to yet another problem. Therefore, developing new knowledge to apply to problems results in only temporary solutions--with every research victory new ignorance is discovered. The relationship between knowledge and ignorance can never be zero sum.[14]

This is a humbling realization, suggesting mastery will always be illusive. Knowledge then is not an exit point but an entry point in an infinite learning process. Therefore, the best outcome for environmental education may not be the development of problem solutions, as is commonly assumed, but addressing problem definitions. In sum, environmental education programs should, as a primary objective, help students arrive at useful problem definitions. The approach to a problem must be taken carefully, deliberately, for within the problem definition lie implicit value assumptions and opportunities to complicate matters upscale.

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[13] Eisner, E.W. 1985. The Art of Educational Evaluation. Philadelphia: Taylor and Francis.

[14] Orr, D.W. 1990. "Is conservation education an oxymoron?" Conservation Biology. 4(2):119-121.

1.2.4. Providing Hope for Students

We have now explored *how* to see problems differently and identified *where* best to focus our efforts; the final element in our discussion addresses the *who* in the model's design equation. Earlier I indicated that a collaborative effort among all campus community members is a desirable design feature, however the primary focus of our program is educating students. A brief discussion exploring the status of students is appropriate at this stage, for the "State of Youth" is a critical contextual condition affecting the design of the model.

The term, "Slacker" has gained recognition in the popular press as an apt descriptor for the current youth generation. The term is meant to distinguish young people who are shiftless, alienated, nihilistic, angry, hopeless, apathetic and despairing.[15] Although any attempt at wholesale generalizations of an entire generation glosses over important individual distinctions, there does seem to be some merit in the concern for the generation of youth coming of age--soon to take up their roles as adult members of society.

While it is clear that the confusion and malaise that has afflicted many youth can trace its origins to many sources, I believe that one important explanation for their angst is the environmental crisis. It seems unlikely to be mere coincidence that these twenty-somethings--who quite literally grew up along

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[15] Howe, N. and B. Strauss. 1993. 13th Generation: Abort, Retry, Ignore, Fail? Random House: New York.

with the modern environmental movement--could be unmoved by the gloom and doom predictions that marked their childhood. In a sense, youth are also victims of the environmental crisis.

If this analysis is correct, then one antidote to the "Slacker Syndrome" may be to offer students a chance to develop the skills that will allow them to become effective change agents--so that instead of being the victims of their elders' follies they can begin to channel their abundant energies toward environmental improvement. By infusing appropriately scaled environmental problem solving situations into the curriculum, educators may be able to create opportunities such that hope displaces despair, trust dislodges cynicism, and a willingness to act for the good of Earth overcomes apathy and paralysis.

Once again the issue of scale must be addressed. When given the opportunity to engage a problematic situation as immense and complex as the environmental crisis, most students (and many adults for that matter) will want to take on a project that exceeds their abilities and the time constraints imposed by the semester schedule. Given that much of the information students learn about the crisis is framed at a global scale or is attributable to evil "others", it is not surprising that their tendency is toward attacking "big problems--out there--brought on by faceless, and heartless corporate or political leaders."

If students do not receive guidance on how to appropriately scale their investigations, and they proceed with an ambitious "save the world" plan, the stage is set for a dispiriting outcome. That is, if the world refuses to shift in the student's favored

direction in short order, the student becomes impatient and discouraged. Rather than have a positive and invigorating experience, these "failures" only serve to reinforce the perception that things "will never change--it's hopeless." Wieck's observation amplifies this losing proposition:

> "The massive scale on which social problems are conceived often preclude innovative action because the limits of bounded rationality are exceeded and arousal is raised to dysfunctional high levels. People often define problems in ways that overwhelm their ability to do anything about them."[16]

The key then, as social reformer Saul Alinsky puts it, is to assist students to identify small win issues, that are "highly specific, realizable and immediate."[17] Each small win then can serve to incrementally develop the skills and knowledge to take on ever more challenging projects in the future. This does not mean that issues or projects are assigned. Personal ownership and identification with the values component of the issue is essential to the success of the learning activity. What I am suggesting is that students can be given appropriately scaled boundaries within which they may exercise their preferences for project selection.

1.3. Model Design

The preceding discussion explored some of the philosophical and epistemological underpinnings that influenced the development of CERP. These notions form the foundation on which the CERP model was built. Although a house building analogy (lay

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[16] Weick, K.E. 1984. "Small wins: Redefining the scale of social problems." American Psychologist. 39(1):40.

[17] Alinsky, S. 1972. Rules for Radicals. New York: Vintage.

the foundation, build the first floor, etc.) has a certain logical and linear appeal, I don't want to belabor this imagery. The truth is that these basic perspectives were not entirely clear to me prior to commencing this project. I came to understand the importance of these notions during an iterative process of planning, implementing and evaluating--and not always in that order! It might be more appropriate to say that I have been designing and building a series of outbuildings--each a little more well adapted to the elements than the previous incarnation. Eventually, these smaller efforts will combine to form a comprehensive program. This is as it should be, for CERP is foremost a growing process of discovery and new understanding.

This said, it would not be forthright to suggest that the following mission statement, program goals and design specifications were firmly established at the outset of this adventure. I have chosen however, to state these structural elements of the model design in the introductory chapter so the reader may anticipate the direction of the chapters that follow.

1.3.1. Mission and Objectives

The mission statement of the Campus Ecology Research Project states:

"The CERP model strives to teach the skills necessary to develop an ecologically literate citizenry so that the university campus can be managed in an environmentally responsible manner."

In 1985, the Wisconsin Department of Public Instruction published an educator's guide of environmental education objective categories.[18] These categories were in turn drawn from the proceedings of UNESCO Environmental Education Conferences in Tiblisi and Belgrade.[19] The objectives outlined below draw upon both these documents in a synthetic application to campus based environmental education.

The Campus Ecology Research Project strives toward these objectives:

Awareness: Increase/enhance student, faculty and staff perceptions of and sensitivity toward campus environmental management issues; help students process, refine and extend these perceptions.

Knowledge: Provide students, faculty and staff with the information necessary to understand ecological functions and the relationship between university activities and environmental problems.

Attitude: Provide students with opportunities to clarify their values and feelings of concern as it affects environmental decisions; help students acquire the motivation and commitment to participate in university environmental management; help students clarify their roles as environmental decision makers in university community.

Skill: Engage students in research and action skill development activities including: critical thinking, problem definition and issue resolution.

Participation: Provide students with opportunities to apply their environmental management knowledge and skills in thoughtful positive action toward resolution of campus environmental issues and ultimate restoration of their campus to a state of ecological harmony.

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[18] Engleson, D. C. 1985. A Guide to Curriculum Planning in Environmental Education. Madison, WI: Wisconsin Department of Public Instruction.

[19] UNESCO. 1978. Final Report. Intergovernmental Conference on Environmental Education--Tbilisi, USSR, October 1977. UNESCO.

1.3.2. CERP Design Specifications

While the preceding goals are meant to establish a skeletal framework for the CERP concept, the following design specifications are intended to provide a finer level of detail. It should be noted that these specifications are flexible and adaptable for use in several educational settings. Although this study follows the initial pilot program in a classroom setting, the CERP model has also been used by students in independent study settings and as part of working internships. The Campus Ecology Research Project design specifications state:

- **What: Experiential and Holistic Education**
  CERP shall provide "real world" environmental problem solving opportunities that engage the learner's whole being: hands, head and heart.
- **How: Research and Action**
  CERP shall provide a balanced set of teaching activities such that students will develop environmental research, problem solving, and action taking skills.
- **Who: Students, Faculty and Staff Working in Collaboration**
  CERP shall encourage cooperative problem solving strategies between and among all members of the campus community.
- **Physical Scope: Campus Based Action**
  CERP issue investigations shall be campus based, based on the understanding that local action has an upward cascading effect.
- **Academic Scope: Transdisciplinary Inquiry**
  CERP activities shall engage all academic fields, shaping a synergistic approach to environmental issue investigation.
- **Investigation Scale: Small Wins**
  CERP issue investigations shall be scaled appropriately and realistically by accounting for the participants' knowledge and skill levels. Well defined small wins provide the greatest potential for an empowering experience.

1.3.3. Overview of CERP History

CERP was developed during the Spring of 1992 with funding support from the Center for Biology Education. An advisory panel, the Committee for Environmentally Responsible Campus Management (CERCM), assisted with the development of the model during the early planning stages. Faculty, staff and students were represented on CERCM. Drawing on the guidance of CERCM representatives, a pilot of the CERP model was implemented in the Fall semester of 1992. This pilot is described and evaluated in Chapters 3 and 4.

Chapter Two

2. Environmental Education: Shaping the CERP Model

The preceding chapter outlined the philosophical dimensions of an innovative environmental education (EE) program. The ideas represented in the introduction, of course, did not emerge from an ideological and historical vacuum. The CERP model was conceived as a response to the unmet curricular needs of this nascent education field. The following brief review of the relevant literature will be useful in establishing a context for CERP while confirming the proposition that the ultimate goal of EE is not being properly addressed by current programs.

2.1. Historic Context: Early Visions For EE

We can trace the origins of EE to the late 1960s and early 70s when awareness of human complicity in environmental decline was heightened by the publication of Rachel Carson's Silent Spring and when photographic images of a fragile and vulnerable looking Earth were brought back from space. Finally the profound truth about the consequences of destructive human activities was entering the collective consciousness. In response to the sense of urgency generated by these and other environmental events, a new educational movement was born.

That EE is only a quarter-century old may seem surprising, as indeed teaching about the environment has long been a part of education in United States. However, EE should not be confused with learning the names of flora and fauna, as in nature study; it is more than an examination of efficient use of natural resources, as in conservation

education; it extends beyond merely using the natural environment as a classroom, as in outdoor education. While EE may incorporate all of the elements of these disciplines, it includes an additional unique dimension.

Educators at the forefront of the EE movement were aware that nature study, conservation education, and outdoor education were failing to address the root cause of the environmental crisis--human behavior. These innovators called for a new type of curriculum that explicitly included an examination of the values and attitudes people use to make decisions. Furthermore, this new field of EE would provide the skills and motivation necessary to respond to environmental problems with action strategies--going beyond the mere acquisition of knowledge and understanding of the crisis. This human behavior and action skill orientation, although now commonly accepted as important, has not always been systematically and comprehensively incorporated into EE programs, as we shall see.

2.1.1. Stapp Definition: Knowledge, Awareness, Motivation

Most historical accounts credit the "groundbreaking" work of a graduate seminar conducted by the Department of Resource Planning and Conservation, at the University of Michigan, for the first attempt at providing a working definition for the new EE concept.[1] The philosophical foundation of the CERP model can also be traced to this definition and so it is appropriate that we begin here.

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[1] Ramsey, J. M. 1993. "The effects of issue investigation and action training on eight grade students' environmental behavior." Journal of Environmental Education. 24 (3):31.

In the first edition of the Journal of Environmental Education, in an article titled "The Concept of Environmental Education", Professor Stapp and his students proposed a definition that incorporated three important learning elements--knowledge, awareness and motivation--themes that are repeated in virtually all subsequent discussions of EE goals. Stapp et al write:

> "(E)nvironmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to solve these problems, and motivated to work toward their solution."[2]

Following the early lead of Stapp the decade of the 70s witnessed a flurry of activity as conferences were organized, books written and an academic journal published--all devoted to defining the new field of EE. A sampling of the early views expressed by advocates for EE reveals a vision that portends a field that is transdisciplinary, applied, community oriented and dedicated to responsible environmental action advocacy.

2.1.2. Transdisciplinary

Visions for environmental education at the university level were often ambitious and sweeping. Early on Professor Clay Schoenfield, of the UW-Madison Department of Environmental Journalism/Communication, articulated the role of the academy as a training ground for citizen activists. In an article published in 1970, Schoenfeld addresses the role that universities could play in preparing professionals for careers in

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[2] Stapp, W.B. et al. 1969. "The concept of environmental education." Journal of Environmental Education. 1(1):30-31.

environmental management. Among a host of roles, Schoenfeld asserts that the university must prepare:

> " ...change agents equipped with an understanding of the interrelationships between their callings and total environmental management and with knowledge of the tools of the trade...lawyers with pertinent legal skills, designers and planners with a grasp of resource policy implementation and communicators and educators equipped to interpret research problems in such a way as to achieve consensus rather than conflict."[3]

Schoenfeld was making the case not only for environmental action advocacy training but the need for transdidsciplinary education that would enhance opportunities for collaborative problem solving. He recognized that given that environmental problems cross over the arbitrary boundaries of academic disciplines, a need existed for programs that could prepare generalists for careers as environmental management practitioners. This vision for activist/generalist training had already taken hold at the University of Michigan, where a program option specifically in Environmental Advocacy was "emphasiz(ing) the relationship between environmental quality and social justice, and methods of changing political institutions through interest group activism."[4]

2.1.3. Applied

Schoenfeld's perspective on applied curricula was amplified by Edward Weidner, then chancellor at UW-Green Bay. Weidner advanced the notion that EE

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[3] Schoenfeld, C. (ed.) 1971. Outlines of Environmental Education. Madison, WI: Dembar Educational Research Services. p 126. Quote from Schoenfeld, C. 1968. "Educating the public in natural resources". Journal of Soil and Water Conservation. p. 17.

[4] Sandman P.M. 1974. "Environmental education in University of Michigan". In Pratt, A. L. (ed.) Selected Environmental Education Programs in North American Higher Education. National Association of Environmental Education. p. 3.

could play a role in demonstrating how experiential problem solving skills could be brought into the curriculum, when he made these remarks in a 1974 speech:

> "We in environmental education have an opportunity to give leadership to problem-oriented education...The ultimate significance of the approach lies in...relating environmental factors to the other problems of the world"[5]

In a somewhat narrower vision of how this new field could find application in the wide world Jones likens environmental education's future to the field of medicine:

> "... which rather than a discipline, might be described as a purpose. Medicine is being served by an aggregation of various specialized disciplines, but focuses on the restoring and maintaining the health of man. Similarly, environmental sciences are served by an aggregation of, and focused on, the purpose of maintaining and restoring the health of the environment."[6]

From the full context of Jones' remarks one can not be certain if this EE vision was conceived as a pursuit that was limited to better integration of natural, physical or biological sciences or if he took the broader view that Schoenfeld seems to espouse which recognized the need for infusing all professional fields with environmental management skills and understanding.

2.1.4. Problem Solving

Other commentators were even bolder in the breadth of their vision, raising the stakes by suggesting that EE take on the way students are taught to approach problems. Proclaiming a departure from the fragmented and abstract orientations of some disciplines,

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[5] Cook. R and E.W. Weidner. 1977. "Environmental education at the tertiary level for general students." In Trends in Environmental Education. UNESCO: Belgium. p. 119.

[6] Jones, P. 1975. "Environmental education in the changing university." In. Schoenfeld C. and J. Dissinger, (eds.) Environmental Education in Action--II: Case Studies of Environmental Studies Programs in Colleges and Universities Today. p. 298.

Schmeider insisted that EE represented an "inherent ...philosophical belief that must seek nothing less than a basic reform in the way our society looks at problems and makes decisions."[7] Schmeider seemed to understand that students needed a chance to be fully immersed in the real and complex world of environmental problems.

2.1.5. Community Based

Finally, where would students and educators look for the environmental problems on which to develop their problem solving skills, and who might students work with to solve these problems? Stapp was clear at the outset that local communities should be the focus of concern for EE. By working cooperatively with community members, students would have access to information and resources that would result in mutually beneficial and empowering learning experiences. This local community orientation would come play an important role in providing students with heightened motivation and a sense of ownership in their education. Dean Bennett, the first Maine Environmental Education Program Coordinator, would put it succinctly: "the community is, indeed, the classroom for environmental education."[8]

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[7] Schmieder, A.A. 1977. "The nature and philosophy of environmental education: Goals and objectives." In Trends in Environmental Education. UNESCO: Belgium. p. 23.

[8] Bennett, D.B. 1971. "Operational Models: A K-12 Program in Maine." In Cook, R.S. and G.T. O'hearn (eds.) Process for a Quality Environmental. p. 102.

2.2. Building An EE. Curriculum: Principles And Goals

2.2.1. Guiding Principles: Tbilisi/UNESCO

During these early years of EE's history, educators around the world struggled to bring shared and uniform meaning to the field. It was apparent that the sardonic definition of one EE pioneer--"Environmental education is what I say it is."--would not propel the field into widespread favor among teachers.[9] It was evident that standard definitions would be useful to the academic and intellectual discourse.

In 1975, at Belgrade, Yugoslavia and in 1977 at Tbilisi, Georgia the United Nations Educational, Scientific and Cultural Organization (UNESCO) hosted international conferences to begin the process of articulating a global mission for EE. North American curriculum designers asserted an important influence on the proceedings of these gatherings. Their ideas are most noticeable in the Guiding Principles that are part of the Tbilisi Intergovernmental Conference Declaration. These Principles continue to be cited by program planners and therefore are relevant to our discussion of the CERP model.[10] (Note: A set of six EE *objectives* from the Tbilisi Conference Declaration were mentioned in the previous chapter and were used to establish CERP goals.)

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[9] Jones, P. 1975. p. 296.

[10] Tblisi Intergovernmental Conference on Environmental Education. 1978. Toward an Action Plan: A report on the Tblisi Conference. Washington DC: US Government Printing Office.

While the Tiblisi Principles provide the basis for many EE programs in this country, it can safely be said that not all environmental educators are aware of the existence of these principles, nor do they necessarily agree with the philosophical implications of the underlying concepts. A discussion of five of these principles will be instructive as they were influential in the design of the CERP mode. The Tiblisi language appears in bold.

Environmental Education should:

1. **Enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences.**

This principle makes the case for giving students both rights and responsibilities in *their* educational experience. With the right to shape their education, students may feel greater ownership and therefore an enhanced sense of motivation and commitment to the outcome of the learning process. This strategy may also counteract the feeling that education is something that is "done to" a student. Rather than be imposed, the learning experience can be shared cooperatively among a community of learners.

Furthermore, if a desirable outcome of the EE experience is the acquisition of responsible environmental values and behaviors, then permitting student input is essential to avoiding even the appearance that the learning activity was coerced. By involving student input the learning activities and behavior outcomes are owned by all participants--not the instructor alone.

A combination of affective and cognitive attributes are identified in this principle, demonstrating the important interplay between attitudes and values with information and

skills. While the emphasis on developing a sensitivity for their community among younger learners is suggested, this does not preclude older learners from identifying with their locale. Possibly the curriculum designers who contributed to these principles assumed that as learners become more environmentally sensitive they could progressively expand their concern to ever larger spatial domains. If this assumption is correct, then what matters most is the learners' developmental stage and *not* their chronological age. Therefore, if we believe that college age students possess limited environmental awareness, skills and knowledge, then constraining them to a local community (campus) focus may be appropriate.

3. **Help learners discover the symptoms and real causes of environmental problems.**

This principle points to the importance of establishing useful problem definitions as part of any environmental issue investigation. Distinguishing between problem inputs and outputs is strategically important to the process of understanding the nature of a problem. Implicit in this discovery process is the ability to conduct research using both primary and secondary sources. Students can use this opportunity to compose and implement surveys, questionnaires and opinionnaires, developing skills in sample design and data collection techniques, as well as hone interview skills. Learners can also further their research skills drawing upon already recorded or published resources.

4. **Emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem solving skills.**

By emphasizing the complexity inherent in environmental problems, students can learn that, more often than not, today's solution becomes tomorrow's problem. As

discussed earlier, General Systems or Hierarchy theories may help students to isolate and scale appropriately a problem of interest--duly respecting the "ripple effect" created by tinkering with a system.

To avoid the pitfall of drawing hasty conclusions that lead to unfounded inferences and insupportable recommendations, students need to develop the ability to efficiently process and interpret information. By learning the core elements of critical thinking--the ability to identify the assumptions and biases that shape, and often misdirect, data collection and interpretation activities--students will be prepared to make valid and useful decisions. A key to this decision making process are the skills that take students through a sequence of problem solving stages that include analysis, synthesis, evaluation and application.

5. **Utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first hand activities.**

This principle suggests a need to breach the confines of the classroom and the traditional lecture format, so that students can participate fully in the challenges of environmental issue investigation. In particular, curriculum planners are directed to involve the student in activities that are experiential and applicable to the "real world." This principle takes seriously the sentiments of the great educator Alfred North Whitehead who declared: "First hand knowledge is the basis of the intellectual life. The secondhandedness of the learned world is the secret of its mediocrity."[11]

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[11] Whitehead, A.N. 1929. The Aims of Education. New York: Free Press. p. 51.

The Tblisi Principles in turn were used to form objectives,[12] summarized as :

1. **Awareness:** Help students acquire an awareness and sensitivity to the total environment and its problems.
2. **Knowledge:** Help students acquire a basic understanding of how the environment functions and how issues and problems dealing with the environment arise and how they can be resolved.
3. **Attitudes:** Help students acquire a set of values and feeling of concern for the environment and the motivation and commitment to participate in environmental maintenance and improvement.
4. **Skills:** Help students acquire the skills needed to identify , investigate and contribute to the resolution of environmental problems and issues.
5. **Participation:** Help students acquire experience in using their knowledge and skills in taking thoughtful, positive action toward the resolution of environmental problems and issues.

2.2.2. Goals: REB And Environmental Literacy

Despite the momentum established by the Tblisi Declaration, environmental education as an academic field remained poorly defined and underfunded in the U.S. through the remainder of the decade. In response to this deficiency, Professor Harold Hungerford of the University of Southern Illinois, in collaboration with R. Ben Peyton and Richard Wilke, developed and published in 1980 "Goals for Curriculum Development in EE."[13] The goal framework they established is based in large part on the Tbilisi Declaration's principles and objectives, thereby building on previously achieved international consensus.

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[12] Conference Declaration on Environmental Education. 1977. Convergence. 10(4):70-1.

[13] Hungerford, H., R. B. Peyton and R.J. Wilke. 1980. "Goals for curriculum development in environmental education." Journal of Environmental Education. 11(3):43-47.

Their vision for EE curriculum has, as its superordinate goal, assisting students in becoming environmentally literate as evidenced by responsible environmental behavior (REB). They define the goal of REB this way:

> "The environmentally literate citizen is able and willing to attempt to make environmental decisions which are consistent with both a substantial quality of human life and an equally substantial quality of the environment. Further this individual is motivated to act on these decisions either individually or collectively."[14]

The curriculum guidelines Hungerford et al present outline four comprehensive and hierarchically arranged literacy levels, with the following attributes:

1. Ecological foundations: Provides learners with sufficient ecological knowledge in order to make ecologically sound decisions.
2. Awareness--issues and human values: Guides the development of a conceptual awareness of how individuals and collective actions may influence the relationship between quality of life and quality of the environment. Explores how these actions result in environmental issues that must be resolved through investigation, evaluation, values clarification, decision making and finally citizenship action.
3. Investigation and evaluation of issues and solutions: Provides the development of knowledge and skills necessary to permit learners to investigate environmental issues and evaluate alternative solutions.
4. Issue resolution and citizen action--training and application. Guides the development of those skills necessary for learners to take positive environmental action. Action skills include: persuasion, political/legal, consumer and physical strategies.

This framework spawned numerous academic careers as investigators applied these curriculum guidelines and empirically tested the underlying theories on which these goals were established. This research will be summarized in the following section.

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[14] Hungerford, H.R. and T.L. Volk. 1990. "Changing learner behavior through environmental education." Journal of Environmental Education. 21(3):8-21.

2.2.3. Other Definitions: State Of Wisconsin And EPA

Another source of support for the CERP model can be found in the state curriculum guidelines for the State of Wisconsin.[15] Engelson, writing in a Department of Public Instruction curriculum guide identified these programmatic characteristics for EE:

1. Action oriented: involving students in real environmental problems.
2. Experiential: diverse learning approaches and environments.
3. Holistic: incorporating social, political, economic, political, cultural, moral, aesthetic, natural and technological dimensions of environmental issues.
4. Interdisciplinary: drawing on all academic disciplines.
5. Issue oriented: dealing with issues from local to global perspectives.
6. Neutral: operating within a forum where all points of view are heard.

Once again we see similar themes that surfaced in the Tblisi Declaration and Hungerford's work. A clear case is set forward that contrasts the traditional pedagogic attributes of disciplinary and "second hand" learning.

Finally the Advisory Council on Environmental Education of the Environmental Protection Agency[16] recently offered this definition:

> "EE is the interdisciplinary process of developing a citizenry knowledgeable about the total environment, in its natural and built aspects, and that has the capacity and the commitment to engage in inquiry, problem solving decision making, and action that will assure environmental quality."

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[15] Engelson, D. C. 1985. A Guide to Curriculum Planning in Environmental Education. Madison WI: Department of Public Instruction.

[16] National Advisory Council on Environmental Education. July 15, 1992. Review Draft: National Report on Environmental Education. Washington DC: EPA. p 12.

As in the earlier Stapp, Hungerford and Tblisi pronouncements, the cognitive affective, and psychomotor domains (knowledge, commitment and action) are once again highlighted in this definition. Accordingly this definition re-confirms the philosophical commitment to reaching the whole student. Also congruent with the other definitions is the interdisciplinary nature of the process.

The preceding review of the literature demonstrates a consistent emphasis on experiential, interdisciplinary and holistic themes in EE curriculum planning. However, as is frequently the case, the ideal and the real do not always intersect. The following sections will review studies which conclude that while many educators agree that REB is a worthy EE outcome, they none-the-less use teaching strategies that are known to be ineffective in achieving this end. The chapter will conclude with an overview of programs that have operationalized teaching techniques that reach toward fulfilling the goal of an environmentally literate citizenry engaged in responsible behavior.

2.3. Meeting EE Goals

The Hungerford et al curriculum guidelines of 1980 provide the basis for many studies that try to answer these two important questions: 1) Have environmental education programs been able to achieve the goal of REB and 2) What are the predictor variables that lead to REB?

2.3.1. Childress: EE Program Survey

Unfortunately studies that examine the structural attributes and behavioral outcomes of EE programs nationwide are few in number. A frequently cited study

conducted in 1978 by Childress, continues to be referenced in current publications as the last comprehensive national environmental education curricular study.[17] The Childress study examined 301 programs to determine how EE was being taught nationwide. Childress concluded that most programs were loosely organized and with little sense of direction. Further, the study described "objectives (that) focused on helping students become knowledgeable about their environment and its associated problems and developing an appreciation of environmental resources, (rather than) helping students actually solve environmental problems and develop problem solving skills" as was called for in the Tblisi Declaration.[18]

2.3.2. Volk: Curriculum Needs Survey

Working from Childress' findings, Volk took a look at the perceived curriculum needs among professional environmental educators in 1984. She sought answers to these questions: If EE programs were not meeting the goal of REB what kinds of program strategies were needed? How did educators view the means and end relationship of curricular content and teaching methods with the achievement of the REB goal?

Volk's findings echoed those of Childress. Her research found that although citizenship action and REB were widely endorsed goals among professional educators,

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[17] Ramsey, J.M., H. Hungerford and T.L. Volk. 1992. "Environmental education in the K-12 curriculum: Finding a niche." Journal of Environmental Education. 23(2):35-45.

[18] Chidress, R.B. 1978. "Public school environmental education curricula: A national profile." Journal of Environmental Education. 9(3):2-11.

> "there are a number of individuals within EE that believe that an environmentally literate citizenry might be attained without an emphasis on citizenship action skill development or participation. At the least, the data suggests (that these educators believe) that citizen participation is no more important as an EE goal than is ecological knowledge or issue awareness."[19]

Ironically, these same educators acknowledged that EE goals were not being met. Volk concludes her study with recommendations for new goal oriented curricula that would "develop knowledge and proficiency across (Hungerford's) four (literacy) levels in a hierarchical manner which is well articulated and educationally sound."

2.3.3. REB Variables And Hines Meta Analysis

The preceding discussion described how program reviews and environmental educator's own assessments point to a need for better curricular tools with which to achieve the goal of REB. To answer this question researchers first needed to know: What are the factors which have a formative effect on the development of REB? Researchers reasoned that if a set of predictor variables for REB could be ascertained, than program strategies could be designed to achieve proficiency in these areas, which in turn would lead to the ultimate goal of REB.

This research strategy was first addressed by Sia, in a comparison of Sierra Club and Elder Hostel program members. In a comparison of eight behavior variables, Sia concluded that the following three statistically significant variables displayed the most parsimonious set: perceived skill in and knowledge of environmental action strategies and

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[19] Volk, T.L., H. Hungerford and A.N. Tomera. 1984. "A national survey of curriculum needs as perceived by professional environmental educators." Journal of Environmental Education. 16(1):10-19.

environmental sensitivity. The action strategy variable was operationalized by accounting for the respondents previous participation in these five action categories: consumerism, physical intervention, persuasion, legal action, and political action. Environmental sensitivity was measured according to the respondents previous outdoor experiences, such as hiking and camping. This finding in Sia's view, "provides a clear mandate for EE curriculum developers to address citizenship participation in environmental problem solving."[20]

The Sia study was followed by other investigations into REB predictor variables.[21] However, the variables under study often were analyzed independently of each other and therefore, did not account for the complex interactions among variables. Hines sought a solution to this gap in the research with her meta-analysis of environmental behavior research. [22] Hines' research culminated in a "Model of REB" that suggests that it is a combination of personality factors, knowledge of issues, and knowledge of action skills and strategies that culminate in environmental behavior. In addition to these variables Hines asserts that situational factors, such as economic constraints or social pressures will either counteract or reinforce the other variables. This

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[20] Sia, A.P., H. Hungerford and A.N. Tomera. 1985-86. "Selected predictors of responsible environmental behavior: An analysis." Journal of Environmental Education. 17(2):31-40.

[21] Sivek, D.J., and H. Hungerford. 1989-90. "Predictors of responsible behavior in members of three Wisconsin conservation organizations." Journal of Environmental Education. 21(2)35-40.

[22] Hines J.M., H. R. Hungerford and A. N. Tomera. 1986-87. "Analysis and synthesis of research on responsible environmental behavior: A meta-analysis." Journal of Environmental Education. 18(2):1-8.

model establishes again the importance of cognitive, affective and psychomotor domains operating in concert to achieve REB.

The studies described in this review are now at least eight years old, however they represent the most current comprehensive research findings. More current, anecdotal assessments are not much more encouraging in their view of the field's successes. As recently as 1992, Ramsey, a frequent collaborator of Hungerford's, asserts that

> "...(W)ithout reference to a cohesive framework environmental education is a curricular glut--multifaceted, unorganized, fragmented and probably ineffective....EE in US schools is not theoretical, systematic or comprehensive." [23]

Similarly the National Advisory Council on Environmental Education concluded in 1992 that:

> "...(T)he action component of EE is weak. Many EE materials and programs emphasize awareness, appreciation and knowledge without an accompanying focus on developing skills and commitment to action, the second part of the EE equation that leads to an environmentally literate and active citizenry.[24]

These critiques, though critical, are intended to support the development and enhancement of programs that have attempted to incorporate the citizenship action component into their designs. The following review will examine four curricula models that were instrumental in shaping the architecture of the CERP model.

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[23] Ramsey, 1992. p. 37.

[24] National Advisory Council on Environmental Education. July 15, 1992. Review Draft: National Report on Environmental Education. Washington DC:EPA. pp. 62-63.

2.4. Action Research And Issue Investigation Models

2.4.1. IIAT

Hungerford and his colleagues have translated much of the aforementioned research into an curriculum known as Issue Investigation and Action Training (IIAT).[25] The curriculum was designed primarily for the junior high level, and subsequently the empirical research that supports its validity is also based on this age group. However, the learning modules have also been used successfully by college undergraduates as well and therefore, a review of IIAT is relevant to our discussion.

The curriculum is, not surprisingly, built on Hungerfords's model of four literacy levels reviewed earlier. Additionally, he identifies the following seven attributes that are essential to the goal of environmental literacy: ecological concepts, beliefs and values, knowledge of issues, locus of control, environmental sensitivity, skills in using action strategies and knowledge of action strategies. With this set of predictor variables as a guide, Hungerford built his six module program. A brief overview of each module will be useful:

> Module I: Introduction to Issue Investigation: Students learn the relationship that beliefs and values have on environmental issues. Students are instructed to distinguish between environmental events, problems and issues in an analytical context.
>
> Module II: The Basics of Issue Investigation. Students learn basic research skills and are provided with learning activities that introduce critical thinking skills.

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[25] Hungerford, H.R, R.A. Litherland, R.B. Peyton, J.M. Ramsey, and T.L. Volk. 1985. Investigating and Evaluating Environmental Issues and Actions: Skill Development Modules. Stipes Publishing.

Module III: Using Questionnaires, Survey and Opinionnnaires. Students learn how to conduct primary source research including instrument design, sampling techniques, data collection strategies.

Module IV: Interpreting Data. Students learn to analyze data, draw conclusions and inferences and make recommendations. Additionally, they learn how to interpret and display data using graphs.

Module V: Investigating an Issue. Students investigate an issue of their own choosing and proceed to apply the skills they have acquired in the previous modules.

Module VI: Issue Resolution Training. Students develop issue resolution action plans incorporating the citizenship action methods. The plans are evaluated according to social, cultural and environmental criteria. If the students wish to enact their plans they have that option although this is explicitly not required.

The emphasis on action skill development in the context of a non-coercive teaching environment are the key elements of this program. In 1981, an empirical study established the efficacy of this curriculum with eighth grade students.[26] Seven years later the same researchers were able to get similar results using a seventh grade group concluding that IIAT is "an effective instructional strategy to foster independent overt environmental behavior (that) will reach the goal of citizen participation in environmental issue remediation."[27]

2.4.2. ACRPS

A second extant EE curriculum that offers important design lessons for the CERP model was developed at the University of Michigan by William Stapp and his colleagues.

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[26] Ramsey, J.M, H.R. Hungerford and A.N. Tomera. 1981. "The effects of issue investigation and action training on environmental behavior in eighth grade students." Journal of Environmental Education. 13 (1):24-29.

[27] Ramsey, J.M. and H. Hungerford. 1989. "The effects of issue investigation and action training on environmental behavior in seventh grade students." The Journal of Environmental Education. 20 (4):29-34.

Stapp's contributions to the field of EE are many, including developing the first working definition for the new field, as well as a stint as the executive director of UNESCO's environmental education program. Stapp's program, known as the Action Research and Community Problem Solving (ARCPS) model, has been implemented at various grade levels.

ARCPS is steeped in the educational philosophies of John Dewey who deplored how schools were systematically separating thought from action. Instead Dewey advocated that students should become involved in the real world with the aim of community improvement, "so that the future will be better than the past."[28]

Dewey's experiential orientation was translated into a social action methodology articulated by the social scientist Kurt Lewin in the early 1940s. It was Lewin's belief that in order to improve peoples living and working conditions they needed to learn democratic decision making and practical problem solving skills in an environment where power is equitably distributed among all members of the community.[29] He developed an iterative process for developing solutions to problems that moves through stages of analysis, conceptualization, fact-finding, planning, execution and evaluation. At the conclusion of this series, the process is repeated again--after the investigators have a chance to reflect on the quality and usefulness of their work. This cycle of planning, implementing and evaluating continues until a satisfactory resolution is achieved. The

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[28] Dewey, J. 1933. How We Think. Boston: D.C. Heath.

[29] Lewin, K. 1946. "Action Research and Minority Problems." Journal of Social Issues. 2:34-46.

advantage of this staged process is that it offers flexibility and adaptability to situations that may be evolving or may benefit from new information. Similarly, this "spiral" process recognizes that in order to fully understand a problem, one must often first become immersed in it.

This cycle of action, reflection, and evaluation--known as praxis--has also been addressed by the Brazilian philosopher Paulo Freire. Freire is well known for his notion of "conscientiation", a process where people can achieve liberation from oppressive conditions as a result of the awareness that comes from immersion in a problem situation. Freire writes:

> "You never really understand an issue or know how to help resolve it until you involve yourself in the issue. Then you begin to understand it, to identify the principal parties and actors involved, and begin to realize how to change it."[30]

ACRPS weds this action research philosophy to community based environmental problems. In this context *environment* is defined broadly so as to bridge what most schools consider the separate domains of natural and social studies. But philosophical linkages extend beyond this interdisciplinary mode: In ARCPS teachers and students collaborate, school and communities cooperate and the affective and cognitive realms compliment each other.

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[30] Freire, P. 1986. The Pedagogy of the Oppressed. New York: Continuum.

A summary of ACRPS goals reveal these programmatic features:

1. To involve students in the planning of their own education, shifting more responsibility for education to the students.
2. To provide students with opportunities to apply acquired knowledge to problems they have identified.
3. To develop skills needed for environmental problem solving including: working in groups, gathering, analyzing, synthesizing, and interpreting information; clarifying norms and values; designing, implementing and evaluating a plan of action; and joint critical decision making.
4. To link disciplines through focusing on a real world issue.
5. To substitute feelings of apathy and powerlessness with the feeling that individuals or groups can indeed make a difference.[31]

Typically the ARCPS project is infused into the regular curriculum--a natural configuration given the underlying holistic educational philosophy--during sessions that last two hours twice a week over a two to three month period. This 30-50 hour in class commitment is not unlike the time constraints of an undergraduate seminar.

The ARCPS handbook provides a description of the basic steps of the process.[32] The project begins with the planning phase as students identify possible problems in their community that they want to investigate. They may decide to work individually or as a group. With guidance from an instructor, the research commences, although the term *research* has a non-traditional meaning here: "it is not necessarily scientific knowledge students are after but rather knowledge that can aid in understanding and improving a

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[31] Wals, A.E., A. Beringer and W.B. Stapp. 1990. "Education in action: A community problem solving program for schools." The Journal of Environmental Education. 21(4):13-19.

[32] Bull, J. et al. 1988. Education in Action: A Community Problem Solving Program for Schools. Dexter, Michigan: Thomson-Shore.

specific problem situation."[33] During their research a problem statement is established *and alternative* strategies for possible remediation are explored. Additionally, evaluation criteria are identified which has the effect of narrowing the possible action plans.

In the second phase students implement their plan, with guidance from the instructor. The instructor may attempt to scale the student's plan so that goals are achievable given time and skill constraints. However, the expectation is not that a particular end will be achieved initially. What is deemed most important is the *process* of working on the problem by taking action.

Throughout the process, and especially during the third phase of evaluation, students record their observations and feelings about how the experience is evolving in daily journal entries. In addition to personal reflections on what a student is learning, teachers solicit students feedback on the learning process itself, using so-called plus, minus, change sheets. Students are asked what they like or dislike about the process and how they suggest things be improved. A sample of responses include:

> (Plus) "I like the fact that we give our own ideas."
>
> (Minus) "I don't like the arguments and fights." and "I wish we could all listen to each other."
>
> (Change) "I wish we could start on the things we came up with...Show Action!" and "We need more days instead of two...we need three (days a week)."

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[33] Wals, A. and W.B. Stapp. 1989. "Education in Action: A community problem solving approach for schools." In Iozzi, L.A. and C.L. Shepard (eds.). Building Multicultural Webs Through Environmental Education. 1988 Conference Proceedings of the North American Association for Environmental Education.

So not only are students engaged in a reflective assessment of what they are receiving as learners, teachers are compelled to consistently evaluate their own teaching styles so to keep the educational process democratic. (This technique was used in the IES 600 class and forms part of the results section in Chapter 4. Interestingly, the sample comments from above are not too dissimilar from the IES 600 comments).

2.4.3. Monday Group

A third EE program with design features that conform to the CERP design specifications is Bill Hammond's high school seminar: Skills Mentorship Action Research Model, or as it is more commonly referred to, the Monday Group. Unfortunately, although this program has been operating for over 20 years, I was able to identify only one published article that described the Monday Group.[34] A letter of inquiry to Hammond went unanswered. Despite this dearth of information the Monday Group is worth noting in this review because of its long record of successful large scale community action projects.

The seminar draws student leaders from across Lee County Florida, for a full day two times each month (meeting on Mondays--hence the nickname). The program's goals include:

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[34] Hammond, B. 1992. "The Monday group." In Project WILD Teacher Guide Western Regional Environmental Education Council. p. 354-360.

1. To help students acquire and refine skills through practical experience in addressing significant community problems.
2. To emphasize political and personal skills--to lobby, to use of mass media, to empathizing with politicians and other community change agents.
3. To acquire insight into differing values and attitudes, to study varying points of view, and the rationales underlying those views.
4. To learn and practice the skills of effective political advocacy within the democratic system.

A brief synopsis of the Monday Group's "class commandments" reveals an educational philosophy that values democratic ideals, incremental change, empathy, cooperation and resilience.

1. Positive viewpoints only: When faced with an issue position with which you disagree, search out and support a positive alternative. If you're against something, you must be for something else as the solution.
2. Do your homework: Be prepared. Complete your research. Know that what you are saying is based on evidence and facts.
3. Probe the force field: Know who's for, neutral or against your position. Know how to defend your group's position and when and how you can accommodate their position. Take the positive energy from those that agree with you and neutralize those who do not agree.
4. Keep a balanced view, empathize: See all sides of the issue. Try to understand and accept the validity of other value viewpoints.
5. Individualize. No stereotyping: Treat everyone as an individual. Stereotyping can often block solutions rather than build bridges among people and groups.
6. Remain Flexible: Be willing to adjust or change your own stand in light of new information. Compromise on the implementation but not the values unless you find from new experience a new value position makes good sense.
7. No scapegoating: Never blame anyone or anything else for your lack of success. Decide what you should take next time to move toward attaining your goal.

8. Be persistent. Recycle: Do it again if it didn't work the first time. Persistence is an absolute key to success in environmental matters. When you encounter a block, back off, reconsider your options and directions. Try another route. Rarely do you achieve closure in environmental matters.

In many regards the Monday Group mirrors the goals and framework of the two programs previously reviewed. The Monday Group shares a commitment to community involvement and educational democracy with ARCPS, and with IIAT an emphasis on research and problem solving skill acquisition. What sets the Monday Group apart however, is it's bold conviction that student leaders at the high school level have already demonstrated proficiency in tackling small scale study projects in their school environment and therefore, they are ready for long term community action projects of major significance.

Indeed, one project continued over a four year period and culminated in the acquisition of a 2500 acre wetland preserve. During the project students conducted a full scale biological and hydrologic study, lobbied for a public referendum, and campaigned for its passage. Following voter approval the students developed a master plan for the site and assisted with the acquisition negotiations.

2.4.4. The 5R Model

An extensive literature review located only one other example of an action oriented EE program despite the strong emphasis of this component in Tblisi EE curriculum guidelines. Glew's 5R Process is a curriculum written for use in

schools in Waterloo County, Ontario, Canada.[35] The curriculum is based on a five stage process (the "5 Rs") of recognition (awareness), research (data collection), resolution (decision making), responsibility (taking action), and revision (evaluation). This framework bears an interesting resemblance to both ARCPS's notion of education as an on-going and reflective process and Hammond's and Hungerford's emphasis on research and action skills. Two examples of how this curriculum has been adapted appear in the journal literature: A simulation exercise unit on species extinction used as part of a EE summer camping program;[36] and a program at a five day residential outdoor and environmental education center.[37]

The five-day residential center's use of the 5R process presented a compelling alternative to the more typical outdoor education strategy of simply providing nature appreciation and environmental understanding activities. By adding an action research component to the center's program the staff were looking to help students "cross the apathy line and apply their values and knowledge...in a positive environmental action." At the time of publication (1991) the center's program was still considered a "work in progress" and therefore no empirical data regarding the success of this 5R approach were available.

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[35] Glew , F. 1988. The 5R's Process: A Curriculum Model for the Teaching of Environmental Values in Education. Waterloo County Board of Education, Waterloo Ontario.

[36] Glew, F. 1990. "Thresholds of Extinction." Camping Magazine. 62(5):14-17.

[37] Fallis, J. 1991. "Moving Beyond Apathy to Environmental Action." The Journal of Experiential Education. 14(1):27-30.

2.5. The Higher Education Landscape: A Role For CERP:

My research of the relevant literature and interviews with national environmental leaders and educators suggests that currently there is no systematic organizational framework, explicitly grounded in established EE curriculum guidelines, that infuses action research strategies into *undergraduate* education programs.[38] Of course, there is the real possibility that many such programs exist and either they have not been reported in the literature or my research failed to uncover their existence.

While no comprehensive undergraduate action research curricula were identified in my research this is not because campuses are entirely void of action minded students or professors. Indeed, students and faculty have undertaken inspiring and innovative environmental action activities at Tufts University, Brown University, Dartmouth University and University of Kansas to name but a few of the most successful and well documented cases reported in The Campus and Environmental Responsibility--co-edited by David Eagan, who as the lead teaching assistant for IES 600 played a prominent role in the CERP pilot as we shall see in the following chapters.[39]

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[38] Keniry, J. Personal communication, November 10, 1994. Staff member of National Wildlife Federation's Campus Ecology Program. Keniry is nearing completion of the book Ecodemia, a national review of campus based student environmental action efforts. The CERP Model will be included in this publication.

[39] Eagan, J. And D.W. Orr. 1991. The Campus and Environmental Responsibility. San Francisco: Josey Bass.

Furthermore, with the publication last year of Campus Ecology: A Guide to Assessing Environmental Quality and Creating Strategies for Change, [40] a "how-to" book for campus activists, and the first Campus Earth Summit at Yale earlier this year, there are now quite literally hundreds of university programs that are using their campus management operations as potent environmental action teaching laboratories. Students are conducting energy audits, recycling waste and conserving water, writing research papers and submitting recommendations to their school administrators in ever increasing numbers.[41]

However, in the course of their research, many students are unable to work directly with an operation manager or other university official who has access to information and resources (Brown's BIG program coordinator and the University of Kansas' Environmental Ombudsman are notable exceptions.) An additional impediment to action is the tone and format of the students' reports and recommendations. To be most useful the students' reports must address well defined problems, taking into account the complex mix of options and constraints that challenge a decision maker. All too often, I suspect, student reports, energy audits or environmental assessments rarely result in achieving changes in operations. The vital link between student and staff/decision maker is missing: the bridge that might make the difference between mere research and *action*

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[40] Smith, A and The Student Environmental Action Coalition. Campus Ecology: A Guide To Assessing Environmental Quality And Creating Strategies For Change. Los Angeles: Living Planet Press.

[41] Keniry, J. 1993. "Environmental Movement Booming on Campus." Change. pp. 42-9.

research. This then is the challenge for CERP: How can an environmental research and action program link students, staff and faculty, in a cooperative effort working on real change on real problems? The remainder of this study follows the story of CERP--a teaching model intended to fill this organizational niche.

Chapter Three

3. The Campus Ecology Research Project (CERP): A Case Study

3.1. A Need for a New EE Program Model

The preceding literature review assessed the EE curriculum landscape and found that the goal of REB was not being achieved in any consistent fashion. Environmental education programs were, by and large, limiting their activities to promoting environmental knowledge and understanding--elements that by themselves do not tend to lead to the development of a citizenry that is capable of resolving environmental problems. Indeed, providing "half of the pie" may increase apathy and despair among students about the condition of the planet.[1]

Empirical research has demonstrated that incorporating research and action skill training activities into the curriculum leads to overt positive environmental behaviors.[2] The literature, and interviews with environmental educators and campus activists across the country, further demonstrated that a teaching model does not exist, that systematically links members of the university community together for the purpose of campus environmental management problem solving. This is the niche that the CERP model hopes to fill.

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[1] Gigliotti, L. 1990. "Environmental education: What went wrong? What can be done?" Journal of Environmental Education. 22:9-12.

[2] Ramsey, R. 1993. "The effects of issue investigation and action training on eighth grade students." Journal of Environmental Education. 24(3):31-36.

3.2. Design Specifications for a New Model

The Hungerford, Stapp and Hammond program models, as described in the literature review, provided important philosophical and pedagogical insights for the design of the CERP model. Concepts and teaching techniques from these models have been woven into the design of the CERP model. While these other programs were primarily intended for use by middle and secondary school students in community settings, the CERP model has been shaped to meet the particular needs and unique institutional constraints of a university setting.

The CERP model is not so much a curriculum offering, (although someday it might evolve into one), as it is the architecture for a teaching activity. The model shapes the context and provides a process into which a variety of educational experiences may be folded. This allows the model to be flexibly adapted to any number of different settings. The following design specifications frame the structure, process and skill content of the model:

- **What: Experiential and Holistic Education**
  CERP shall provide "real world" environmental problem solving opportunities that engage the learner's whole being: hands, head and heart.
- **How: Research and Action**
  CERP shall provide a balanced set of teaching activities such that students will develop environmental research, problem solving, and action taking skills.
- **Who: Students, Faculty and Staff Working in Collaboration**
  CERP shall encourage cooperative problem solving strategies between and among all members of the campus community.
- **Physical Scope: Campus Based Action**
  CERP issue investigations shall be campus based, with the understanding that local action has an upward cascading effect.

- **Academic Scope: Transdisciplinary Inquiry**
  CERP activities shall engage all academic fields, shaping a synergistic approach to environmental issue investigation.
- **Investigation Scale: Small Wins**
  CERP issue investigations shall be scaled appropriately and realistically by accounting for the participants' knowledge and skill levels. Well defined small wins provide the greatest potential for an empowering experience.

3.3. CERP Mission And Objectives

The mission statement of the Campus Ecology Research Project states:

> "The CERP model strives to teach the skills necessary to develop an ecologically literate citizenry so that the university campus can be managed in an environmentally responsible manner."

The CERP model mission is limited in scope to the university campus, however, this boundary recognizes that the activities on campus have far reaching implications. An ecologically literate citizenry possesses the skills, knowledge and motivation to act on the resolution of environmental conflicts. Environmentally responsible management is defined as those actions that tend to lead to the preservation and restoration of human and ecological harmony. Both means and ends are critical to the model: Students learn environmental action skills and the institution improves its environmental management practices.

The Campus Ecology Research Project strives to achieve these objectives:

1. Awareness: Increase/enhance student, faculty and staff perceptions of, and sensitivity toward, campus environmental management issues; help students process, refine and extend these perceptions.
2. Knowledge: Provide students, faculty and staff with the information necessary to understand ecological functions and the relationship between university activities and environmental problems.

3. Attitude: Provide students with opportunities to clarify their values and feelings of concern as it affects environmental decisions: help students acquire the motivation and commitment to participate in university environmental management; help students clarify their roles as environmental decision makers in university community.
4. Skill: *Engage students in research and action skill development activities including: critical thinking, problem definition and issue resolution.*
5. Participation: Provide students with opportunities to apply their environmental management knowledge and skills in thoughtful positive action toward resolution of campus environmental issues and ultimate restoration of their campus to a state of ecological harmony.

3.4. Plan

Designing the CERP model has followed a process much like that described earlier as the Lewin Spiral: an iterative process of planning, implementing and evaluating followed by planning, implementing and evaluating, etc. Although the following case study description appears to follow a linear progression, many of the steps, in reality, occurred in a less rigid order. The following descriptions are meant to provide the reader with enough information to be able to reflect on the appropriateness of the model for further development.

3.4.1. Students, Staff And Faculty: A New Dialogue

The CERP model is based on a straight forward premise: significant teaching opportunities exist for students to learn environmental action skills (and thereby prepare ecologically literate citizens) by working collaboratively with university staff and faculty on campus management issues. However, bringing together the student, faculty and staff "communities" for this effort is a significant challenge. Complex social and political relationships exist between these groups that have historically thwarted constructive

dialogue. Many long time employees of the university have told me that they continue to mistrust students as a result of Vietnam era protests when students stormed the Chancellor's office, and destroyed university property. Faculty have indicated their wariness of losing the control over the academic enterprise to non-academic staff. Students have expressed misgivings about the way staff and faculty dismiss their ideas and control their lives. This then is a key consideration for the CERP: How to establish a dialogue between students faculty and staff, that might lead to environmentally responsible management of the campus operations?

3.4.2. Building Relationships: The Role of a Liaison

A catalyst for starting this new dialogue between students, staff and faculty is essential: someone with the power and vision to make change happen. For the CERP model this catalyst was Duane Hickling, Assistant Vice Chancellor for Facilities Planning and Management (FPM). As the top administrator of FPM, Duane oversees the operation of these campus departments: Transportation Services (campus bus service, auto and bicycle parking), Grounds (trash and recycling operations, snow removal, etc.), Safety (hazardous materials management), Physical Plant (building maintenance, heating and cooling control, etc.), and Planning and Construction (landscape and building design). His leadership and commitment to the CERP concept has been essential to the development and implementation of the model. A description of the relationship building process between myself and Duane will be useful in setting the context for the development of CERP. Several anecdotes will be illustrative of this process.

In the Spring of 1994, Duane and I were asked to make presentations at the first Campus Earth Summit at Yale University. We were listening to Amory Lovins, an internationally renowned scientist and appropriate technology advocate, speak about how he had been able to achieve important changes in energy policy in the face of opposition from the utility community, government regulators and passive consumers. In response to a student's question, which implied confrontation was the best strategy for change, Lovins remarked: "It is better to dance with a partner than fight with an enemy." What Lovins didn't address, but which is probably more important from the perspective of a student without a political power base, is the question: "Before I can start dancing how do I get a date?" The CERP model, tries to meet this challenge by creating a role for a liaison/broker or a "matchmaker"--the role I played.

The analogy of a matchmaker arranging relationships is a useful one. It begins with the matchmaker establishing connections. The working relationship that Duane and I developed evolved over many months. Often over animated breakfast or lunch discussions, we explored topics of mutual interest: institutional change, leadership, motivating people to take risks that lead to improved management and service delivery. The discussion had a less overt agenda: We needed to understand each other's motives and political vulnerabilities.

The development of any relationship occurs incrementally as successive challenges are attempted and trust is established. The political and professional risks have to be warranted by the possibility of mutually beneficially outcomes. I had several things working for me. As an older graduate student and teaching assistant I did not fit

neatly into traditional role descriptions: I was a student but by no means young, I was filling a teaching role but I was not faculty. This "in-between" status made me an ideal candidate for the role of liaison between the administration (staff), professors and students.

3.4.3. Fall Of 1991: IES 600

My first opportunity to work with Duane came in the Fall of 1991. I was the lead teaching assistant (TA) for the semester long project of the capstone seminar of the Institute for Environmental Studies (IES) undergraduate certificate program--referred to in the course catalogue as IES 600. The IES 600 seminar is intended as the culminating and integrative academic experience for students in a special series of environmental studies courses. Each semester the professor may select a new topic for this seminar. The goal for this semester was to complete the first UW Madison Environmental Audit--a twelve part audit of campus environmental operations from water conservation to transportation, to hazardous cleaning supplies.

I invited Duane to speak to the IES 600 class to share his perspectives on campus environmental management and his interest in working with students, so as to help his organization explore new ways of managing campus operations. Before the presentation, Duane had agreed to cooperate with the students as they conducted this campus-wide environmental assessment. As such his presentation included a description of the FPM organizational chart. He indicated to the students that his entire organization would be available to answer their inquiries.

There was some hesitation on the part of several key personnel working for Duane. Some staff had recent unsatisfactory experiences with students. Some clearly were still drawing on the traumatic events of the 1960s and 70s to justify their reticence. These barriers to information were important to overcome--if ever there was to be real effective student and administration collaboration. In the end, reluctant collaborators effectively eliminated themselves from this first effort--student inquiries went unanswered. Some staff clearly had other priorities that prevented them from participating, while others were taking a "wait and see" approach to this new initiative.

Other university staff, however, embraced the opportunity to be a part of the educational experience--from department directors to custodians. One key manager, Bob Hendricks of the Planning and Construction Department, upon being presented with a long laundry list of questions, offered to meet with the research group on a weekly basis in an informal seminar. This case was exceptional, however, I think it represents the kind of enthusiasm that some administrative staff can have for research--and being included in the academic side of the institution. Senior management were not the only sources of information. For a group investigating the hazards associated with cleaning materials, the custodial staff provided key information. They had a wealth of useful insights--and concerns of their own.

At the end of the semester the class decided to make a public presentation of their research. All of the staff that had been interviewed were invited to share in the "release" of our study. To lend additional impact to the presentation, I had prepared a news release for distribution to local media inviting them to join in the activity. However, prior

to sending the release off I received a call from Duane. Some of his managers were concerned about the possibility that, if they attended the public presentation, they would be placed in an awkward position if their department was shown to be negligent or somehow in code violation. Duane asked me if it was our plan to invite local community media. I replied that I thought it would be a good experience for the students. The suggestion that the media not be invited to a public event, seemed to me, to be contrary to the values of open discourse cherished by the academy.

This presented, in retrospect, a critical stage in my relationship building process with Duane. He had welcomed our inquiry as a legitimate exercise in serving the interests of his customers. He had taken some risks in allowing students access to his staff and information resources. Now his managers were balking at the opportunity to fully and comfortably listen to this information for fear that they might have to explain their actions to overzealous television reporters, eager to pop off a story without getting all the facts. They were scared of being ridiculed and "beaten up" by the media. I tried to assure Duane that it was never our intention to embarrass or berate his staff. However, our working relationship was still too fragile for him to feel comfortable requiring his staff to attend a presentation that might expose them to unfair attention.

In consultation with the other teaching staff, and the media representative of IES, I decided to withhold the news release from community media, but send it along to the student newspapers. This arrangement satisfied the staff's concerns. They attended the presentation, listened, and learned. During the question and answer period they

challenged some assumptions and conclusions made by the students. The dialogue continues.

I have chosen to relate this story in great detail because of its importance to the overall effort of launching and sustaining the CERP model. These early experiences exemplify the kind of mutual respect and flexibility that are key to establishing dialogue and resolving conflict. As Hammond's Monday Group commandments suggest "Keep a balanced view...remain flexible...and treat everyone as an individual."

3.4.4. Center For Biology Education (CBE) Grant

Following the successful Fall 1991-IES 600 Environmental Audit experience, I determined that a more systematic and comprehensive approach to campus environmental management was needed and could succeed. The approach would join students, faculty and staff together for the purpose of collaborative environmental problem solving. I applied for, and was awarded, a grant from The Center for Biology Education (CBE), a funding agency located at the University of Wisconsin Madison dedicated to supporting innovative science curriculum initiatives. The late Professor Gretchen Schoff, a faculty member with the departments of Engineering and Professional Development, Integrated Liberal Studies and IES, served as the principal investigator. Additional administrative support was provided by the Institute for Environmental Studies (IES).

The one year, $14,977 grant began in July 1992. The funding provided a 40% Project Assistant salary for me and 480 hours of salary for a student assistant. In addition, a small travel and supply budget covered phone and travel expenses associated

with a trip to New England to meet with representatives from these universities: University of Kansas, University of Southern Maine, Tufts University, Harvard University, Brown University, University of New Hampshire and Dartmouth University. Interviews conducted during the New England trip provided important background information on student research and action activities across the country. It also provided a perspective, based on the extensive network of contacts represented by those interviewed, that my concept for the CERP model represented a new and innovative teaching strategy at the university level.

The complete grant application can be found in Appendix 1. As the earliest formal document outlying what would become the CERP model, the CBE grant program objectives articulate some of the critical elements of an action research teaching strategy:

1. Provide undergraduate students with enhanced learning opportunities in realistic problem solving situations in their community--the campus.
2. Engage students in a research process that makes use of the following skills: critical thinking; cooperative problem solving; and collection, organization, analysis, and communication of scientific data.
3. Create permanent and cooperative learning linkages between students, faculty and administrators so that environmental management issues facing the university community can be effectively addressed.
4. Encourage students to critically examine their personal activities with respect to the consumption and degradation of natural resources.
5. Provide students with an opportunity to participate in the campus management decision making process by contributing valuable information.
6. Provide decision makers with baseline data profiles of campus environmental impacts.

3.4.4.1.Talloires and CERCM

The key to developing a structure to implement the program objectives would be the formation of a new combination advisory board and information clearinghouse: The Committee for Environmentally Responsible Campus Management (CERCM). The grant proposal cited guiding principles in the Talloires Declaration to support the establishment of this advisory group in order to promote multi-disciplinary research activities and engage students, faculty and staff in environmental policy activities. Not only did this Declaration provide important inspirational source for the CERP model it firmly established a high-level commitment to the ideals of environmental literacy and responsible citizenship.

The following selected goals and recommendations are drawn from principles articulated at a Tufts University sponsored environmental conference at Talloires, France during October of 1990. The Talloires Declaration signed by the twenty-two participating university and college presidents, including UW-Madison's then Provost David Ward, states:

> We the presidents, rectors, and vice-chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation and the depletion of natural resources...We believe that urgent actions are needed to address these fundamental problems and reverse the trends... University heads must provide the leadership and support to mobilize internal and external resources so that their institutions respond to this urgent challenge. We, therefore, agree to take the following action:
>
> 1. Appoint a special advisor, an environmental programs dean, or faculty group to promote environmental programs within the university.
> 2. Set aside funding and create positions for interdepartmental and interschool faculty who will research and teach population, environment, and sustainable development.
> 3. Establish a university environmental policy to engage faculty, administration and students in activities such as energy and water conservation and recycling...

4. Encourage multi-disciplinary thinking with the use of internships, capstone and integrating seminars, work study, and case studies.
5. Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and responsible citizens.

3.4.4.2. CBE Grant Partners: IES and FPM

The two key institutional partners in this CBE grant effort were IES and FPM, representing academic and administrative interests respectively. Both were important reviewers of the early drafts of the proposal. Duane, comfortable with the results of our earlier working relationship, agreed to provide a letter of support indicating his willingness to continue cooperating with students. I don't recall Duane actually ever reviewing the grant application although I supplied several drafts. What was key for him was that this experiment represented an opportunity for him to participate more fully in the educational side of the academy while at the same time invigorating his organization with "customer" feedback.

The partnership with IES was not a given, despite my working relationship with the department over the previous two semesters. The gatekeeper, the assistant director, recognized that although I was proposing a joint effort with FPM, this was essentially an academic driven project and he was interested in protecting the integrity of his organization's educational mission. In principle, working with the administration sounded acceptable, however, the assistant director did not want any interference with coursework. Prior to signing off on the proposal I spent many weeks recruiting and pitching my idea to prospective faculty sponsors who would be willing to implement the model and serve on an advisory board. Interestingly, once the grant was awarded I received virtually no oversight from the IES administration.

3.4.5. *Committee For Environmentally Responsible Campus Management (CERCM)*

The first step in the planning process was to convene an advisory board composed of students, faculty and staff, called the Committee for Environmentally Responsible Campus Management (CERCM). CERCM convened four times during the summer and early fall of 1992. The meetings were planned in coordination with Duane, although I prepared the agendas, facilitated the meetings and wrote the minutes. (See Appendix 2 for agendas and meeting minutes.) Although Duane kept a low profile leadership role, it was sufficient to leverage the participation of key senior managers from his division. In addition managers from the Divisions of Housing, and Business Services attended meetings. The meetings served several key functions:

1. Established my credibility with key faculty and staff members whose support would be critical to pilot program implementation in subsequent months.
2. Provided a sounding board during the development stages of the model's key organizing documents.
3. Began a dialogue between faculty and staff, that established a "comfort zone" on which a continued working relationship could be established.

Two essential model documents were developed in collaboration with CERCM members, a Project Request form and a Roles and Responsibilities outline. These documents are described in the following sections.

3.4.5.1. Project Request (PR) Form

The Project Request (PR) is the key piece of the model's architecture. It is modeled on the more familiar RFP (Request for Proposal) used by organizations when hiring consultants for specific service or research projects. The PR concept envisioned the administrator as a "client" and the students as "research consultants." Faculty would

serve as guides to the students as part of a "research team." The PR used in the pilot in the IES 600 class can be seen in Appendix 3.

Potential research topic ideas could be submitted by any member of the university community, however it was always felt that the projects that were submitted by clients (staff/administrators) would have the greatest political salience--and presented the best chance for constructive collaboration. The completed PR is submitted to the project coordinator (liaison/matchmaker/broker) who in turn compiles the PRs into a directory. The directory is then made available to students interested in independent study projects or faculty looking for in class projects. CERCM participants, as well as a few faculty and staff, submitted twenty-three Project Requests for the Spring 1992 semester.

3.4.5.2. Roles and Responsibilities

Many CERCM discussions centered around the roles and responsibilities of the research team members--faculty, students and staff. Discussions included specific limits to appropriate activities. A summary of the main interests and concerns of the CERCM participants were as follows:

1. Faculty requested assurances that they would maintain complete academic control over the research.
2. Students requested assurances that their work and recommendations would be taken seriously and given due consideration by the administration. If recommendations were made, the client/administrator would respond specifically to the student's ideas.
3. Staff requested assurances that the information that was shared with the students and faculty would remain, as one FPM director (and former professor) put it "classroom confidential."--that is not to be shared with the mass media without mutual consent of all research team members.

These views and concerns were then translated into a "Roles and Responsibilities" document. (See Appendix 4).

3.4.6. CERCM Fades

According to the CBE grant proposal, CERCM would continue to function as an advisory board during the implementation phases of the program. At the conclusion of the fourth meeting, however, participants agreed that it would not be necessary to meet again until the end of the spring semester for a program evaluation. This meeting was never called due to delays in completing the evaluation, and the grant period ending.

The long-term value of an advisory Committee is arguable. Convening and sustaining a regular meeting format requires large amounts of staff support time--not to mention the valuable time of participants. It was apparent to me that unless there was funding, and a mechanism for continued staff support of a committee's needs, additional meetings could unravel the momentum created by the initial planning meetings. The fact that CERCM provided useful feedback during the design phase of the program suggests the overarching value of the exercise. CERCM members did receive several mailed updates during the remainder of the grant period including copies (upon request) of the final reports generated by the IES 600 pilot project in the fall and the independent study projects the following spring.

3.4.7. New Name: Campus Ecology Research Project (CERP)

No formal name had been given to the teaching model that was being shaped by CERCM. After several months of use, the acronym CERCM was becoming a bit awkward. It was clear that a different name was needed--something that sounded less like "circumvent or circumcision." I selected a more manageable name that reflected more explicit and self evident objectives: The Campus Ecology Research Project. The term "campus ecology" had recently been used by April Smith, as the title to her book of the

same name.[3] April is also one of the original authors of a campus environmental audit at the University of Southern California--a model for the 1991 IES 600 class.

Interestingly, an extensive literature review revealed that the term "campus ecology" was not an original phrase. As cited in a journal representing the field of student personnel administrators, the term refers to social relationships and interactions between members of the "campus ecosystem," the built environment, and the fundamental missions of the institution: teaching, research and service.[4] My use of the term is not entirely inconsistent with this meaning, except that the management of institution's natural environment is included.

3.4.8. Model Variations

The CERP model was designed to interface with a variety of academic settings. To date, three variations of the CERP model have been implemented:

1. In the Fall of 1992 the IES 600 class piloted the model as part of an in-class team project.
2. Six independent study students participated in individual research projects in the Spring 1993 semester.
3. Students working as paid interns for FPM's office of Environmental Management completed projects in the 1993-94 academic year.

The remainder of this study will deal exclusively with the implementation and formative evaluation phases of the IES 600 pilot.

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[3] Smith, A and The Student Environmental Action Coalition. 1993. Campus Ecology: A Guide to Assessing Environmental Quality and Creating Strategies for Change. Los Angeles: Living Planet Press.

[4] Hurst, J. 1987. "Student development and campus ecology: A rapprochement." NASPA Journal. 25/1:5.

3.5. Implement

3.5.1. Faculty And Client

Professor Evelyn Howell, a faculty member from Landscape Architecture and IES, agreed to pilot the CERP model, in addition to other class activities, in the Fall 1992 IES 600 capstone seminar. Evelyn had participated in the CERCM discussions and was supportive of the CERP model's applied group research techniques, having successfully used this method in many of her Landscape Architecture courses.

During the CERP pilot segment of the seminar, students were divided into two "teams" to examine paper recycling and campus transportation issues. The clients for the team projects were also CERCM participants: Rex Owns, Coordinator of the university's Administrative Committee on Recycling (ACOR), as well as, a manager of the Consolidated Stores and Surplus operations; and Lori Kay, the new Director of Transportation Services at FPM.

In addition to Prof. Howell, the teaching team included lead teaching assistant (TA) David Eagan (45% appointment), TA Christine Finlayson (33% appointment), and myself as a "participant observer" (5% appointment-to establish official contact with the class). Evelyn attended most classes, made several presentations and participated in weekly planning sessions. David had the highest instructor profile on the team, coordinating most classes and developing much of the non-team project activities. In addition, he supported the work of the paper team. Christine attended all classes and weekly planning sessions, and made several class presentations. She supported the work of the transportation team. I attended most of the classes, helped introduce and

coordinate the team projects and participated in the weekly planning sessions when relevant to the team projects. Unlike the other team members I did not evaluate or participate in the grading of any of the class assignments.

Although David, the lead TA, had extensive general experience in the field of natural science education, and is an accomplished editor and writer (he co-edited the first comprehensive review of campus environmental management initiatives in the US: The Campus and Environmental Responsibility), this was his first time teaching an undergraduate environmental studies course. Christine brought extensive technical writing experience to the teaching team. This was her first semester as a graduate student as well as her first semester at UW-Madison. Prior to this course she never had been in an instructor's role.

3.5.2. Structure of the IES 600 Seminar

Thirty-two, mostly senior level students, participated in the seminar. The class met for two and a half hours each week from 5:30 to 8:00 PM. Numerous meetings outside of the scheduled class period were also necessary--especially at the end of the semester when the team project final reports were being prepared.

The seminar was intended as a integrative capstone experience of the IES Certificate program. As such, most of the students had already completed a series of environmental studies courses that included an examination of the social, political and scientific dimensions of this discipline. For many this was their first academic opportunity to interact closely with fellow students and instructors.

3.5.3. Content

The IES 600 seminar included four major assignments: a seminar chronicle, an individual research project (IRP), a campus Profile Data Report (PDR), and the team project (CERP pilot). The PDR and IRP assignments were intended, in part, to prepare the students for the team project by building group dynamic skills, research skills, and familiarity with campus resources. The chronicle was a combination reflective journal and record keeping document. The other assignments are mentioned here only to inform the reader of the full context of the course. References to these other assignments appear in some of the data presented in Chapter 4.

To attempt to extract the team project from these other class assignments is not possible. These assignments were meant to prepare the students for the "big" project and therefore, their influence is important. However, it is beyond the scope of this particular effort to examine these other seminar assignments. Fortunately, the case study format is particularly appropriate for this situation. It allows us to acknowledge a wider context while at the same time paying closest attention to a few manageable issues.

3.5.4. Syllabus/ Class Schedule

A seminar syllabus and schedule were distributed to students at the beginning of the semester. (See Appendix 5.) As this was the first time that the seminar had been taught by this teaching team, several of the seminar assignments and deadlines identified in the syllabus evolved or changed over the course of the semester, as was necessary. A brief synopsis of each seminar session, as it related to the team project, will help the reader interpret the evaluation data (especially the comment cards) in Chapter 4. The number that precedes each date refers to the week in the semester.

1/Sept 2: Teaching team introduce themselves and the course assignments, and provide a description of the seminar's collaborative teaching strategy.

2/Sept 9: Assistant Vice Chancellor Duane Hickling speaks to the seminar, describing his management philosophy and the resources available in his Division of Facilities Planning and Management (FPM). [1 hr.]

3/Sept 16: Christine lectures on technical writing skills. [45 min.]

4/Sept 23: Daniel introduces team project concept. Team project clients Lori Kay (Transportation Services) and Rex Owens (Administrative Committee on Recycling) discuss their Project Requests (PR) and their need for research assistance. [1 hr.]

5/Sept 30: Daniel elaborates on team project organization. Divide into transportation and paper recycling teams. Team mtg. #1. [1.5 hrs.]

6/Oct 7: Team mtg. #2 [1.5 hrs.]

7/Oct 14 : Team mtg. #3 [1.25 hrs.]

8/Oct 21: Presentation of preliminary findings. Representatives from each team discuss their research progress before the other seminar participants. [1 hr.] Team mtg. #4 [.5 hr.]

9/Oct 28: Brad Hughs, Director of the university writing lab discusses the challenges of collaborative report writing. Invites students to make use of the lab's resources. [.5 hr.] Team mtg. #5 [1 hr.]

10/Nov 4: Daniel leads the class in a discussion of ways to deal with the inevitable stress and personal conflict that occurs in any group experience. [.5 hr.] Team mtg. #6 [2 hrs.]

11/Nov 11: Students present their draft findings to a review panel that includes team project clients and members of the IES faculty. [1.5 hr.] "Final" drafts of the team reports are submitted.

12/Nov 18: Report drafts returned. Students express general frustration with the team report writing process. Team mtg. #7 [2 hrs.]

13/Nov 25: Team project reports submitted. Due to Thanksgiving holiday many students do not attend.

14/Dec 2 : Duane Hickling returns to discuss campus operations management and the student's research experience.

15/Dec 9: Course critique completed by students. (See Appendix 6).

16/Dec 16: Final exam period. Students complete an essay response to the topic: "Reflect on the role of the individual (student) and the role of the institution (university) in promoting environmentally responsible management."

3.6. Formative Evaluation

Evaluation of environmental education programs, as discussed earlier, is an infrequently conducted activity. In a publication of the EPA's Office of Environmental Education, the current situation is assessed this way:

> "In general, EE programs have not received rigorous evaluation to determine their effectiveness. Several factors may contribute to this void, including the complexity of measuring long term educational changes, broad program design, and a lack of quantitative objectives.[5]

Although many environmental educators continue to call for more research on the effectiveness of EE programs, even the field's premier academic publication, the Journal of Environmental Education, has published but a handful of articles dedicated to EE program evaluation strategies. Typically these articles suggest, pre and post test measurements to quantitatively assess changes in student behavior.[6/7] Given the

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[5] National Advisory Council on Environmental Education. July 15, 1992. Review Draft: National Report on Environmental Education. Washington DC:EPA. p. 48.

[6] Niedermeyer, F.C. 1992. "A checklist for reviewing environmental education programs." Journal of Environmental Education. 23(2):46-50.

[7] Bennet, D.B. 1988-89. "Four steps to evaluating environmental education learning experiences." Journal of Environmental Education. 20(2):14-21.

formative stage of the CERP model and the short duration of contact with the students, this evaluation strategy was not feasible, nor would it be particularly revealing.

3.6.1. Case Study

An evaluation strategy that seeks to understand the social context of the program experience rather than assess performance of individuals may provide the most useful information for curriculum developers--especially in the early stages of a program.[8] The case study approach is intended to meet this need. Although case studies may incorporate quantitative instruments, it is the ability to pose qualitative questions that sets case studies apart from objective based evaluations. This allows the evaluator to ask the question "How is the program going?" rather than "Did the program achieve preset goals for the student?"

For this reason, this formative evaluation will focus on the structural and process issues that framed the educational experience, for these issues are ultimately responsible for creating the learning environment that will--eventually--lead to the goals of REB and environmental literacy. My interaction with the data, therefore, is done with the intent to provide impressions, focus on inefficiencies, highlight the role of individuals and their roles in decision making and monitor the progress of the pilot effort. In sum, the evaluation will explore the "why and how" behind the first implementation of the CERP model.[9]

3.6.2. Data Collection

Information used in this evaluation was collected from three assessment instruments--described in greater detail below. In addition, this case study draws upon

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[8] Thomas, I. 1989-90. "Evaluating environmental education programs using case studies." Journal of Environmental Education. 21(2):3-8.

my participation and observations in pilot activities. I was not, however, able to gather any data during student meetings or activities outside of the classroom setting. This would have been impossible due to limitations on my schedule, nor would it have been entirely appropriate or useful. Part of the experience that the model hopes to provide is a chance to develop independent and empowering student led education. My presence in these out of class meetings would have surely compromised this teaching objective.

One possible source of information about these outside class meetings, was the student's "Seminar Chronicles". These journals were intended, in part, as a work log to track the progress of their team project activities and to reflect on other class assignments. However, of the chronicles I was able to gather at the conclusion of the class, none provided in any great detail the content or duration of outside class meetings. Program artifacts of this sort might have been extremely useful in better understanding the kinds of research challenges and learning experiences students were having.

3.6.3. Comment Cards

The teaching team decided that opportunities for student feedback would be critical to the overall success of the class. I had been introduced to a comment card technique as a student and found it to be a valuable way to communicate with the professor. When I suggested comment cards to the teaching team, I was unaware of the plus/minus/change technique used by the ARCPS program, as described earlier. However, the two methods are quite similar and serve the same end: allowing students to "speak"

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[9] Taylor, J. And M. Wynn. 1984. "Enhancing environmental education and training through case study experimentation." The Environmentalist. 4(3):235-42.

directly to the instructor, who in turn may use the comments to improve the educational process.

The comment cards technique is quite simple. At the conclusion of each class students were requested to complete a comment card reflecting their concerns about how the class had gone, what they enjoyed, what they would like to do in the future, what they thought might be changed or improved. After David transcribed these comments, and the teaching team discussed the feedback, responses were shared with students at the next class meeting. A total of eleven sets of comment cards are included in the data set--comments from the first eight consecutive class meetings and three from alternating weeks for the next six sessions. The comments form an interesting chronological record of the seminar's progress. Due to space constraints, comments referring to activities not relevant to the team project were edited out. However, all other comments, critical and complimentary have been included to provide the reader with a complete perspective on what students felt.

3.6.4. Course Critique

The course critique was administered at the conclusion of the seminar (last class meeting prior to "final summary period"). The survey was written by David and reflected his interest in gathering information about the entire course--including assignments that were not directly related to the team project.

The course critique asked three questions that are of interest to this evaluation:

1. Which projects (or parts of projects) were most worthwhile and why?
2. Which were least worthwhile and why?
3. If you were in charge: How would you run this class differently, in terms of assignments, readings, speakers, in class activities? This is the 'suggestion box' question. Feel free to comment on any aspect of the course.

These open ended questions were transcribed and the references to the team project were excerpted, in their entirety, for analysis. In the Chapter 4, I have identified student responses as either "plus" (most worthwhile), "minus" (least worthwhile) or "change" (how would you run things differently?). Twenty-three of the thirty-two students completed the critique. (See Appendix 6.)

3.6.5. Focus Groups/Questionnaire

Several weeks into the semester following the IES 600 seminar I invited all of the students to participate in a focus group to help identify issues that would be included in a CERP pilot questionnaire. Eight students accepted the invitation to identify three attributes of the team project experience that set the IES 600 seminar apart from other university experiences. Then the students were asked to brainstorm advantages (plus), disadvantages (minus), and ways to improve (change) these seminar attributes. From these comments I composed the questionnaire. Some of the students comments were stated originally as "pluses" however in the questionnaire I rephrased the question as a negative attribute. In addition, many of the attributes addressed identical issues but were asked both in positive and negative contexts to assist with identifying confusing questions. The questionnaire can be viewed in Appendix 7.

3.6.6. Client Evaluations

Each client was asked to complete an eight part evaluation of the final report and reflect on their general experience of working with students. This evaluation form is an integral part of the CERP model, as conceived during the CERCM discussions, where students expressed a desire to have an assurance that their research efforts would be

seriously considered by the client. This client evaluation, therefore, would have been completed regardless of this case study. The completed client evaluations are in Appendix 8.

Chapter Four

4. Results: A Formative Evaluation of IES 600 and CERP

This formative evaluation of the CERP model reflects, in large part, the observations, impressions, and opinions of the students in IES 600. CERP was developed to meet students' perceived needs--as imagined by the model designer. Therefore, it seems fitting that student voices be heard as the model is refined. The reader should not, however, conclude that these student assessments necessarily have any special cumulative weighted meaning. For each participant a unique perspective holds true--grounded in their personal experience, expectations and abilities. Though a particular perspective may resonate among many vocal critics, the reader should not infer that the same holds true for students from whom we hear nothing. Certain topics presented opportunities for simplistic and chronic dissent. It is important not to confuse volume for rightness.

Data from three assessment instruments are included in this chapter. All commentary relevant to the team project has been included. Certain references to other class assignments have been included in instances when deletions would have disturbed the context of the relevant material. Furthermore, there are many comments that cross over the artificial categories (structure, process, skill content) into which data has been divided for the purposes of this summary. While problematic in the milieu of quantitative analysis, the qualitative assessment format used here is more concerned with the rich texture of the whole than the distinctions of the pristine parts.

The following explanatory notes will be helpful in understanding the identification *codes that associated with the data and the headings in the skill acquisition and attitudinal* results tables:

Comment cards. The comment cards have been sorted by date in order to provide the reader with a sense for how issues developed relative to in-class activities as well as how certain attitudes and concerns evolved throughout the semester. The first number in the code that precedes an excerpt refers to the class meeting number in a sixteen week semester. Thus, 7/Oct 14 means the seventh class meeting on October 14.

Course critiques were submitted anonymously and therefore no code reference is used.

Questionnaires were submitted with the student's name attached, so that follow-up requests for unreturned questionnaires could be made. Although students were assured confidentiality, identifying gender and research team affiliation was important to the analysis. Therefore, a code was used to tag data derived from this questionnaire: FP means a female in the paper group and MT signifies a male in the transportation group.

Skill acquisition tables. The symbols used in column headings for the *frequency* with which a skill was practiced or developed can be translated as follows:

++	Often (3 or more occasions)
+	Sometimes (1 or 2 occasions)
0	Not me (the opportunity existed but not something I did)
NA	Not applicable (this skill was not used by anyone in my group)

The symbols used in the column headings for the *effectiveness* of the team project at developing or reinforcing a skill, relative to other classes at the university, can be translated as follows:

+	More effective
=	Same as other classes
-	Less effective
N/A	Not applicable-the skill was not used in the 600 class or other classes

Attitudinal tables. The numbers and codes in the column headings of the attitudinal tables can be translated as follows:

5	strongly agree
4	agree
3	no opinion
2	disagree
1	strongly disagree
0	doesn't apply to me
N	answer not provided
ttl	total number of responses

Data from all three evaluation instruments (questionnaire, course critique and comment cards) were sorted into three categories according to the perceived theme of the response. If the response tended to address issues relating to spatial or temporal elements it was placed in the *structure* category. If the response dealt with interactions between team members then it was placed in the *process* category. Finally, if the response referred to learning activities it was placed in the *skill content* category. These major categories were subdivided again into topic areas and then sorted a third time if the response tended to be positive (plus), negative (minus) or included a suggestion for improvement (change).

The organization of these major categories is somewhat arbitrary for each dimension--structure, process, skill content--interacts dynamically with each other. In a general way, however, a program's *structure* creates the setting into which the *process* of teaching can occur. In turn, the *skill content* of a teaching experience will be influenced by both the design of the structure and the execution of the process. The organization of sub-categories for each of these major dimensions (e.g., scale/structure,

cooperation/process, writing/skill content) was established after the data set received a preliminary analysis. In so doing the students' comments, in a sense, asserted control over the arrangement of issues discussed in this chapter.

4.1. Structure: Project scope, scale, and choice

4.1.1. Questionnaire: positive

Problems may be addressed on a much larger scale, and therefore more in depth solutions can be explored, as well as more options. FT

Different perspectives. Can accomplish a larger task, more in depth. FT

When this resource acts as a team there is no limit to the amount of material you can learn and how far you can go. MP

4.1.2. Questionnaire: negative

Don't get to do what you'd normally choose (out of a list of tasks). FP

One gets focused on one's own part of the research project and doesn't learn much about the other parts. FT

One learns one's own area within the group project but often knows little about areas one didn't work on. MP

You only learn about the topic you personally researched. MT

4.1.3. Questionnaire: change

Having the kids establish projects and how to apply them. FP

4.1.4. Course critique: change

The team project - there are many problems on campus. It would have been nice for us to pick a problem we were all interested in, instead of the instructors picking it (it would be nicer if it was like the PDR).

4.1.5. Course critique: change

I would not focus the course on campus issues. We already focus our entire existence on the campus. Madison is already its own little world. We should, in an integrative course, include the segments of our society. Afterall a minority (college students), and we need to realize this and stop centering our thought on the campus.

This course loses direction, the only thing to bring such direction and goals is the group project. This could be enhanced by discussion of current issues, as mentioned above. It is important to force conceptual thought and ideas of integrating social and environmental science with technology. Many young environmentalists have little notion of the real world issues beyond casual "greentalk" - folks such as Tom Dawson, Kathy Falk, DNR, Government Reps, etc. could give excellent insight.

And, relax a little on the militantness of sticking to just campus - I understand the point - but in our chronicles anyway we should be a little more relaxed - that's supposed to be our time to contemplate.

Talk more of specific cases than just rhetoric in discussions.

Maybe use something besides the campus for the team projects. Seniors have been here so long that they may be more interested in what's happening beyond the campus....

4.1.6. Comment cards

1/Sep 2 The only complaint I have is about the lack of choice in the campus issues..

2/Sep 9 This is a 600 level course and a seminar. I think as upperclassman (and mostly seniors) students shouldn't be complaining about too much work & deadlines, but about not having courses that get really deep & specific into a subject.

5/Sep 30 We may want to do less in class -- quality no quantity!

7/Oct 14 I have such a hard time limiting my perspective to boundaries. However, I will continue to deal with this - and should be able to focus my energies.

8/Oct 21 Projects seem to be getting heated up. Cool. I really didn't think I'd be too much into the "micro: world of campus but my attitude is being reformed.

8/Oct 21 I'm really frustrated right now with this class's exclusion from the city of Madison -- the average student in Madison is very involved in the city and is a member of the community.

8/Oct 21 Obviously we don't have time to do all the stuff assigned to us in this class - either in or out of class, we need to get rid of some of it. I think people are frustrated. David you seem frustrated too.

4.1.6.1. Summary:

Scope: Several students indicate an interest in research activities that explicitly engage issues beyond the campus proper. They viewed the campus focus as restrictive and contrary to the integrative nature of the seminar.

Scale: Within the scope of the campus issues examined, several students commented that the topic was too large. Therefore, when research responsibilities were divided among the group, students lost touch with the whole. Others appreciated the opportunity to explore complex topics that they could not tackle without the cooperative efforts of a group.

Choice: A couple of commentators suggested a preference for student input on the selection of projects.

4.1.6.2. Discussion:

Scope: The CERP model explicitly concerns itself with the activities within the control of campus decision makers. While this design feature is arbitrary it is not capricious. As described earlier, cognitive limits and time constraints require a narrowing

of boundaries of interest, if a successful--and hopefully empowering--experience is to be offered to the students.

The model has adopted the ecological principle that everything is connected and that ultimate effects of a decision often extend well beyond the physical boundaries of the university. For example, a decision by university purchasing agents to buy only 100% recycled content office paper may influence demand in the pulp industry (upscale effect), as well as, change the expectations of office workers as their supply options may be limited (downscale effect).

Limiting the scope of the course and the team project to campus based activities posed a cognitive challenge to some students. They sometimes seem to fail to appreciate the abstract quality of establishing a campus boundary. For instance the comment, " Maybe use something besides the campus for the team projects. Seniors have been here so long that they may be more interested in what's happening beyond the campus...." suggests that the student is not fully appreciating the fact that the campus scope is intended only as a starting point to explicitly *connect* the learner to the wide world--not create more isolation.

I suspect part of this drive to look beyond the campus is linked to a need to avert attention from the self-examination implicit in a campus based research activity. To understand the operation of the campus requires an examination of personal values represented by questions such as: "What transportation modes do I use when commuting to campus?"; or "Do I make single sided copies?" These questions require a student

researcher to assess their complicity in the issues under inquiry. This process in turn raises difficult questions that some students would rather avoid.

Scale: While many undergraduate IES courses allow the student to survey the broad field of environmental issues, few allow an in-depth review of a particular entity--in an applied setting. This in-depth approach is intended to create teaching opportunities for students where concrete and specific recommendations are the outcome of the research endeavor--as contrasted by the vague calls to action (e.g. "we should recycle more") that dominate many undergraduate reports.

Choice: The topics for the group research projects were selected by the CERP liaison in conjunction with the teaching team. This was a deliberate, politically motivated design consideration. It has been my observation from previous student research programs, that when a student selects a topic and then proceeds to solicit contact with an administrator who has not likewise identified this as a priority issue, an unsatisfactory working relationship develops: the administrator may feel that his/her time is being wasted on a trivial (or plainly irrelevant) project and, in turn, the student may become frustrated by an unresponsive or minimally cooperative research resource.

While the Hungerford and Hammond models suggest student initiated topic selection, the CERP model advances the notion that ultimate program success (e.g., implementation of student recommendations, or policy changes based on student generated data) is enhanced if the research issues provide political salience for the client. The model is striving for both an academic experience *and* a useful report outcome.

4.1.6.3. Recommendation:

Scope: Using the campus as the locale for student research is an integral part of the model and therefore, should not be changed. Students should be well aware of this focus prior to participation in the seminar. Possibly more emphasis can be placed on demonstrating how local decisions influence the wide world.

Scale: Teaching staff need to assist students with scaling the research effort in ways that assure task completion within the given time frame of the class. It must also be said that students may benefit from struggling with scaling decisions.

Choice: The greatest prospect for the project report recommendations receiving consideration for implementation resides with a client who has an active interest in the outcome of the research. It therefore seems prudent to continue to preselect topics that have both academic interest and relevance for the student and political salience for the client.

4.2. Structure: Group size, diversity

4.2.1. Course critique: positive

The team project was helpful in learning how to work in large groups.

I liked team projects but way too many people involved.

Group projects was most worthwhile, group skills are always good to learn and you can accomplish more as a group .

(Group projects good)...although with 15 people per group it was very difficult to organize.

4.2.2. Questionnaire: positive

Learning to appreciate other's ideas and views. FP

People have different backgrounds, knowledge and abilities all which combine to help others learn about new angles to solving an environmental challenge. FT

Application of the various skills,... MP

Diversity of knowledge, background and interests. MP

I got to see the knowledge that others possessed and could add it on to my experience. MT

4.2.3. Course critique: negative

The team project was a really hard to get everyone together on because the groups were too LARGE!

Team project - too many people. It was often hard to get things done, meet people, too many conflicts.

Sixteen people working on one paper is too many. Ideas got lost trying to synthesize styles.

The big project because it could have been a lot more organized from the get-go. Division of labor and communication were poor.

4.2.4. Course critique: change

No matter what, some idea of the work load should be known at the start and a greater division of labor is needed. Large groups can work , but they need greater organization and communication.

Oh, and another thing: smaller groups for the team projects would foster more cooperation and a more cohesive paper.

4.2.5. Questionnaire: ideal group size

In response to a question about an ideal group size, student suggestions ranged from five to eleven group members. The median number was approximately eight.

4.2.6. Comment cards:

1/Sep 2 I like the idea of working in teams.

1/Sep 2 I like the fact that this class is small -- the smallest class I've ever had at this university. ...good way to meet someone new and no pressure on finding a partner if you don't know anyone in the class.

4.2.6.1. Summary:

Group size: The IES 600 seminar was an unusually small undergraduate course, with thirty-two students and a student to instructor ratio of nearly 10:1. This unique opportunity was not lost on the student who commented: "I like the fact that this class is small...the smallest class I've ever had at this university." This class size worked well for most class activities.

The group project, on the other hand, was organized around two student teams of sixteen, with one TA assigned to each group. Most students felt that this group size was unmanageable. This perspective is not entirely apparent from the frequency with which group size was mentioned in the data set presented in this section, however this issue is implied in comments found elsewhere in this chapter. There is no doubt, though, that the large size of the research groups was an intensely felt and common gripe among students. Negative comments on this issue were so prevalent that during the focus group sessions

used to design the questionnaire I discouraged discussion of this topic--it had become a chronic complaint that did not benefit from repeated commentary.

Diversity: Despite general misgivings about the unwieldy size of the project groups, several students noted that working closely with peers offered them a chance to share diverse perspectives, knowledge and skills.

4.2.6.2. Discussion:

Group size and productivity losses: Theoretically the productivity of a research group increases with the addition of members--the more people who can gather and process information the more complete and thorough the outcome. However, the benefits of increased size only accrue up until process losses pose obstacles. Process losses may include: social loafing (group members take a free ride allowing others to do their work), production blocking (group members getting in each others way, interrupting their progress due to physical constraints or social distractions) and group maintenance activities (time must be dedicated to sustaining the group dynamic, resolving inter-personal conflicts, etc.).[1] All of these textbook process losses presented themselves during the course the project.

Ideal size: Organizational behavior researchers have studied the critical influence that group size has on productivity. Optimal group size depends on variables such as task complexity, leadership and the ability of group members to complete tasks on time

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[1] Wagner, J.A and J.R. Hollenbeck. 1992. Management of Organizational Behavior. Prentice Hall: New Jersey. p. 379

while meeting norms for quality output. Many agree that the ideal small group size for efficient functioning is either five, seven, or nine. These odd numbers are thought to be preferable, so that even split alliances cannot form. Below this range there may be too few people to provide synergistic benefits of a group, while above the threshold of nine work coordination, direct communication, and division of responsibilities becomes increasingly complex--with diminishing benefits. Two student comments identified this challenge nicely: "Large groups can work but they need greater organization and communication" and "Ideas get lost trying to synthesize ideas (in large groups)."

While there are certainly times when groups larger than nine are warranted, it does not seem reasonable to attempt a project of this group size among participants with limited group management skills. Nor should this suggestion imply that small groups--of themselves--are more functional. When the first campus environmental audit was conducted by the IES 600 class of 1991, the research groups were made up of four students. Even in this more intimate setting individual students failed to carry their weight, dissension flourished and communication between group members was unsatisfactory. In contrast with the student comment, "smaller groups for the team projects would foster more cooperation and a more cohesive paper," I would maintain that cooperation is as much function of the quality of the interactions as it is the number of people involved.

Diversity. A disempowering effect of attending a large university is the isolation a student feels. This may be especially true of environmentally aware students who are

struggling to establish a new set of values that often conflict with much of what they have learned in the past. A supportive alliance of like minded peers with whom a student can thrash out the meaning of evolving personal philosophies is important.

4.2.6.3. Recommendation:

A group size of five would seem to be ideal: large enough to benefit from the support and diversity represented by a group, yet manageable with regard to information sharing and meeting scheduling. In certain respects this stretches the teaching staff somewhat (more clients to identify and coordinate, more papers to read, topic areas to understand), yet overall management of conflicts and process losses may be reduced.

4.3. Structure: Organization, assignments, assessments

4.3.1. Course critique: positive

Team projects were good but unfortunately things seemed rather unorganized.

I had a good time in this class and learned a lot, thanks for a great semester.

4.3.2. Course critique: negative

The big project because it could have been a lot more organized from the get-go. Division of labor and communication were poor.

4.3.3. Course critique: change

Also, people need to be graded (not just credit - no credit) on more than just the team project. This semester the projects had too many people in each and were too disorganized to reflect anyone's grade for the whole semester accordingly.

The teaching staff needs to get its act together before coming to class. There needs to be a sense of purpose, structure and organization. Way too

much time was wasted talking about what we're supposed to do, how we're supposed to do it and why the point wasn't made clear in the first place.

The course project needs to be better organized. You should know more about the project before the semester begins. A project needs some structure before it gets handed over to the students.

Eliminate the seminar chronicle and reading and focus more on the team project but keep IRP.

Set up ways of using student generated information better, less time and energy wasted.

Concentrate the course around the team project and don't dilute it with other assignments.

...Less structure.

Besides the former suggestions of organization, I believe the course is well integrated. Need better system to conduct projects....

More organization and time consideration may be helpful, so that we can accomplish something!!!

Have the major project be the only focus over the entire course without any other assignments.

Less material packed into one day - always rushing and concerned with time. We should have been able to pick our own topic for the research project and been given more freedom with the way it was to be done. Definitely less people to a group.

4.3.4. Questionnaire: change

Have the teachers give a better outline of what is expected to be found out. Depending on the type of project, perhaps (groups) smaller (than 8). MP

Learn more about what project entails at onset. FP

To have a distinct guideline and approach to the topic. FT

Have a specific plan we need to follow to complete research (as in 462's research program). MP

Communication is a must. Once a week to meet as a complete group doesn't cut it. More required weekly meetings are a must. And more centralized form of communication would help as well. E-mail would fill this, if utilized appropriately. MP

4.3.5. Comment cards:

1/Sep 2 I found the course well outlined and organized.

1/Sep 2 ...seems like a lot of fun. I'm excited about being in it.

1/Sep 2 ...good job of creating an inclusive, interesting class atmosphere...seem to have low expectations of students' abilities to communicate, turn papers in on time, work together, etc.

1/Sep 2 The overview was complete and interesting, if a bit long, and the groups seems fun.

2/Sep 9 We spend an awful lot of time just getting organized and talking about what we'll be doing. We might save time if we just did stuff, without talking to death first.

2/Sep 9 I don't think this class has too much work. It is a 600 level seminar -- hopefully the students in this class have learned to work hard in the past 3-4 years that most of us have been here. The subject "campus environment" doesn't really thrill me though -- I'm in my 5th year and very ready to look beyond the campus. I'm still optimistic about the class but would have been more interested in studying the campus freshman or sophomore year.

3/Sep 16 Things to be improved upon -organize, organize, organize; conciseness; efficiency.

4/Sep 23 I feel you are crowding too much stuff in too little time, which leads to confusion, which wastes time. ... On a good note -- I like the class.

4/Sep 23 Tonight's lecture was particularly enjoyable because it was so well organized. I really appreciate the fact that the agenda was maintained.

4/Sep 23 The speakers were quite interesting, and the limited time was a good idea.

4/Sep 23 I wish we would have spent more time discussing our team projects (paper recycling - transportation) but I guess we'll find out more about it next week, hopefully.

5/Sep 30 I think part of the overall team project is working out, as a team, how to go about the specific project. Therefore, I think the identification of the steps is unnecessary. Most of us are seniors and have experience working in groups, we are not stupid.

5/Sep 30 The format and requirements for the Team Project was very well presented. Good Job.

5/Sep 30 Class ran very smoothly. Excellent organization.

5/Sep 30 I wish we had more of a choice of the team projects we are about to begin.

5/Sep 30 Getting started on team projects was better with helpful outline & timeline & introduction by teaching staff.

7/Oct 14 Things seem to be moving along though the structure is rather inconsistent.

12/Nov 5 I'm really unclear about how the grading will work for the paper. In the syllabus it says that we will be grading each other. I can't imagine how that can happen. Once in our groups we sub-divided into smaller groups. I really have no idea who did what in the other groups & therefore do not feel qualified to grade them. On the same note, I don't think anyone (except X) has any idea what I did, so how they grade me? A lot of people did not get involved until the end while I did most of my work at the beginning. I think a lot of people are unaware of that. (Some have even gotten a little snooty.) Anyway, how is this to be addressed?

14/Dec 2 I was a little shocked to find out that we are going to have to write that essay, I was hoping we were not going to have a final.

14/Dec 2 I'm not too excited about writing a summary on the 16th, especially since it is coming completely by surprise. This time of year people don't need any new surprises.

14/Dec 2 I protest! We've done individual reports, data profiles, reading summaries, huge projects, and oral presentations throughout this entire semester. Surely you have enough criteria by which to grade us. What's the story on this summary period essay?

4.3.5.1. Summary:

Number of assignments: A strong sentiment was expressed for streamlining--and simplifying--the course by reducing or eliminating many class assignments so that more time and attention could be spent on the team project.

Project organization/structure: Students expressed often polar views on course organization provided by the teaching staff: either there was not enough structure or there was too much structure. Some students expressed a strong need for certainty in laying out the course schedule ("Have a specific plan we need to follow to complete research"), while others seemed up to the challenge of an upper level seminar ("I don't think this class has too much work. It is a 600 level seminar-- hopefully the students in this class have learned to work hard..."). Indeed, all of these perspectives can operate simultaneously, given the multi-layered nature of the course, and the different expectations and needs of different students.

Assessments/grades: The strategy for evaluating the students work generated only a handful of comment cards and no additional input in the course critique or post class questionnaire. Comment cards, interestingly, never received any comments.

4.3.5.2. Discussion:

Number of assignments: The group project was one of four major assignments in addition to preparing summaries of course readings. (See Appendix 5.) Most students did not seem capable of managing the multitude of assignments required by this course. While there is value in introducing a challenging, and hopefully stimulating array of tasks, an appropriate balance must be struck. Many students seem to have resolved the excess demand on their time by "triaging"--that is paying attention only to the salvagable assignments and allowing some assignments to die--or be attended to by their group partners.

Project organization/structure: Although similar to the Fall 1991/ IES 600 seminar, this course was different in many respects: teaching staff, assignments, grading policy and large research teams with client driven objectives were all new. As a result, there were times during the semester when unclear or inadequate information was provided to the students. Confusion was also compounded by the variety of assignments. Students and teaching staff could not always keep up with the ambitious agenda. At other times, the teaching staff may have over-anticipated the need for organizational structure, resulting in additional frustration.

Assessments/Grades: Grades for assignments in this course combined a number of different strategies including credit/no credit, individual grades and group grades (See

Appendix 5.) The group project accounted for 40% of the overall grade. One grade was assigned to the entire group by the teaching team. The other assignments were based on a credit -no credit format. Comment cards were used as a means of soliciting feedback from the students. During the following class session the teaching team attempted to deal with the concerns and issues expressed in the comments. In several ways this technique was similar to the reflective evaluation of praxis used by instructors in the ARCPS model.

4.3.5.3. Recommendation:

Number of assignments: If the CERP model is used in an IES 600 seminar in the future, teaching staff should be careful to scale other class assignments so that students are not pulled in too many directions. Other assignments can be woven into the course, complimenting the group project, without overwhelming the students. Even if a group project is the major focus for the semester, time will be short--especially if students are given the opportunity to work on implementation of their research recommendations.

Project organization/structure: The learning experience should be structured so as to encourage creativity, initiative and self directed student rule within defined parameters. Some tasks should be presented with specific and rigidly imposed structures (e.g., the campus based scope and the research topic issue areas-- as deemed appropriate by the teaching team). Within these parameters maximum latitude should be encouraged--striking a balance between freedom and responsibility.

Assessments/grades: Comment cards were an effective strategy for providing the teaching staff with immediate feedback on the course's progress. As a tool for student reflection on *their* educational experience, the comment card exercise might be improved if

weekly topics were suggested, such as: identifying group successes, suggesting ways to improve communication or assessments of useful techniques employed by the teaching staff. These weekly topics might help students to reflect on issues in addition to what disturbs or distresses them.

The teaching team's use of alternative grading strategies, seemed to compound the students' anxiety over their academic achievement--especially so for the group grade on the team research project. This is a complex dilemma: the teaching team wanted to wean students from their GPA quest while at the same time encouraging self-regulated academic excellence, in addition to satisfying the university's requirements for a letter grade. Quite possibly, it might be expecting too much of some students, this late in their academic lives, to give up grades, in favor self motivation..

4.4. Structure: Time management, class period

4.4.1. Course critique: positive

The team project was probably the most worthwhile, although we should've started on it sooner, because it was the most involved.

The team project was most worthwhile - more time for this would be nice, more depth could be added.

(Team project worthwhile but). ..we should have had the whole semester to do it.

4.4.2. Questionnaire: positive

....and time management. FT

...learning to divide one's time efficiently. MP

4.4.3. Questionnaire: negative

Budgeting your time. FP

4.4.4. Course critique: change

Break class up into more than one class period - It's too long - and too late at night. Not everyone likes night school.

I have two big comments: The class should meet twice a week for about an hour and a half each time. This would allow project members more time to meet, scheduling meetings was a nightmare 12. Better deadlines and overall guidance on assignments.

Also more time should have been spent on team projects, so that we could have actually seen an implementation of some of our suggestions.

I would start the team project on the first day.

It would be easier for the class to meet twice a week. Once a week does not allow for easy meetings between classmates. Perhaps a 2 hour and 1 hour session.

Keep the general format, maybe start the big team data report earlier?

4.4.5. Questionnaire: change

Have a longer time to work on it. FT

Start sooner! FT

4.4.6. Comment cards:

1/Sep 2 I'm concerned about keeping up and finding mutual time to meet partners.

4/Sep 23 I can't imagine how such a large group is going to work together to produce a cohesive product. Time is always such an issue!

8/Oct 21 I have a little problem with the way a timeline has been set up for the paper project and we are being pushed to get things done at a certain time. It seems that the realization of what it

takes to get it done is not happening. I think a little more time in class to organize and discuss would help.

4.4.6.1. Summary

Length of class meeting period/frequency: The class met once a week from 5:30 to 8:00 PM. This late evening time period posed a stamina challenge for some students. Students are more accustomed to receiving their education in fifty minute time chunks. Several students identified the 2.5 hour once a week class schedule as an operational constraint on the course.

Chronological order of assignments: Many students indicated that the group project should commence earlier in the semester. It is not always clear if these same commentators are suggesting that the order of assignments be changed or if the other assignments should be eliminated.

Time management: As early as the first class session one student expressed concern about time conflicts and the need to find time to meet classmates.

4.4.7. Skill acquisition: Time Management

	Frequency				Effectiveness			
	++	+	0	NA	+	=	-	NA
2. Scheduling my workload to successfully collaborate with others .	17	0	0	0	10	7	0	0

4.4.7.1. Summary:

Frequency: Unanimous agreement that the group project provided many opportunities to develop time management skills. Effectiveness: Many (10) indicate that

the team project experience was more effective at teaching time management skills than other courses. This finding is not surprising given most undergraduate courses do not require collaborative group projects and therefore the opportunity to develop this skill. I wonder, however, if the team project experience actually changed a student's time management habits. In other words, were habitually irresponsible and tardy students just left behind, while well prepared, time conscious students made to carry the ball?

4.4.8. Attitudinal: Time Management

	5	4	3	2	1	0	N	ttl
1. I learned how to manage my schedule so I could be in sync with others.	4	11	2	0	0	0	0	17
2. It was difficult enforcing responsibility- people rarely completed their tasks on time.	3	6	3	4	1	0	0	17

4.4.8.1. Summary:

1. Majority (15) agree that they learned time management skills.
2. Many (9) express other people were not abiding by time agreements.

4.4.8.2. Discussion:

Class period/frequency: The CERP model requires a large block of time to accomplish the tasks associated with a group project. Time together is essential if the group is to develop the intra-group relationships that will lead to useful learning outcomes.

Chronological order of assignments: The order in which skills are presented is critical to group cohesion and individual growth. If we are to be successful teaching students the skills necessary to become environmentally literate citizens then a logical and

incremental process is called for. If the demands are too advanced for the student then rather than provide an empowering learning experience we feed the cycle of despair that comes from unrealistic expectations. This is not always as simple as would seem. Some students will always be ready to act sooner than others. To restrain some, while remedial work is conducted with others, is frustrating for all involved. In any case, due consideration must be given to building skills, incrementally.

Time management: The success of a group project is linked to the fulfillment of agreed upon tasks. When unrealistic deadliness are established and imposed, a recipe for disaster is set in motion. Setting and keeping to deadlines is a skill that few students, or for that matter adults, possess. Once a deadline is set there are only two options: meet it or don't meet it. However, students tend to treat deadlines relativistically: there is late by a couple of hours or days, which is nearly early; and there is late by a week, which is about on time; finally there is really late, which has come to mean it will never get done. A group project compounds these behaviors until near chaos reigns.

A certain amount of flexibility is appropriate. No one can account for all future contingencies that might beset a group. Conversely repeated revisions of timeline erodes confidence and tends to reward the chronically tardy. Again a balance needs to be struck between deadlines that help to encourage well paced contributions toward a goal and deadline expectations that do not account for the diverse constraints that complicate peoples lives.

4.4.8.3. Recommendation:

Class period/frequency: It would be appropriate to have at least two lab periods scheduled during the week to help facilitate group meetings, preferably early in the day when energy levels are highest. However, scheduling a class period in the late afternoon or early evening may still present the best opportunity for accommodating student's schedules, particularly if the IES 600 class is a required course for the Certificate program.

Chronological order of assignments: If the recommendation to focus the entire class around a group project is implemented then this issue becomes moot. It is still important to consider how assignment are ordered within the single project class design. Small steps and small wins should precede more complex tasks.

Time management: It is advisable to spend a significant amount of time early in the process establishing good time management skills. Setting significant deadlines early in the semester will certainly involve stress and conflict--and no doubt a deadline will be missed. The teaching team can then use these occurrences to call attention to the importance of group commitments and good planning.

4.5. Structure: Experiential, real world complexity, relevance

4.5.1. Course critique: positive

(Group project good)... But I wish I knew for sure that it was going to be used for actual campus policy

4.5.2. Questionnaire: comments

I hope that this project will show people -administrators the public, faculty and students themselves -that intelligent, practical solutions to environmental challenges leap from the minds and hearts of dedicated

motivated people. We can work together to help this planet and ourselves, and I believe we can even enjoy it. FT :

A very interesting and thought provoking survey! I found myself wanting to write answers instead of circling numbers. I am now working for Scott Paper Company as a process engineer. Several of my projects are involved with solving the difficulties associated with high recycled fiber content in our processes...and the world gets smaller! MP

4.5.3. Comment cards:

1/Sep 2 I'm pleased this class will be focused on political issues as opposed to more theoretical topics. Many IES classes seem to get lost in the less applicable theories and lessons.

1/Sep 2: It kept everything interesting. You may want to explain the history of CERCM and CESI and how you got to developing this class.

2/Sep 9... I feel a little burnt out on the IES program. It has proved to be incredibly repetitive and depressing (subject matter). I think there needs to be more action involved.

4/Sep 23 I don't know, but I've got this feeling that we're just pawns for an administrative game. Maybe it's just me.

5/Sep 30 I'm glad to be starting our big project. It feels good to do that will hopefully have a positive impact.

14/Dec 2 ...little emphasis is placed on quantitative research, and much is placed on esoteric green talk. Excellent to have Duane Hickling.

4.5.4. Attitudinal: Experiential learning, Skill relevance, Organizational complexity

	5	4	3	2	1	0	N	ttl
1. Learning by trial and error is a waste of time. I prefer lectures where we hear the facts from experts. (Experiential learning)	0	1	1	6	9	0	0	17
2. The skills we learned and developed during this project will be useful in my future career. (Relevance of skills)	3	11	2	1	0	0	0	17
3. I learned how big this university really is in cold numbers-how much work and money are actually involved in operating this place. (Organizational complexity)	2	12	2	0	1	0	0	17

4.5.4.1. Summary:

1. Majority (15) disagree that lectures are a preferable way to learn and experiential learning situations are without value.

2. Majority (14) agree that skills learned during the project are relevant to their anticipated future work.

3. Majority (14) gained new awareness of how a complex organization operates.

4.5.4.2. Discussion:

Experiential learning: Learning by doing, while often difficult to manage from both the student and educator's perspectives, can be a valuable learning strategy, however, it requires much supervision and guidance to be effectively conducted. The data suggest that these students had a preference for applied learning situations.

Relevance of skills learned: An education should be judged by its usefulness. Education that fails to connect the learner with the wide world is a waste of time and

resources. The comments, as detailed in 4.5.2, seem to suggest that the group project connected in meaningful ways for these two students.

Organizational complexity: Unfortunately, many students' university education experience is confined to the classroom where textbook learning creates a simplified and easily defined view of the world. This often leaves the student unprepared for the complexity of the "real" world upon graduation. The team project seems to have provided students with an eye-opening opportunity to get closer to the inner workings of a large organization, an operation with significant environmental impact: the university campus. Exposure to this complex system may have valuable transfer value to other organizations which the student may encounter throughout life.

4.5.4.3. Recommendation:

Experiential learning: It may be unreasonable to expect that opportunities for experiential learning will increase at a large university that is experiencing a shrinking budget. The CERP model requires small teacher/student ratios and a sizable commitment of time on the part of the client and faculty. However, in selected settings (where class size can easily be limited) continued commitment to experiential learning is essential to training environmentally literate citizens. One creative way to overcome the time and instructor constraints might be to develop student mentoring relationships. Students that have completed an action research project could be recruited for a second semester as a "junior" teaching assistant, thereby relieving some of the responsibilities of the teaching staff.

Relevance of skills learned: The teaching staff must remain mindful that group process and problem solving skills are the foundation upon which the environmental management issues can be acted upon. While mastery of the technical elements of an issue are important to the discourse, the lasting value of a group project for the student is the sense that they learned *how* to conduct an action research activity. More emphasis on problem identification and conflict resolution skills would be appropriate.

Real world complexity: Introducing a student to the so called "hard-reality" of the wide world will probably temper their idealism that issues can be easily fixed. While this reorientation is valuable, the teaching staff must recognize that students must not be left feeling used or discouraged by their contact with the administration. Many students are already feeling cynical and despairing about the world they are about to inherit. Hope comes from seeing that little things can change. Therefore, it bears repeating, projects need to be scaled appropriately so that students gain an understanding for complexity without being overwhelmed it.

4.6. Process: Cooperation, trust, team building

4.6.1. Course critique: positive

> Overall it was a great experience - learning and working...lots of people interaction, etc.

> I've made a lot of great contacts in this class, and some really great friends, but now I'm leaving. I would have liked to have made these contacts sooner.

Ranked form the most to least worthwhile - team projects, individual research projects, profile data reports. The team project teaches you to work with other people...

Profile data reports and in some ways the team research projects were good. They taught us good group cooperation.

The main projects, i.e. - paper purchasing and transportation. Taught us how to work together and be professional.

4.6.2. Questionnaire: positive

Learning how other people think and work. Getting a new perspective on what you're working on. (FP)

The advantage of learning patience, tolerance coordinating skills..." (FT)

Exchange of ideas, ...and group support, team work experience." (FT)

People are the greatest resource to us all. Its like having a team of supercomputers working at your disposal..(MP)

Learning to cooperate with others...(MP)

4.6.3. Course critique: negative

The team projects really stressed me out, especially after everyone jumped ship when they all got sick of it. Maybe it should have been started earlier.

4.6.4. Questionnaire: negative

Frustration of hashing and rehashing the same things over and over.

Having to work with people who don't really want to learn anything.

Trying to convey your own ideas when the group is so big.

Frustration galore.

You often spend more time tracking people down and trying to get them to get their particular tasks done, than you spend learning a doing a thorough job on your task.

When the group doesn't work as a team, progress is slowed. To use a cliché, a chain or web is only as strong as its weakest link. Sometimes personal progress can be slowed by weak individuals, especially if you put your trust in them.

Holding people accountable to their tasks and feeling so frustrated that people don't do their jobs that it made me feel that I didn't care about learning about the project, I just wanted to finish.

4.6.5. Comment Cards:

6/Oct 7 I'm looking forward to getting started on the big project!

6/Oct. 7 Just a note about the way our groups have started off: It's really difficult to try to work off 3 people's ideas of what the group should be like. What I mean is, that I would have preferred going over our groups goals and framework as a group so we could all have the same approach to our project. Not that I have problems with what was written out but I feel unprepared and its just begun. But once we go over things and can verbally get associated with our tasks it will be OK. I think group work would be better if the group can get together and each come up with their own formulations, etc.

7 Oct. 14 I'm very pleased to see the direction our team projects are taking. It looks as though we've got a great game plan going here.

10/No 4 Nice job on the stress/tension presentation. I didn't necessarily agree with everything but it was definitely needed.

10/No 4 Ugh! Positively ugh...

10/No 4 D. Einstein's comment on 'how I view the world and my ability to work with others' struck home. Behavior and respect with meaningful communication can accomplish any task. Despair and cynical behavior concentrates on regression, not progress.

10/No 4 Diligence would help us in putting out a polished final product.

4.6.5.1. Summary:

Students experienced the full range of emotions as the group experience unfolded. Positive commentary included: 1) Appreciating for the value of synergy in a cooperative group project; 2) Having opportunities to develop interpersonal and professional work skills and 3) Learning group dynamic skills such as patience, tolerance and trust. Critical comments included: 1) Frustration over different expectations for group participation; 2) Anger over unfulfilled commitments and 3) Impatience over slow progress on group decisions.

4.6.5.2. Discussion :

All of the experiences described in the student evaluations are typical of group interactions. While not always pleasant, the conflict and negotiations that the students experienced present excellent opportunities for personal growth. Observers of the group dynamic process often refer to four stages of group development: 1) Forming, 2) Storming, 3) Norming, 4)Performing. Interestingly, the chronological presentation of the comment cards reveals this process occurring during the group project. *Forming* is characterized by enthusiastic anticipation ("looking forward to getting started") and boundary challenges (I think group work would be better if..."). *Storming* is the most challenging stage for a group. Feelings of frustration and tension are typical as the group develops an identity and struggles with the group's goals. The *norming* stage is often characterized by members showing acceptance for each other and their ideas and attempts to achieve harmony through conflict management. ("Behavior and respect with meaningful communication can accomplish any task.") Finally the group is able to

traverse the final stage, *performing*, show satisfaction in their work and are able to work constructively.[1]

Sometimes a group can become stalled at the storming stage--never resolving their differences. By week ten it was obvious that both groups were experiencing the symptoms associated with this stage: tension, challenges to the group direction and leadership (both peer and teaching team), conflict and negativism. In a short presentation and open discussion I acknowledged the "rightness" of this stage in the group's development. I shared my view that while not always easy, the clash of ideas, perspectives, working styles, and expectations, are events universally experienced by most groups. Bringing the issues out into the open seemed to relieve some of the anxiety over "doing it all wrong."

4.6.6. **Attitudinal : Peer Learning and Trust**

	5	4	3	2	1	0	N	ttl
1. I learned from other student some useful new perspectives on how to tackle complex environmental problems	2	13	1	0	1	0	0	17
2. I learned not to trust other students or rely on their judgments.	0	1	3	9	3	0	1	17

4.6.6.1. Summary:

1. Majority (15) say they learned useful new perspectives from each other. Strong concurrence that a group learning process results in peer teaching. As contrasted with the more prevalent classroom format where individual students are made to compete

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[1] Scholtes, P.R. 1988. The Team Handbook: How to Use Teams to Improve Quality. Joiner Associates: Madison. p 6-4.

with each other--sometimes resorting to cheating and sabotage--the group learning experience provides an opportunity for shared success.

2. Majority (12) indicate that mistrust and loss of peer reliance did not occur. Due to the negative phrasing of the question, we cannot necessarily infer from the data that student learned to trust each other in new and useful ways. Did students truly develop trusting relationships or did they merely defer to others after becoming so frustrated by the collective decision process? ("I didn't care about learning...I just wanted to finish.") How do we achieve appropriate "buy-in/commitment" from students for an experience that you can wait out if conflict resolution is not being addressed? Is there enough time for trust building to occur in the a semester?

4.6.7. Attitudinal: Working Styles and Differing Views

	5	4	3	2	1	0	n	ttl
1. I learned how to be patient and tolerant of other people's working styles.	6	10	0	1	0	0	0	17
2. It was impossible cooperating with people who had different views than my own.	0	0	2	8	6	1	0	17

4.6.7.1. Summary:

1. Majority (16) indicate patience and tolerance were learned. These attributes are integral to functional group dynamics, yet given the level of apparent unresolved frustrations in both groups, was there true acceptance or did pragmatic acquiescence as expedient way to move ahead preside? When is it appropriate to be intolerant of broken promises, inadequate contributions and disregard for the well being of the group?

2. No respondents indicated that "group cooperation was impossible". The

phrasing of the statement only gauges the extreme case of group dysfunction where conflicts go unresolved. The data suggests that individuals were able to work through their values conflicts. Once again the recognition that the semester time constraint "resolves all conflicts" must be noted.

4.6.8. Skill acquisition: Interpersonal/interaction

	Frequency				Effectiveness			
	++	+	0	NA	+	=	-	NA
1. Dealing with people who have different ideas than me.	12	5	0	0	11	5	1	0

4.6.8.1. Summary:

1. Frequency: Majority (12) indicate they often interacted with people holding different perspectives than their own. Resource people, teaching staff and, not least, peers often assert ideas that are new or contrary to the students' beliefs. Effectiveness: Majority (11) indicate that the group project was more effective at creating opportunities for this experience to occur than other classes. What the question does not capture is how effective the class was at presenting communication and conflict resolution skills that might make interactions between two disagreeing individuals more productive or satisfactory.

4.6.8.2. Discussion:

Managing a successful group process is not simple--to wit frequent examples of dysfunctional committee work and imploding political initiatives. For this reason, the skills that lead to successful group work must be given due attention in the planning and implementation of a group project. While the project outcome is critical, a bad group

project experience tends to re-enforce attitudes of hopelessness and loss of power that are at the core of an apathetic citizenry.

While a group project presents these learning opportunities as a natural outgrowth of the structure, the teaching staff needs to be prepared in the skills of conflict resolution, consensus building, and idea brainstorming to take full advantage of the "teaching moment." These skills must not be left to evolve by themselves. To ignore these techniques will result in participants resorting to those skills that they have been exposed to in their past, which from the author's perspective, are misguided and contrary to program objectives: isolation, personal attack, powerlessness, and apathy.

The most powerful advantage of group work is the prospect of a synergistic outcome--where the whole is greater than the sum of the parts. However, the dark side to synergy, entropy, can cause a group effort to result in lost effort, frustration and dejection if not properly managed. In a compact (semester long) effort there is not much time to lose. When individuals fail to meet the groups (or other individuals) expectations a negative cascading effect occurs--group moral is diminished, credibility is lost and group effectiveness may never recover.

4.6.8.3. Recommendation:

It is not always easy to disengage from the drive for a completed project to focus on the issues of trust, commitment, constructive criticism, vision and purpose. If the teaching team does not have the facilitation skills to conduct the activities that promote these attributes it might be sensible to bring in an outside resource. Of course, this raises

the issue of time constraints--when time is short it does not seem prudent to examine the sticky and unpleasant underbelly of group work. This is a typical response in a conflict averse culture. Yet, if an environmental education experience is to prepare citizens for active participation in resolving the ecological crisis, than group dynamic skills must be an integral--if not central--focus of the process.

4.7. Process: Leadership, Decision Making

4.7.1. Course critique: change

...allow a "team hierarchy" to be established earlier in the project allowing the rest of the semester work to flow.

4.7.2. Questionnaire: negative

Give out responsibilities. MP

If people do not know how to work in a group--for example how to listen, delegate, suggest, and constructively criticize-- it can make things difficult.

In a large group (i.e. more than seven people) the decision making process on project topics such as the research format, report format, editing procedures and the variance of research quality and thoroughness of research deletes (sic) from a thorough research project. FT

By inherent nature, groups can be slow to reach consensus. Process can become unwieldy. MP

Delegation of tasks and completion. Assign priorities MT

4.7.3. Questionnaire: change

Establish more of a hierarchy early on; we eventually established our own, but it wasn't until editing time and the project was nearly over! FT

I would establish that for each sub-group, a spokesperson reported to the larger group. This spokesperson could change, however. The responsibility could be rotated. FT

There are some decisions that need to be made more autocratically (less divisiveness once decision is made). MP

Have leaders appointed by the group at the first meeting. Leaders for the group would be good for direction and having a point person to turn to when (we) need to find out who's doing what. These people wouldn't be doing most of the work, they just know what needs to be done and they assign people to do them. MP

Maybe more leadership or direction. MT

(Do) not (change) a thing. Each (group) will develop their own approach. Cannot rely on someone to tell you how to do it. You have to figure it out. MT

Appoint task leaders or coordinators. MT

4.7.4. Attitudinal: Leadership

	5	4	3	2	1	0	N	ttl
1. The instructors should assign specific roles and responsibilities for each group member.	1	1	0	12	3	0	0	17
2. I would have preferred it if our group had appointed student project leaders right at the start.	4	5	2	6	0	0	0	17
3. The students should select a peer to lead the group so tasks can be delegated.	3	6	4	4	0	0	0	17

4.7.4.1. Summary:

1. Majority (15) oppose assignment of responsibilities by the teaching team.

2-3. Fewer students (9 in the 4/5 range) indicated that they wanted group appointed leaders. This apparent ambivalence suggests a preference for some kind of balance between external control and peer leadership. Do some students fear giving their power away to other students or do they fear they might have to take responsibility themselves? If the standard work world model of external leadership control dominates,

are we as educators obliged to conform or do we explore new strategies? Is there really time to develop the interpersonal skills necessary for non-directive leadership?

4.7.4.2. Discussion:

The dominant leadership style in this culture is based on hierarchical top down models. Many respondents showed a strong and consistent preference for organizing the project accordingly. I suspect, however, that what students describe in their critiques was not a lack of leadership or direction but disagreement on *what* direction the group should take. This confusion is implicit in the comment: "there needs to be some decisions that need to be made more autocratically--less divisiveness once the decision is made." If you don't like the message kill the messenger. If you don't like the decision get a new leader.

Effective leaders do not so much impose their will on their followers as interpret their needs and coordinate the process by which goals are attained. This relationship requires an exchange of trust between a leader and the led. Trust takes time and shared experience to thrive. In this context the student's remark, "...we eventually established our own (leadership hierarchy), but it wasn't until editing time and the project was nearly over!" is not unusual. Leadership is a process that develops over time. It rarely shakes out until the group has matured.

It is no keen insight that young people can be rebellious and irresponsible. Calls to assign tasks, delegate responsibility, and appoint leaders are unlikely to make much difference. These are structural solutions to a process issue. Tasks must be relevant to

the project outcome, responsibility must be accepted and leaders must have the support of the group. There is the telling and the doing. The lone comment dissenting from the more -power-to a leader crowd suggests a route built on internal locus of control: ("Each group will develop their own approach. (You) cannot rely on someone to tell you to do it. You have to figure it out."

4.7.4.3. Recommendation:

Despite student comments calling for external imposition of a hierarchical leadership model, this may not be an appropriate response. If the teaching team "installs" a leader, this may serve to reinforce the students' sense of powerlessness. True leadership must spring up from those that will allow themselves to be led. However, students should receive guidance from the teaching staff on decision making and leadership techniques that are fair and democratic (e.g., consensus building, brainstorming, non-coercive facilitation). In this way the teaching staff can help guide the process that makes it possible for the group to proceed efficiently towards a task outcome.

4.8. Process: Student/Teaching Staff Relationships

4.8.1. Course critique: change

I'm sorry we didn't get to see Evelyn more.

David: try to be more supportive than critical. A little positive reinforcement goes along way. Although teaching assistants shouldn't interfere with the project, they should be there to provide a backbone.

An idea about the comments given on papers: Instead of saying this is wrong, this is wrong, etc.; it would be useful to explain why. We all know how to write and in some cases I felt our word choice was better than that you gave (except of course for these comments)...

I like the team project though and I think it taught some valuable lessons - but also think there should have been a little more help of emphasis from the teachers to keep us on track and prevent the "cram" at the end of the project! I think this would result in a better final output! Also, relax. If we're getting into a good discussion where people are actually being thoughtful - don't cut them off - go with it! A bunch of separate "research projects" don't result in an integrative seminar!

Less TA's, people...

I would've liked more feedback on my progress. Too many instructors. I only got to know one TA.

David Daniel, Christine and Evelyn: Please be consistent when you grade papers. Your comments are helpful, but not when they contradict each other!...

4.8.2. Comment cards:

1/Sep 2 I'm intrigued by the nature of the course. Interested by the intensity, and encouraged by the teaching staff.

1/Sep 2 It looks like the teachers have done a good job getting the class together. I look forward to working with each of you and am excited about the enthusiasm shown today.

1/Sep 2 I'm looking forward to working with Evelyn -- I've heard a lot of nice things about her in the Botany Dept. and wasn't aware she would be involved on 600.

1/Sep 2 I like the relaxed and personable attitudes held by the teaching team I'm concerned about the deadlines.

1/Sep 2 I like the fact that we work in groups and have projects rather than exams. It's good to switch speakers often, like you did, because that's more interesting. Thanks for being enthusiastic and encouraging.

1/Sep 2 I like the fact that we do group projects and are encouraged to work with people we do not know. Most classes on this campus are too big and most TAs, professors don't care to do it because it is too much work.

1/Sep 2 Enjoyed the four person teaching panel. It allows for nice diversity.

1/Sep 2 I liked the staff's (teachers') introductions. Good to keep everybody close and friendly, and make a well-knit group out of all the individuals. I think the "Consulting team" is a good idea.

1/Sep 2 The teaching team seems very enthusiastic about the coming semester. I like the tone that has been set so far. I think it's going to be an enjoyable class and I think I'll get a lot out of it.

1/Sep 2 Pardon me, but I didn't quite understand Dan's relationship to Albert. Is David going to enlighten us with yarn/twine crafting? I think it would be cool. Overall, good enunciation from the group.

2/Sep 9 It's cool that you asked for feedback from us about our classroom environment. Fostering an atmosphere in which we all feel important and respect each other will encourage us to cooperate, communicate, and work hard.

2/Sep 9 I was thinking it might be nice if Christine became more visible in the classroom. i.e. -- bigger role in telling us what is going on.

3/Sep 16 Today seemed to drag a bit. The subject matter was a little dry. I appreciated Daniel s interludes of movement and less-seriousness or shall I say silliness.

3/Sep 16 Nix the 'Simon Says' in favor of more discussion.

3/Sep 16 Simon Says thing was dumb.

4/Sep 23 Christine is a really helpful TA. I'm bored. Sorry.

5/Sep 30 I dislike the way the "discussion" went today. I don't think people should raise hands & be called upon by David -- or anyone else. The constant clock-watching limits free flow thought & discussion. You constantly ask yourself "Is what I have to say worth everyone's time?" I know we have only one meeting a week, but maybe we shouldn't plan to get so much done if it means such a controlled environment. I thought this class would be different in that sense, but maybe it was a misconception.

6/Oct 7 It seems that the class runs smoother when there are only two instructors.

6/Oct 7 *I like the way you respond to any comments from the week before at* the beginning of each class.

7 Oct 14 Right on Dan! I was thinking about scope too!

8/Oct 21 I think Daniel phrased his question (about weight vs. volume) rather obnoxiously of more like he knew what was right and the group was wrong period.

12/Nov 5 Comments: I'm so happy how I've been able to get to know so many people so well in this class. Even though we came together because of a hell paper we needed to write, our bonding was very invigorating. This class has helped make this campus feel comfortable and small. It's been a great experience. I appreciate the immense amount of time and energy you put into our paper. Thanks.

12/Nov 5 Thank you, Evelyn for recognizing our frustration with these projects!

12/Nov 5 On behalf of my fellow classmates in 600 ...You don't like pie graphs...So what!!! Maybe someone else loves them -- What does this point have to do with the price of rice in China? Are you not being a little picky and opinionated on some of your petty points.

14/Dec 2 Evelyn is really super duper cool!

14/Dec 2 Thank-you for arranging it so we could meet Duane Hickling.

4.8.2.1. Summary:

The early comment cards evoke the initial enthusiasm for the intimate teaching team model ("...excited about the (teachers) enthusiasm.", and "I liked the teachers introductions. Good to keep everybody close and friendly.") Similarly the inclusive notion of a collaborative learning experience composed of students, instructors and administrators was viewed favorably: ("...the consulting team is a good idea" and "It's cool that you asked for feedback from us...")

As the semester progressed the students felt comfortable sharing forthright commentary on their learning experience and the instructors who were guiding it: ("I'm

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As the semester progressed the students felt comfortable sharing forthright commentary on their learning experience and the instructors who were guiding it: ("I'm

bored", "The class runs smoother when there are only two instructors" and "Daniel phrased his question rather obnoxiously.") Occasionally an unsigned missive was received: ("You don't like pie graphs. .So what! Are you not being a little picky and opinionated...)

Some comments demonstrated an appreciation for the teaching teams work: (" I appreciate the immense amount of time and energy you put into our paper. Thanks." and "Evelyn is really super duper cool!") The end of the semester critique aired frustrations over what seemed like excessive criticism from David: ("...try to be more supportive than critical.") and at the same time a request for more teacher input ("I would've liked more feedback on my progress.")

4.8.3. Attitudinal: Student/teacher relationships

	5	4	3	2	1	0	N	ttl
1. I liked that instead of just listening to the professor and TAs for 50 minutes we got to work one-on-one with them.	4	11	2	0	0	0	0	17
2. It was great getting so much assistance from the TA.	1	6	7	0	1	2	0	17
3. The working relationships between the TA and the students were too close. This interfered with our learning.	0	0	2	10	5	0	0	17
4. Often it felt like this was the TA's project not the students'.	15	65	4	4	1	0	0	17
5. It would be better if the teaching staff gave more direction on how to organize research activities.	0	12	4	1	0	0	0	17

4.8.3.1. Summary:

1. Majority (15) liked the easy access to the teaching team.

2. Many (7) felt ambivalent about the intensity of the TAs involvement with the group project.

3. Majority (15) felt the close working relationship with TAs did not interfere with the learning process.

4. A cross-tabulation of the data reveals that of the eight students in the 4/5 range only two participated in the transportation group. This suggests that students in the paper group felt that ownership of the project was with the TA.

5. Majority (12) would have liked more direction on how to organize research activities. When contrasted with the responses from questions 2 and 4 above, this may seem contradictory. But a subtle distinction can be drawn between advising and steamrollering.

4.8.3.2. Discussion:

The success of any curriculum initiative is ultimately dependent on the instructors who breath life into a teaching activity. This is especially true in an experiential learning setting where teacher and learner collaborate closely in a shared enterprise. The entire teaching team put their full energy into working with the students. They spent countless hours working with students outside of class, and yet more time reading and editing the reports.

David's personal dedication to the project was extraordinary--indeed he may have crossed the fine line between mentor and guide to quasi-peer with too much personal investment in the outcome of the paper. His ambitious drive may have alienated some students, especially when editing paper drafts. Students respond differently to the same teaching style: while some recognize passionate pursuit of excellence others feel dispirited and bullied by the same hard-nosed critique. Christine's interaction with students was less assertive yet she also demanded high quality writing. Her leadership style was decidedly more non-directive than David's.

4.8.3.3. Recommendation:

A group project demands great quantities of time and dedication from the teaching staff. Indeed, these are important reasons why more group projects are not attempted. Further, helping to coordinate an intensive group process requires deft social and managerial skills. When selecting TAs for this type of assignment, due consideration must be given to the candidate's previous experience working with groups as well as their academic background.

4.9. Process: Student/Client Relationships

4.9.1. Questionnaire: negative

> My personal frustration (and that of many others throughout the semester) was the limited encouragement from Lori Kay. Her response to our final presentation was very positive and reassuring but during the project, morale was pretty low! There was a general feeling that we were all wasting our time...possibly more meetings with the administrators throughout...? I wasn't aware there was a gender issue-why all the questions?!? FT

4.9.2. Comment cards:

2/Sep 9 Duane Hickling was very helpful.

2/Sep 9 I also thought Duane presentation was very interesting and helpful.

2/Sep 9 ...informative and encouraging to hear from Duane Hickling. It is good to see a high ranking administrator who is willing to work with students who are concerned about the campus.

2/Sep 9 Duane was very interesting. I wish we would have had more time to hear him speak.

2/Sep 9 I found the talk by Duane Hickling was interesting. I thought since we are studying how the university works, you could have allotted him more time.

2/Sep 9 A+ for today's seminar. The guest speaker was great. The new room s great.

2/Sep 9 Duane was great. It would've been nice to have him elaborate on more, instead of only covering administrative stuff.

2/Sep 9 Duane was very informative about where to find info for our projects. It was a good idea to have him.

2/Sep 9 I thought tonight's lecture was great because the discussion was very open and the guest speaker was excellent. I hope that we will have more of the same.

2/Sep 9 I found Duane Hickling's talk rather interesting as the make up of the university bureaucracy is not common knowledge.

2/Sep 9 I enjoyed Duane's talk. It made this big Bureaucratic institution seem even as convoluted as I has assumed but in a more organized fashion.

2/Sep 9 It would be good if next time we had more time to ask guest lecturers some questions!!

2/Sep 9 Duane was an excellent guest speaker.

2/Sep 9 The guest lecture was interesting. I'm looking forward to the group project.

2/Sep 9 I think it was wrong to ask Duane Hickling to leave -- I think we could all benefit from the wealth of info he has!

2/Sep 9 I enjoyed Duane's program. It was very informative.

2/Sep 9 Duane Hickling's talk would've been shortened and improved by using a handout with structure & names & he could've spoke more on specific people to talk to for specific info finding purposes.

4/Sep 23 Rex seemed to really be on the ball! Lori Kay also!

4/Sep 23 The speakers were helpful. I'm glad we've gotten into our groups for the big project.

4/Sep 23 The two speakers Rex and Lori, were very helpful with defining what the purpose of our team project was for.

4/Sep 23 I thought the presentations by both Lori Kay and Rex were pretty interesting.

4/Sep 23 Both speakers were great. It is so refreshing to know there really are administrators interested in "the cause." These 2 projects both seem pretty interesting -- let's hope that the results actually get used for something positive!

4/Sep 23 The speakers were effective in that I was torn between the two topics whereas last week I was set on recycling. I'm really excited for this project.

4/Sep 23 Both Rex and Lori were worthwhile speakers.

4/Sep 23 Lori Kay sounds enthusiastic and eager to work with us to gain new insights into possible solutions to transportation problems.

14/Dec 2 It was cool to have Duane here again.

14/Dec 2 It was good to hear from Duane again. Listening to people in power positions is always a rarity.

14/Dec 2 I enjoyed Duane's presentation. His works of advice helped and his enthusiasm for helping us, the customer, is encouraging.

14/Dec 2 Duane Heckling is a very entertaining guy!

14/Dec 2 Duane is enjoyable and enthusiastic. It gives me hope that we can change institutional policy and make our institutions environmentally sound.

14/Dec 2 Duane Hickling's talk was really informative and interesting. I liked how the politics and economics was finally brought into a discussion and the class.

14/Dec 2 I was really disappointed that we had to cut Duane Hickling short. I was really interested in what he had to say and found it very valuable information. He encouraged me to write a letter to Donna Shalala about something that I'm very unhappy about. Again, I really think that there is too much scheduled for one day and a lot of interesting and important stuff is getting shoved off.

14/Dec 2 Duane Hickling's talk and interaction with the class was a real stimulating, interest, and thought provoking discussion. It's good to know that there's at least 1 person like Duane that really cares & takes his job very seriously & takes the time to talk to, interact, & answer questions from students like us on this campus.

14/Dec 2 Thanks for inviting Duane Hickling. That was a provoking discussion. A little more feedback on how we are progressing would be nice. I would like to have an idea of how you perceive my efforts.

14/Dec 2 Thank you, thank you for having Duane Hickling back. His consistent interest and attention to our class clearly demonstrates the interest and accessibility that exists with the administration. He has clearly been another energetic, though provoking individual to add to our guiding advisors in this class.

4.9.2.1. Summary:

Duane's presentations to the class (class sessions 2 and 14) generated the greatest number of comment card responses for any one topic. Students were clearly enamored by his presence and enthusiastic support for the class. I wonder: Were they responding to the person or the position he represented?

Lori and Rex's introductory remarks to the class were also greeted with the flush enthusiasm of a new relationship. They would return one more time later in the semester to hear an oral presentation of the group's preliminary findings. For many of the students this was their only contact with the project clients--although the TAs and a few students did have repeated telephone and in-person contacts during the semester. Nonetheless, the only other mention of either Rex or Lori in the data set comes from a student who suggests disappointment with the working relationship that she and her group had with Lori.

4.9.3. Attitudinal: Student/Client Relationships

	5	4	3	2	1	0	N	ttl
1. The administrator we worked with seemed biased against students.	0	0	2	11	3	0	1	17
2. Having the top administrator for campus facilities management (Duane Hickling) speak to the class helped to motivate me in this project.	5	8	2	1	1	0	0	17

4.9.3.1. Summary:

1. Majority (14) did not feel that the project client was biased against students. However if the comment from FT 11 holds true for the group, does this question capture a sense that positive functional sentiments were felt for the client?

2. Majority (13) assert they were personally motivated by Duane's class presentations. Did the two students who indicated disagreement with the statement find Duane's participation a negative influence or were they saying that they were already motivated or motivated by other variables?.

4.9.4. Attitudinal: Project recommendations

	5	4	3	2	1	0	N	ttl
1. I never felt that the administration really cared about our recommendations.	0	3	6	7	1	0	0	17
2. I felt more committed to the project because we were told the final report would be reviewed and acted upon by university administrators.	5	9	0	2	0	0	1	17
3. Let students work on pushing the recommendations with the administration after the report is completed.	3	6	6	1	0	0	1	17

4.9.4.1. Summary:

1. Respondents opinions are split on the issue of administrative concern with the student's recommendations. More than one-third of the responses indicate "no opinion" suggesting uncertainty and skepticism.

2. Majority (14) indicate that commitment to the projects outcome was enhanced based on the promise that recommendations would be reviewed .

3. Many (9) students indicate an interest in using the research to work on implementation. However, a significant "no opinion" group (6) suggests either ambivalence or lack of interest in taking further environmental action steps. Despite the confusion and frustration encountered during the research phase some students seem to want to tackle a much higher order of complexity with even a slower response time. Does this reflect naiveté or sincere interest in exploring this piece of responsible citizenship?

4.9.5. Attitudinal: Gender role model

	5	4	3	2	1	0	N	ttl
1. It was valuable having an opportunity to work with an administrator/professional role model who is the same gender as I am. MALE- Paper only	0	1	4	0	0	0	0	5
1. It was valuable having an opportunity to work with an administrator/professional role model who is the same gender as I am. FEMALE- Transportation only	5	0	1	0	0	0	0	6

4.9.5.1. Summary:

This table reflects only those response where both the student and the client were of the same gender (i.e., male students in the paper group and female students in the transportation group).

1. Male students did not feel that same gender role models were valuable.

2. Female students felt very strongly that same gender role models were valuable.

4.9.5.2. Discussion:

Project clients: Lori Kay and Rex Owens became the clients in this pilot project for simple and pragmatic reasons: 1) They had participated actively in the CERCM discussions and were familiar with the objectives of the student research initiative; 2) they held managerial level positions in departments that had a need for information and therefore, there was built-in motivation to assist students; 3) the topic areas presented relatively easy task divisions; 4) both departments had already gathered some data that could be analyzed; and 5) the topics represent issues that student behavior can directly affect and for which student interest had been previously demonstrated.

Top Administrator Support: Comment cards reflect an almost reverent awe that a high "official" would come to visit the class--three times! I wonder if the "romance" with him is not unlike the seldom seen out-of-town uncle bearing gifts. The uncle is adored despite the short duration of contact, whereas, the parents (teaching staff) are less well respected because of the different power dynamic (grade control, supervision) and their "ordinary" presence. There is no denying, however, in Duane's case it is both the person and the position that made such a lasting impression on the students. As described earlier, Duane's commitment to CERP is long-standing and sincere. His remarks and intentions demonstrate a refreshing and rarely exercised effort on the part of the administration to work cooperatively with academic units. It is doubtful that the CERP model would have been able to develop without his assistance.

Gender role models: Selecting project clients of both genders was not intentional (it was also coincidental that the TAs worked with same gender clients). However, during

the focus group session, a female student indicated that she felt that gender imbalance in her particular sub-group interfered with her ability to fully participate in the data collection process. This was the first time that I became aware of the possibility that gender issues might play a role in this experience. Based on her comments I included this question to determine what effect gender role models might have had on students.

This question appears to be an example of how open ended question strategies can result in "unanticipated outcomes." It never would have occurred to me to pursue this line of inquiry, had it not been suggested to me. It seems to support the notion that the observer's perspective, in this case a male's, profoundly influences what is understood--based on *which* questions get asked.

Not surprisingly, from my male perspective, most of the male students did not have an opinion on this issue. The female students, however, gave this question the strongest agreement rating of any question in the survey.

4.9.5.3. Recommendation:

Project clients: An ideal project client would be available to meet with students and TAs on a regular basis to work on Project Request goals. Given the time constraints on all concerned, this is not always going to be possible. However, if a lab period were scheduled for students in the class, and this time period did not pose a particular problem for the client, more frequent interactions could be facilitated. This might go a long way to satisfying both the client's need to get usable data in exchange for their efforts, and the students' and teaching staff's need to receive access to the information that will make the research process successful.

Senior administrator support: Sustaining and nurturing the support of a senior administrator is essential to the continued development of CERP. If the model is to become fully embedded in an academic program, as opposed to the current situation where the IES 600 seminar instructor sponsors the campus environmental research concept on a semester-by semester basis, then continued and extended contacts with senior administrators are essential. This continued support may be linked to the generation of useful data--that is future time commitments from administrators may depend on the faithfulness with which Project Requests are written and executed. This perspective may touch off warning bells among some professors who imagine non-academic forces dictating course content. Of course, this is not the intent here. Course content is centered around teaching research and environmental action skills--not necessarily any particular environmental issue. Therefore, assuring useful information to the cooperating administrator is distinct from the teaching activities that contribute to that outcome.

Gender role models: In virtually all senior administrative and academic positions on campus males preside. Lori Kay is but one of two senior management women working for FPM (she was hired only the year before the pilot). For young women considering professional careers, having a same gender mentor with whom they can work may add a special dimension to the learning experience. While it may not be advisable to weight this variable heavily in selecting a client with whom to work, future classes may benefit from an opportunity, for both male and female students, to work with a female client.

4.10. Skill content: Problem solving

4.10.1. Questionnaire: positive

How to coordinate parts of the project into a whole. FT

...problem solving. FT

Learn not only different ideas but different perspectives on methods to discover these ideas. MP

Application of the various skills. MP

Learning to piece together everybody's research. MT

4.10.2. Comment cards:

8/Oct 21 It seems like the paper project trying to meet the 95 requirements will be pretty difficult. The major barriers are mostly technical, and not easily remedied without financial burden. I'm afraid we can brainstorm alternatives till the end of time to no avail. Or maybe not. I think we would be better off putting more into reduction.

4.10.2.1. Summary:

Interestingly, this lone student comment card seems to have captured the essence of a problem solving strategy: 1) Analysis (identify sub issues--"95 requirements"); 2) Synthesis (larger context of issue--the relationship of financial and technological effects on the issue); 3) Evaluation (judging the appropriateness of a possible solution--"till the end of time, to no avail"); and 4) Application (selecting a strategy--"put more (effort) into reduction").

However, this comment coming early on in the group project, is telling in another respect: the student seems to have jumped to a conclusion about the possible outcomes

of the research process. While the issue investigation process is certainly iterative, and strategic realignment is essential, problem solvers need to reserve judgment until sufficient data has been collected. I wonder if this comment was used by the teaching team to probe the common pitfall of premature assessments?

4.10.3. Skill Acquisition: Problem solving

	Frequency				Effectiveness			
	++	+	0	NA	+	=	-	NA
1. Breaking a problem into manageable sub-issues. (analysis)	8	7	1	1	7	9	0	1
2. Seeing a complex problem holistically-in a larger context (synthesis)	11	4	0	2	8	7	0	2
3. Judging the appropriateness of an idea as a possible solution to a problem. (evaluation)	10	5	1	1	9	7	0	1
4. Selecting a useful problem-solving strategy for examining environmental issues. (application)	7	8	0	2	9	6	1	1

(Note: The problem solving terms, analysis, synthesis, evaluation, and application, were not included in the questionnaire.)

4.10.3.1. Summary:

1-4. Frequency: All four dimensions of the problem solving process (analysis, synthesis, evaluation, application) were practiced or developed by the majority (15) of respondents. Effectiveness: Viewed cumulatively, more than half of the respondents indicated that the group project presented problem solving skills more effectively than other university courses.

4.10.3.2. Discussion:

Students volunteered little feedback on this skill, so it is difficult to comment extensively. Indeed this dearth of commentary suggests that the students may not be familiar with the elements or vocabulary associated with this skill. Fragmenting a

problem or issue into manageable pieces was accomplished--but with some effort as is often the case. Re-uniting the elements into a coherent document presented the greatest challenge, as will be discussed in the section on the final reports.

4.10.3.3. Recommendation:

Problem solving techniques, such as those suggested by Hungerford[1], need to be explicitly introduced into this learning experience. Training that incorporates communication, problem definition, conflict resolution, and critical thinking skills, need to be systematically addressed during the research process.

4.11. Skill content: Research

4.11.1. Course critique: positive

> Group project was most worthwhile - group skills, researching, writing. do research to interviews.
>
> Team projects -research skills...
>
> Learning how to contact people and how to gather information on campus environmental issues.
>
> It is important to have the proper mentality, mental ability to get information, by asking, or formatting the question in context to whom it is being asked. To take 5 minutes and prepare a trouble shooting approach before starting can maintain open channels, rather than closing them because of an ill planned question. Developing a paper trail can solve problems.

---

[1] Hungerford, H.R, R.A. Litherland, R.B. Peyton, J.M. Ramsey, T.L. Volk. 1985. Investigating and Evaluating Environmental Issues and Actions: Skill Development Modules. Stipes Publishing.

4.11.2. Course critique: change

I would also talk about how to do research (i.e., interviews, articles, etc.). I would go over the specifics of research for a scientific paper/proposal.

4.11.3. Skill Acquisition: Primary and secondary data sources

	Frequency				Effectiveness			
	++	+	0	NA	+	=	-	NA
1. Conducting a face to face interview.	3	8	4	2	7.5	5.5	4	0
2. Conducting a telephone interview.	5	10	2	0	6.5	7.5	2	1
3. Finding information in published documents.	8	5	2	2	1	10.5	4.5	1

4.11.3.1. Summary:

1. Frequency: More than one-third of respondents indicate that they or their group never conducted a face to face interview. Effectiveness: Nearly one-fourth of the respondents feel other courses did a better job teaching this skill.

2. Frequency: Majority (15) conducted telephone interviews during the group project. Effectiveness: Majority (14) felt the group project was as good or better than other courses in teaching this skill.

3. Frequency: Majority (13) indicate that they used secondary source research skills. Effectiveness: Only one student felt that this skill was presented more effectively than in other classes. This research skill received the overall lowest effectiveness rating of all skills identified in the questionnaire. Was this because teaching staff assumed that this skill receives primary attention in the more traditional research paper driven courses?

Interestingly two people indicated that no one in their group used face-to-face or secondary source research skills--clearly this was not the case given other responses. Did respondents interpret the question to mean their sub-group only? Or does this

misinformation suggest that some students were not well informed as to the activities of their research colleagues due to the fragmentation of the research activities?

4.11.3.2. Discussion:

The limited available data set does not permit extensive commentary on the student's perspective on the research skill training they received. It does not appear that students were aware of explicit research skills training, as is the case in a traditional lecture format. Is it possible that the "teaching moment" was transparent to the student? That is, the act of doing research is "learning" without an explicit teaching situation. This transparent learning notion may have been operating--or not.

4.11.3.3. Recommendation:

An important aspect of any applied learning experience is the chance for students to "try out" what they have learned previously. By testing an idea, the learner can gain insight into the value of a particular approach. This critical self evaluation may not always happen on its own. At some point the instructor may need to help the student evaluate the usefulness of a chosen research strategy and, if appropriate, offer an alternative.

Developing proficiency at interviewing, is one topic area, in particular, that deserves more attention. On many occasions, I have been interviewed by students who have not properly prepared a questioning strategy prior to placing a call. This is frustrating for both the student and interviewee. One strategy for teaching this primary source data gathering skill is to conduct in-class role playing activities. By taking turns as

interviewer and interviewee, students may begin to appreciate the importance of identifying key questions prior to initiating a conversation.

4.12. Skill content: Writing

4.12.1. Course critique: positive

...write, edit and organize.

4.12.2. Course critique: change

I would invite the person from the writing lab to come in earlier in the semester. I would eliminate the PDR to give more time to team projects.

The speakers were great but, I think the writing lab guy should have come earlier and talked more about team writing.

4.12.3. Questionnaire: positive

How to edit a group action. How to collect and process data for a paper.

4.12.4. Comment cards:

3/Sep 16 I realize the importance of technical writing, however, devoting most of the class was a waste of time for me.

3/Sep 16 I found the discussion on technical writing extremely thrilling, interesting, and exciting. (Sarcastic)

3/Sep 16 The technical writing handout was very helpful; but (note my punctuation, I'm not even sure if it's right!) I don't think we needed to go over it in such detail!

3/Sep 16 Although Christine is nice person and fun to listen to,...the technical writing segment was a little on the long side.

3/Sep 16 I think we used time more effectively this class. The writing review was probably helpful, although I've heard it may times before.

3/Sep 16 Class was great today. I feel much more informed. Also, technical writing is, of course, creative as is scientific research.

3/Sep 16 It may be helpful to mention why we are doing a certain activity (purpose). E.G., writing a letter so that they may be used as an example of how to write technically, etc./ Speaking of technical writing -- technique will (I'm sure) be helpful, although it was dry. Then again, I can't think of a way to make it less dry myself.

3/Sep 16 It was good to go over scientific/technical writing skills again. ...it was a good refresher and a good to have a checklist, or outline on the fine points on hand.

3/Sep 16 Christine's technical writing lecture and sheets were helpful. I've never had a technical writing class and none of my classes emphasis technical writing or have even mentioned technical writhing.

5/Sep 30 Some of the revisions of the papers seem trivial. There could be more comments of what we did well on, instead of the huge amounts of what ifs, do nots, etc. Some revisions have to do w/personal writing styles rather than problems w/the papers; at least it appeared that way to me. Thank you.

12/Nov 5 A lot of the Trans Group hasn't read the paper. I agree with a lot of the comments on the paper . I think it also needs to be reorganized into a better full structure incorporating the information into a good format. Outline maybe: I. Introduction. A. Current Situation (1. How people get to campus {a. data} 2. Surveys telling how outstanding) B. Problems elaborated on (1. Parking, etc., 2. Racks) C. Goals II. Methods. A. Use of surveys - Research methods B. Critique of Methods (1. Survey analysis) III. Problems Specific from Research. A. Overall to specific. IV. Recommendations, subdivided into groups. V. Conclusion, selling points.

12/Nov 5 Was good for everyone, as a group, to hear comments on papers from teaching staff and realization of some problems & frustrations involved in paper revisions.

12/Nov 5 On behalf of my fellow classmates in 600 ...You don't like pie graphs...So what!!! Maybe someone else loves them -- What does this point have to do with the price of rice in China? Are you not being a little picky and opinionated on some of your petty points.

4.12.5. Skill Acquisition: Editing, technical writing

	Frequency				Effectiveness			
	++	+	0	NA	+	=	-	NA
1. Writing technical information concisely and clearly.	9	6	1	1	3	7	6	1
2. Editing other people's work.	7	6	4	0	13	2	1	1

4.12.5.1. Summary:

1. Frequency: Majority (15) indicate frequent opportunities to develop technical writing skills. Effectiveness: More than a third of the respondents felt that other courses dealt with this skill more effectively than the seminar. With six respondents marking the "less effective" column this skill received the lowest rating.

2. Frequency: Majority (13) developed editing skills during the group project. Four students indicated that they never became involved in an editing activity. Effectiveness: Majority (13) indicated that editing each others work was practiced more effectively in the group project than in their other courses.

The high effectiveness rating for editing skills is not entirely surprising. Editing another student's work is a rare event in many students' university experience. With little experience for students to compare, the results of this item may reflect a frequency characterization rather than an effectiveness assessment.

4.12.5.2. Discussion:

Technical writing training occurred throughout the seminar: Christine presented a lecture on common writing flaws; the director of the university writing lab lectured on strategies for improving group writing activities; and the entire teaching team provided

extensive editorial comment on all writing assignments. However, these attempts by the teaching team to provide instruction in writing techniques were often rebuffed or led to disagreements about the appropriateness of established writing conventions.

For many students, receiving extensive editing comments on their writing was a unique experience. Often it seems, student writing assignments in other courses never received editing from instructors. This led many students to the conclusion that their writing skills were adequate. When the IES 600 teaching team returned student papers with extensive rewrite requirements, several students were quite distressed.

As described earlier, both Christine and David have extensive editing experience--for book length publications. Their proficiency at identifying composition deficiencies is clear; however, the TAs may have lacked diplomacy in the expression of their editorial comments. Furthermore, in David's case, he may have used his editing pen to shape the content of the paper, in a way that may have overshadowed the student's perspectives.

4.12.5.3. Recommendation:

Writing, by its nature, is a highly personal enterprise and therefore, some writers confuse criticism of their writing as an attack on their being. Instructors need to be sensitive to this dynamic. If students become overstimulated by repeated unfavorable writing critiques, they may develop, if they haven't already, an aversion to writing. This obviously is an undesirable outcome. This said, I do not advocate a relaxation of writing standards; good writing skills are essential to an environmentally literate citizenry. However, instructors need to be fair and consistent with comments, so as to improve the

students' communication skills--not infuse the document with their personal perspectives. This is a difficult and important teaching challenge.

4.13. Skill content: Verbal communication

4.13.1. Course critique: change :

The presentation should count for more, too, and be given at the end of the course rather than at the middle. A larger audience might benefit. (Perhaps there could be a paper editing team and a presentation team).

4.13.2. Comment cards:

1/Sep 2 ...developing communication skills and meeting deadlines.

1/Sep 2 1st lecture: excellent. I like the team/communication thing.

8/Oct 21 I think today's class presentations were helpful: I like knowing what the other group is doing and their research methods. It helps with my own.

8/Oct 21 David: we need to communicate and coordinate between groups. How about weekly "leader meetings"? We're losing the integration which this process needs. What's up with the background group? They don't ask anyone for info. What are they doing? Custodians are cool people. Talk to them. They know what's up at this University.

8/Oct 21 Presentations went really well. Very interesting work so far. It was interesting to compare the two projects. Recycling seems to be more of an analysis of data whereas transportation seems to be more focused on recommendations and future proposals.

8/Oct 21 Excellent presentations. Its great to see how things are coming along. Excellent group dynamics and discussion. It's getting there!

8/Oct 21 The presentations went well I think they were a good idea.

8/Oct 21 Using this time for getting together with the group would probably have been more useful - hearing the group was interesting ... but all of the potential problems that transportation people brought up were already recognized by paper people - if feedback was the goal, there wasn't enough time.

8/Oct 21 Unfortunately, I wasn't as involved in the presentation as I would have liked, bit I was very impressed - A lot more organized that I thought.

8/Oct 21 Paper group did a really good job (with presentation). The groups seem to be doing well. There's a lot of info with a small amount of time, however these reports can be great beginnings to future project ideas.

8/Oct 21 Presentations were great. Hard to evaluate though because they are supposed to be preliminary, updates - so people weren't as keyed into visual aids and documentation. They both seemed super prepared and organized - good fob by both groups.

8/Oct 21 As far as class went today, the presentations were interesting. The Peterson building paper inflow data gathering sounds like it will take some time. Finding the right people to talk to is key.

12/Nov 5 I feel like I did not do a very good job in my individual presentation. I forgot to say a lot of information -- mainly because I get too nervous. But I still feel like I learned a lot from it.

4.13.3. Skill Acquisition: Oral presentation

	Frequency				Effectiveness			
	++	+	0	NA	+	=	-	NA
1. Getting up in front of a group to discuss a technical subject.	5	7	5	0	7	8	2	0

4.13.3.1. Summary:

1. Frequency: Nearly one-third indicate that they did not participate in an oral presentation. Effectiveness: Less than half indicate that the seminar was more effective at teaching oral presentation skills than other courses. Although the question is intended to gauge only those experiences relating to the team project, I suspect some students

responded with other seminar assignments in mind; therefore, it is that the team project was not directly responsible for the effect being measured by this question.

4.13.3.2. Discussion:

Well developed oral presentation skills are essential to the citizen activist: lobbying, educating, and advocacy activities all depend on effective and articulate communication. However, incorporating this skill into a teaching activity is constrained by the considerable amount of class time required for presentations. It is for this reason that students may not be proficient at this skill--despite four or more years of higher education.

The preliminary presentations provided to the panel of clients and faculty seem to have actively involved only a few students. Having all of the students participate in the presentation, however, would have been ungainly and ultimately less useful, in terms of getting a clear message out to the audience. Most students did have a chance to make oral presentations to their peers as part of other assignments. Yet part of the challenge of public speaking is contending with the pressure of presenting information to an influential and critical audience.

4.13.3.3. Recommendation:

Oral presentation skill practice should be an integral part of the seminar. Finding the time to incorporate this element into a busy schedule may require a different class setting, as will be explored in the following chapter. Developing creative strategies for involving *all* students in this skill practice are critically important, otherwise, only the

students who are already comfortable with public speaking will receive opportunities to refine this skill.

4.14. Team Research Reports

The team projects culminated in the presentation of two final reports to the transportation and paper clients. The students and teaching team worked many long hours researching, writing, editing and rewriting these documents. Given the constraints described earlier, the final documents are impressive.

Due to the length of the reports, and the process focus of this case study, only the transportation report is reviewed in this section. Readers interested in examining the paper recycling report can view this document in the IES library at Science Hall on the UW-Madison campus. The paper recycling report is included in a permanent collection of student reports on campus environmental issues. The entire transportation report is in Appendix 9.

4.14.1. Project Request (PR)

A discussion of the team projects logically begins with an examination of the PR--the main vehicle for organizing and identifying the "nature of assistance required" by the client. The CERP liaison/coordinator wrote the final version of the transportation PR based on interviews with both the client and teaching team. An attempt was made to scale the PR in a way that was appropriate given the anticipated constraints of resources, time and student skills.

The teaching team exercised their right to modify the PR to better meet their academic objectives. This was an issue anticipated in the early CERCM discussions; it was always felt that the learning experience was the ultimate, and undisputed, responsibility of the instructors. This said, it is worth comparing the differences between what the client requested and what the students provided, in order to explore how these differences may have influenced the client's level of cooperation with students and her reaction to the report.

A brief summary of the transportation PR reveals these client requested tasks:

1. Review and analyze transportation surveys from 1989-1991. Conduct additional data collection as needed.
2. Develop recommendations in these issue areas: rideshare (car/vanpool), flex parking permits, bus transit.
3. Develop marketing materials to promote alternatives to driving alone.

The PR identified these desired outcomes:

1. Interpretive graphs of the survey data.
2. A prioritized list of 4-6 recommendations for each issue area using the following evaluation criteria: economic feasibility, ecological sustainability, the needs of handicapped individuals, and social equity considerations.
3. Educational and promotional materials that promote alternative transit.

The following table details how the final report diverged from the issues and outcomes identified in the PR:

Issues	Pages in report	# Rec. in report	Identified in PR?
Bicycling and Pedestrian	7	4	No
Flexible Parking	4	3	Yes
Vanpool and Carpool	4	3	Yes
Buses	3.5	3	Yes
Transportation Alternatives	4.5	2	No
Promotion	1	1	Yes

An analysis of the total number of pages in the report reveals that nearly half of the report was dedicated to the two issues *not* identified in the PR: bike/pedestrian, and transportation alternatives. Furthermore, the report provided only one table using data from the Transportation Services surveys (additional data from the Transportation Services surveys were used in the report in non-table form, especially in the discussion of bus issues.) The only promotional material offered in the report was a prototype three panel double sided brochure. The brochure appeared to have been thrown together in a hurry. The only data collection instrument mentioned in the report was a two-page sample survey. The survey, attached as an appendix to the report, was not field tested.

4.14.2. Client Evaluation

Lori Kay's assessment of the report suggests a satisfactory, if not enthusiastic response. (See Appendix 8). Her comments indicate a general frustration with many of the report's recommendations. She repeatedly comments that ideas were "not checked with me...not practical." Her response to the recommendation that a campus transportation information office be established, however, was quite enthusiastic: "Excellent! A definite goal for us to aim at." What Lori does not indicate in her comments, is the fact that plans were already underway to establish an information center--*prior* to the student's recommendation.

Lori would have obviously preferred an opportunity to work closer with the research team, so that the report would have more relevance. In her comments on areas for improvement of the group research activity, she relates this suggestion: "Time is

always a problem but one or two final "check-out" meetings between students and clients should be required before draft report is presented." Finding a time for these additional meetings would not be easy under current conditions.

In the end, students and teaching staff may have missed an opportunity to create a more influential report. While they were able to research issues they felt were important, they failed to meet the information needs as identified by the client. This difference between client and academic interests need not be a mutually exclusive dilemma. Within the scope of the PR exist countless opportunities for students to express a wide range of opinions--which Lori was already willing to consider.

While bike and pedestrian issues are a key piece of the overall transportation picture, is not a pressing issue for this transportation director. She had laid out her top priorities--signaled her intentions. The teaching team failed to exploit this opening to its fullest. Conversely, it can be argued that by dedicating a significant portion of the report to this topic the students made a case for "moving up" bike-pedestrian issues on Lori's priority list. As "customers" at the university this would be appropriate. As "consultants," with limited time and resources this was a squandered opportunity.

Despite these criticisms there is much good to be said about the report. Students grappled with a set of issues and programs that require specialized knowledge, involve difficult to obtain information and are controlled by far flung organizational entities--on and off campus. The fact that the student's recommendations tended to be general, if not plain vague, is understandable. I base this assessment on my personal experience as the

university's current Transportation Demand Management Coordinator--a position I assumed six months after the publication of the IES 600 report. Two years into the position, I *still* struggle with many of technical and operational issues associated with the students' ideas.

Epilogue. In the two years since the release of the IES 600 report, several of the recommendations discussed by students have been implemented, including: a flex parking pilot, installation of additional bike racks, and the establishment of a central transportation information office. Other programs mentioned in the report are also under active consideration. To suggest that the IES 600 report played a pivotal role in the decision to pursue these programs would be an exaggeration. The fact that the client directed the students to explore these programs demonstrates that she *already* had an inclination toward these strategies. While a causal link is impossible to assert, it can be said that the report did generate valuable staff discussions, uncovered some useful links with other universities, and importantly, it helped to establish the UW-Madison Environmental Management office and the Transportation Demand Management Project.

For these reasons, the students in the IES 600 class can be proud of their important contributions to advancing environmentally responsible management of the UW- Madison campus.

Chapter Five

5. Conclusions

This case study has provided a detailed description of how the CERP model was developed and then applied in a particular setting--the IES 600 seminar. Student and client commentary was used to frame a discussion of the valuable dimensions of the program, and identify areas for improvement. While many pieces of the IES 600 pilot can be improved upon, as can be expected from any formative effort, the foundation elements of the CERP model--experiential, holistic, transdisciplinary teaching--seem to be viable and appropriate to the task of teaching environmental literacy skills. Many more projects will need to be completed before more extensive commentary can be made. Based on experiences thus far, it seems reasonable to continue refining and adapting the model.

Great interest has been demonstrated in the initial successes of CERP. National recognition for the model has resulted from a presentation to the National Recycling Coalition in October, 1993, and the publication of a feature article in the Natural Resource Defense Council's quarterly journal.[1] In addition, CERP along with the UW-Madison recycling program won the Governor's Waste Reduction and Recycling award for comprehensive campus recycling programs and innovative undergraduate research activities in the fall of 1993.

Infusing the CERP model into the IES 600 seminar format is not the only

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[1] Lerner, S. Summer 1994. "Student Greens get practical at the University of Wisconsin." The Amicus Journal. 16(2):36-41.

opportunity to use this concept. Although not described in any detail in this case study, the CERP model has been used in other UW-Madison settings, including independent studies and paid internships. It is hoped that the CERP model will be used at UW-Madison or at another university in the near future. With this in mind the following summary of program design issues is offered. I welcome reports on the challenges and successes of other environmental action and research programs, as well as general inquiries from individuals interested in developing CERP type programs of their own.

The CERP model, in its present formative stage, is essentially a structure that supports a teaching process: a technique for bringing students, staff and faculty together in order to identify and address campus environmental problems. Two types of outcomes are expected from this effort: students develop environmental *research and action taking skills,* and university administrators receive assistance developing policies and practices that may lead the university to *improved environmental management.* Several factors contribute to the success of this process and the achievement of desired outcomes.

Program coordination: By design, the CERP model requires well coordinated relationships between all collaborators: students, faculty and staff/client. At UW-Madison this role was filled by a program coordinator/liaison. It is possible that this coordination role could be accomplished by a faculty or staff member, or possibly a student. However, the time required to establish the trust that serves as the foundation for a collaborative relationship is considerable. For most people interested in this type of teaching model, just finding the time to establish and maintain contacts will pose a major

challenge. Even if time is available, finding mutually acceptable time slots for meetings is always an additional complication.

Certainly applied problem solving activities have been successfully incorporated into many undergraduate curricula without the aid of a special coordinator. Furthermore, at smaller academic institutions, where there are fewer students, staff and faculty, it may be easier to establish and maintain working relationship without the assistance of program coordinator/liaison. In all cases, however, a long term commitment to building relationships must be made. It would be prudent for anyone considering this type of activity to consider these questions:

1. Do I have (or have access to) the political power to initiate the relationship building process that precedes the program?
2. Do I have the time to sustain the program during the relationship building stages--and beyond?

Funding. If a program coordinator is used, then a source of funding will be necessary to support this new position. First year funding for the CERP coordinator (paid to a graduate assistant) was provided by an outside grant. At the conclusion of this 12 month grant, the program coordinator's salary was paid by the administrative unit of Facilities Planning and Management, drawing on both grant and regular salary funding. Money to pay student internship stipends for research activities came from three additional grant sources.

In an era of limited (and shrinking) funding for education budgets, outside sources of support may be essential to initiating a CERP type program. The time needed to research and write grant proposals should not be underestimated by anyone considering

taking on this project. Arguments can be made that recommendations that might result from student research activities can have fast "payback value" to the university, yet it was my experience that cash savings that accrue to a large and complex operations budget are difficult to transfer to salaries. Therefore, a "we'll save you money, if only you pay us to show you how" argument may not be persuasive.

If extensive surveys or measurements are to be part of the research process, resources must be identified to purchase or borrow tools and services such as scales (e.g., for waste characterizations) or computer time (e.g., to store and analyze large data sets). The "cost" of a client's time should also be considered. While this cost can be "donated" by the administrative unit, program designers should be prepared to justify this contribution--especially when challenged by what some program detractors may consider an academic--not administrative--activity.

Time issues. The CERP model was piloted in a once-a-week seminar setting. As discussed in Chapter 4, this presented many limitations on the program. Importantly, the students were not able to spend any time working on having their recommendations implemented. This was a serious shortcoming of the IES 600 seminar, in as much as participation in action strategy implementation is a major component of the CERP model.

Alternative class schedules may alleviate this problem by permitting students, faculty and staff/clients the large blocks of continuous time together that is necessary for efficient research and discussions to take place--as well as provide for the sometimes slow

implementation stage of a new policy or practice. Possible alternative class schedules might include:

- Full or half day "labs" during the regular school year would be ideal for student research and "group maintenance" activities. Other classes, especially those that require numerous field trips, make this time requirement. However, long lab periods often create complicated, or impossible schedules for upper level students trying to fit in required courses.
- Summer semester courses allow for flexible time blocks. However, it is not only large time blocks that must be considered--overall course duration is important if progress on slow moving recommendations is to be made.
- Multiple year projects (with the same students returning) offer the advantage of establishing long term working relationships among students, so that more time can (eventually) be spent on research and implementation activities.
- Multiple year projects (with a new set of students) would offer the advantage of long term working relationships between faculty and staff, if of course, faculty and staff assignments remain constant.

Individual versus group projects. Both individual (independent study and internship) and group (IES 600) projects have been tried using the CERP model. Each strategy carries strengths and liabilities. Clearly an individual project will require the greatest amount of resources--especially faculty and staff time. On the one hand, this provides the best opportunity for simple and direct communication between research team members. Conversely, if the student fails to complete the project (as has been my experience with several independent study projects), then the client may feel as if their time was completely wasted. Group projects, of course are much more complicated to organize and may cover too broad an issue area (as was the case in the IES 600 projects).

On the plus side, a group project may be more likely to result in a report that has some salience for the staff/client.

Teaching staff. *The demands on teaching staff (in a group project setting) are considerable in a program of this kind. Given some of the unique features of this activity* (primary research, data collection and technical report writing, etc.) instructors may find that students' research and communications skills are not adequate to the task. Teaching staff must, therefore, be prepared to work closely with students reviewing and revising research proposals and report drafts, as well as practicing interview skills. This remedial work can be challenging for both student and teaching staff. Teaching staff need to be demanding in their standards for quality work while at the same time considerate of student's perspectives.

In addition, teaching staff need to have the skills necessary to manage group conflict that will arise from this intensive program. Teaching staff should be prepared to deal forthrightly with student behaviors that undermine the effectiveness of the group's work. These conflicts need to be viewed openly and enthusiastically by instructors: teaching conflict resolution and communication skills is a valuable piece of an environmental education.

Staff/client: Identifying appropriate staff/clients for a collaborative research project is a critical consideration. Obviously, the client needs to be committed to helping students understand the issues under investigation. The client needs to have both the time to work with students and a familiarity with the technical aspects of the problem

under study. A mid level manager may be best suited for this role: their schedules tend to be flexible enough to accommodate students' schedules and they are close enough to "where the rubber meets the road", as one manager likes to put it, to be familiar with many of the operational issues that conspire to create the problem. Senior managers and front line staff are also important resources however, the former tends not to have the free attention to spend time with students and the latter may not have the skills to effectively shape the problem definition or address root problems.

Students. All of the students in the IES 600 seminar had senior level standing--for several this was to be their last semester in college. Although not clinically confirmed, an ailment commonly referred to as "senioritis" may have afflicted students in this seminar. Individuals with this affliction often are impatient with authority, display an inflated perception of their ability to write concise prose, and frequently fail to complete assignments in a timely fashion and may, on occasion exhibit bouts of cynicism. Teaching staff need to be prepared for these symptoms and deal with outbreaks accordingly. Senior students are also an enthusiastic and hard working lot. They bring to the classroom a heightened awareness of environmental problems and a high levels of motivation to "do something to change the world." Working with this type of student can be gratifying for instructors and client alike.

Offering a CERP type activity to students earlier in their undergraduate careers, however, may provide the best opportunity for teaching research and action taking strategies. Younger students may be more receptive to remedial instruction and their time schedules may not be as restrictive as older students. Further, working with younger

students might make it possible to develop a multi-year curriculum during which skills could be developed an practiced and improved.

Action orientation: The IES 600 team project was able to achieve only part of the CERP promise of environmental research *and* action. For reasons discussed previously, much of this case study focused on the structural and process issues associated with the research enterprise. Now our attention must be directed at the next challenge for CERP practitioners, and environmental educators in general. We must find an answer to this question: How can *environmental action strategies* (i.e., persuasion, political, legal, consumer and physical actions) be systematically incorporated into teaching activities? Achieving this goal remains the greatest unmet challenge for undergraduate environmental education.

Environmentally Responsible Campus Management:
Enhanced Opportunities for Hands-on Student Research Projects

SUMMARY

In many respects the UW-Madison campus community is analogous to a mid-sized city--with all the political, economic and social functions of its urban counterpart. As citizens of the campus community we live and work in distinct residential, commercial and industrial districts; we travel along our own transportation system; we participate in a system of self-governance; we operate our own energy generating facilities and we consume large quantities of natural resources.

In short, the university campus operates the same organizational systems--and generates the same types of environmental impacts--that students will encounter upon commencing their careers after graduation. Learning environmental management problem solving, decision making, communication and research skills, as an integral part of the curriculum, will prepare students for their roles as environmentally responsible citizens.

An exciting opportunity to understand the implications of management policies, as they affect the environment, is possible by examining the university's facilities operations. The campus *itself* becomes a wonderful laboratory--a place to research and test new ways of conducting the business of education in a manner that is respectful of the biosphere that supports us.

Examining the conduct of the university becomes even more critical when we consider how the management policies of the institution may be incongruous with the values expressed in the classroom. How might we ameliorate the differences between what the institution teaches and the way the university chooses to operate? Before this question can be addressed fully, the campus, as an institutional entity, needs to be better understood. This proposal envisions the creation of a formal data collection and analysis program that draws on the talents of one of the university's greatest resources--the undergraduates.

Specifically, this program will organize and coordinate student-faculty research teams, in partnership with administrative staff and facilities managers, for the purpose of data collection and analysis regarding campus environmental conditions.This data can then be used by decision-makers to develop environmentally responsible and sustainable management policies.

Particular attention will be paid to the direct influence of policy decisions on biotic communities. Some projects, such as those relating to energy resources, have a less direct connection to biology. Yet, the significant impact on biotic communities that results from the extraction and consumption of energy resources, especially oil and coal, make these areas of inquiry no less important than activities that examine biota directly. Indeed, as basic ecological principles would suggest, our understanding of the biological sciences are inextricably linked to the study of other scientific disciplines.

PROGRAM OBJECTIVES

1. Provide undergraduate students with *enhanced learning opportunities* in realistic problem solving situations in their community--the campus.
2. Engage students in a research process that makes use of the following skills: *critical thinking; cooperative problem solving; collection, organization, analysis and communication of scientific data.*
3. Create permanent and *cooperative learning linkages between students, faculty and administrators* so that environmental management issues facing the university community can be effectively addressed.
4. Encourage students to *critically examine their personal activities* with respect to the consumption and degradation of natural resources.
5. Provide students with an opportunity to participate in the campus management decision making process by contributing *valuable information.*
6. Provide decision makers with *baseline data profiles* of campus environmental impacts.

SCOPE AND CONTENT

1) What are the educational objectives of the program and how will they be achieved?

This grant proposal will support the enhancement of undergraduate learning by providing students with opportunities for applied environmental research. Student-faculty research teams will investigate campus resource flows (energy, food, solid waste, etc.) as influenced by the institution's management policies. This research activity is intended to promote ecological literacy and environmental responsibility among all members of the campus community--students, faculty and administrators.

2) What guiding principles will help to shape these learning opportunities?

The following selected goals and recommendations are drawn from principles articulated at a Tufts University sponsored environmental conference at Talloires, France during October of 1990. The Talloires Declaration (See Appendix 1 for full text), signed by the twenty-two participating university and college presidents, including UW's Provost David Ward, states:

"We the presidents, rectors, and vice-chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation and the depletion of natural resources...We believe that urgent actions are needed to address these fundamental problems and reverse the trends... University heads must provide the leadership and support to mobilize internal and external resources so that their institutions respond to this urgent challenge. We, therefore, agree to take the following action:

1. Appoint a special advisor, an environmental programs dean, or faculty group to *promote environmental programs* within the university.
2. Set aside *funding* and create positions for interdepartmental and interschool faculty who will *research and teach population, environment, and sustainable development.*
3. Establish a *university environmental policy* to engage faculty, administration and students in activities such as energy and water conservation and recycling...
4. Encourage *multi-disciplinary thinking* with the use of internships, capstone and integrating seminars, work study, and case studies.
5. Establish programs to produce expertise in *environmental management*, sustainable economic development, population, and related fields to ensure that all university graduates are *environmentally literate and responsible citizens.*

3) How might UW-Madison use these ideas to shape campus environmental policy?

The UW-Madison solid waste reduction/recycling system is our most notable, and laudable, campus environmental management program. This operation demonstrates the university's commitment to reducing environmental degradation, but much more needs to be done. However, before additional programs can be created, data must be collected and analyzed so that feasible proposals can be developed. This grant proposal presents a plan for organizing information that will assist in the implementation of environmentally responsible management policies.

The formation of a clearinghouse committee to explore innovative ideas and strategies for obtaining data is the first step in the policy development process. The various organizational units responsible for campus facilities management need a mechanism to integrate and coordinate their data collection activities. Furthermore, this clearinghouse can help to select projects that will provide the best return on the investment of creative energy and capital, while at the same time avoiding project duplication.

4) What will this clearinghouse be called and how will it operate?

This proposal envisions the creation of a Committee for Environmentally Responsible Campus Management (CERCM). The members of CERCM will serve as an advisory board to decision makers, by providing suggestions and strategies for implementing environmental management programs. CERCM will convene at least two times each semester to discuss and decide issues. During the intervening periods, a staff liaison person (funded by this grant) will coordinate the activities of CERCM.

During the past eight months David Eagan (Project Director of the Campus Environmental Stewardship Initiative--a CBE funded program) and I have been meeting with Duane Hickling, Assistant Vice Chancellor of Facilities Planning and Management to discuss environmental management at UW-Madison. Vice Chancellor Hickling is a strong advocate of integrating his operational sphere (Physical Plant, Safety, Transportation, Engineering and Grounds) with the academic elements of this institution. If CERCM is established, he has agreed to work with the group and its research teams.

On Earth Day, 22 April 1992, Duane Hickling and I convened a meeting of campus facilities managers, academic administrators and students to introduce the concept of CERCM. Also in attendance was David Orr professor of environmental studies at Oberlin College. Dr. Orr has written extensively on the topic of campus environmental management (see Appendix 2 for a related article). His ideas are a source of guidance and inspiration for this program. In addition, Dr. Orr has recently co-edited with David Eagan the book, The Campus and Environmental Responsibility (See Appendix 3). This book will serve as a key resource for investigating other campus environmental management programs.

All participants at the Earth Day meeting will be contacted in the next two weeks to continue discussing the CERCM concept. Initial responses have generally been good with expressions of interest and support (See Appendix 4 for meeting agenda and attendance roster).

5) Who are prospective members of CERCM?

Up to fifteen student, faculty, and administration representatives may serve on CERCM, including a committee staff/liaison member. The Committee will oversee the work of the staff member who in turn, serves as the link between CERCM and student-faculty research teams. The research teams will be directly responsible for the data collection activities. Prospective members include:

Administration

Representative from the Chancellor's Office
Assistant Vice Chancellor for Facilities Planning and Management
Assistant Vice Chancellor for Business and Support Services
Director of Safety Department
Director of Transportation Services
Director of Physical Plant
Assistant Director of Physical Plant-Energy Conservation Coordinator
Director of Memorial Union Food Service

Faculty

Evelyn Howell-Landscape Architecture
Erhard Joeres-Civil and Environmental Engineering
Gretchen Schoff-Institute for Environmental Studies (IES)

Student

WSA Environmental Affairs Director
Representative of student environmental group

6) What are some of CERCM's goals ?

CERCM members and the staff liaison will:

1. Establish selection criteria for, and identify "Areas of Environmental Concern" (based on a mix of economic, social and political criteria).
2. Conduct a survey of "Policy Development Data Requirements" to identify what types of information are available and are necessary for decision makers.
3. Compile a directory of possible research projects so as to link specific facilities managers (who have access to campus operations information) with student-faculty research teams.
4. Coordinate the collection of data by student-faculty research teams.
5. Serve as a clearinghouse for the distribution of data to decision makers.

7) What research projects might students pursue?

Students will have the opportunity to conduct surveys, perform experiments and analyze information in applied case studies. All projects will require faculty oversight. Participating faculty may be drawn from any school or college on campus where expertise is appropriate. These research studies may be incorporated into any number of learning programs including: work study, class projects, independent study, capstone courses or honors projects. Examples of projects might include:

1. Assessments of dormitory electricity consumption patterns.
2. Analysis of storm water run-off for toxic pollutants that may harm aquatic plants and animals.
3. Computer models of environmental impacts on biotic communities resulting from proposed construction projects.
4. Experimental landscape restoration with native plantings.
5. Surveys of plant and animal species affected by herbicide and pesticide applications.
6. Interpretation of heating and cooling data with economic return on investment calculations for alternative strategies.

WORKPLAN-TIMETABLE

Planning Phase: July-September 1992

1. Research and/or visit model campus environmental programs at other universities:
   Tufts University (TELI and CLEAN)
   University of Kansas (Environmental Ombudsman)
   Hendrix, Carleton and St. Olaf Colleges (Food Service)
   Brown University (BIG--Brown is Green)
   UCLA (Campus Environmental Audits)
   University of Georgia (Environmental Task Force)
2. Convene CERCM planning group. A small sub-group of CERCM members will meet to compose surveys that identify potential "Areas of Environmental Concern" and "Policy Development Data Requirements." The results of these surveys will be distributed prior to the first full CERCM meeting.
3. Plan first CERCM meeting, a half-day charter workshop. Pre-workshop surveys will expedite decisions to be made at the workshop regarding program objectives.
4. Contact and recruit prospective faculty willing to sponsor student projects.

CERCM/Directory Phase: October-December 1992

1. Conduct CERCM charter workshop.
2. Staff/liaison writes up proceedings of charter workshop. Distributes copies to CERCM members for alteration/amendments.
3. Conduct second meeting of CERCM to finalize research project listings and establish program operations procedures.
4. Publish and distribute student research project directory. This directory will list the names of current management policy initiatives that would benefit from data inputs. Time requirements (one semester/on-going), project size (small or large research team), project complexity (advanced skill requirements), special skills (computer modelling, engineering) and other needs will be detailed in the directory.
5. Promote program to students and faculty.
6. Select pilot projects. The staff liaison will select five pilot research projects to monitor and assist during this experimental period in the program's development. By limiting the program to five pilot projects, organizational weaknesses can be identified and corrected.

Student Project and Evaluation Phase: January-June 1993

1. Monitor student projects for quality of learning experience.
2. Coordinate media coverage to promote program.
3. Evaluate CERCM organizational dynamic.
4. Assess quality of pilot project data outcomes.
5. Conduct program evaluation.
6. Organize public presentation of data generated by student-faculty research teams.

MECHANISM FOR EVALUATION

Each phase of the program will be evaluated separately. The overarching evaluation issues will include:

1. Production of useful data.
2. Functional inter-personal relations among CERCM members and research team participants.
3. Timely production and distribution of printed materials.
4. Willingness on part of CERCM members and research participants to continue working with the program in the future.

Students in the five pilot projects will be closely monitored by the staff/liaison throughout the third phase of this project. The value and success of their work and the CERCM process overall will be based on the following issues:

1. Were the research teams able to produce data that were useful (effectively organized, analyzed, interpreted and communicated) as evaluated by the end user, the facilities managers?
2. Did the members of CERCM efficiently identify important and manageable student research projects?
3. Did students find that they received adequate guidance from the staff liaison, faculty mentor, and facilities manager contact?
4. Did the research projects listed in the directory represent a wide range of learning opportunities for students? Were students from a wide range of academic disciplines attracted to the projects?
5. Did the process of cooperative engagement between faculty and facilities managers result in functional working relationships--such that CERCM and student research projects become embedded in the institution?

Mechanisms for evaluation will include interviews and questionnaires with program participants and CERCM members.

BUDGET NARRATIVE

Personnel:

Project Assistant-Staff/Liaison (S/L) to CERCM:
Performs all day-to-day responsibilities of CERCM. Serves as link between CERCM and student-faculty research teams.

Hourly clerical:
Reports directly to S/L. Types, copies and distributes printed materials generated by CERCM. Assists with survey and questionnaire data compilation.

Supplies and Services:

Directories:
250 copies (five pages double sided). Distribution either directly to participating faculty or to students by request (in response to poster advertisements).

Printing and fax:
Based on projected use of 200 printed pages for each of fifteen CERCM members, as well as, research and information copying. Fax copying will be necessary to communications with other university environmental management programs.

Telephone:
The success of this project is dependent, in part, on establishing and maintaining contact with a network of other similar campus environmental projects. I anticipate making extensive use of the telephone to conduct research interviews.

Travel:
Roundtrip airfare (Madison-Boston). Surface public transit (bus, train, subway). Visit Tufts University (Medford, Massachusettes) and Brown University (Providence, Rhode Island). Possible excursions to other Boston area campuses or Dartmouth College (Hanover, New Hampshire).

Food and Lodging:
Based on standard university expense limits. Hopefully, reduced rate accommodations can be located at each campus.

CERCM

Committee for Environmentally Responsible Campus Management

August 14, 1992 1:00 pm
Agenda

1. **Topic**: Introductions. Relationship building. (5 minutes)
Action desired: Provide short answers to these questions.
What is your position title and role at the university?
Describe something new and exciting that is happening at work or at home.

2. **Topic:** Project selection criteria. (10 minutes)
Action desired: Provide feedback (elaboration, additions or deletions) on proposed guideline.
Reference: Note handout titled "Some thoughts on how to select projects" (distributed Aug. 7)

Issues to consider when developing a CERCM sponsored project:

A) Does the project have specific and practical applications to current campus environmental policies.
B) Do project tasks have well defined educational objectives?
C) Does the project have a resonable potential to provide economic benefits to the university?
D) Does the project avoid politically sensitive topics?
E) Will the overall mix of projects attract students from a wide variety of disciplines?

3. **Topic**: Policy areas for CERCM projects. (5 minutes)
Action desired: Confirm suggestion: "CERCM will initially focus on energy use and waste management issues when developing project ideas."
Reference: Note handout "Decision making model" (distributed Aug. 7)

4. **Topic**: Project ideas. (60 minutes)
Action desired: Brainstorm potential projects for ES 600 class (pilot) and Spring 1993 semester.

A) What are the current planning/policy development issues on campus relevant to CERCM objectives (e.g. fossil fuel conservation, waste reduction)?

B) What are useful strategies that address these planning/policy issues? (e.g. weatherization, alternative transportation, customer education, appropriate technology)

C) What specific tasks (data collection and analysis, pilot studies, surveys) could students perform that would assist the development or implementation of these strategies (e.g.computer modeling of electricity consumption patterns, instruction modules for teaching new dormitory residents how to conserve heat and electricity, pilot project to explore composting and worm farms for food preparation waste reduction)?

5. **Topic:** Next meeting-August 21. (10 minutes)
Desired action: Set agenda items, confirm time and place.

(M2 agenda aug 14)

CERCM

Committee for Environmentally Responsible Campus Management

550 North Park Street 70 Science Hall
Madison, Wisconsin 53706
(608) 263-5492
FAX: (608) 262-2273
E-mail: Einstein@MACC.WISC.EDU

To: CERCM members
From: Daniel Einstein
Re: August 21 meeting
Date: August 17, 1992

Our next meeting will take place this Friday from 9:00 to 10:30 am in the Facilities Planning and Management conference room (957F WARF). I'll bring along coffee and bagels. Don't forget your re-fillable cups.

Minutes of Aug. 14 meeting

Attending:
Dave Drummond-Safety Department
David Eagan-Teaching Assistant/ES 600
Daniel Einstein-CERCM/Staff Liaison
Paul Evans University Housing
Robin Katcher-CERCM/Staff Assistant
Lori Kay-Transportation Services
Phill Michalski-Physical Plant/Energy
Rex Owens-Business Services/Recycling
Rob Walther-UW system/Recycling

2. **Topic:** Project selection criteria.
Action completed: Feedback resulted in modification of the guidelines as follows:

Issues to consider when developing a CERCM sponsored project:

A) Does the project have specific and practical applications for those campus policies and practices that have environmental consequences?
B) Do project tasks have well defined educational objectives?
C) Does the project have a reasonable potential to provide economic benefits to the university?
D) Can the project be structured so that politically sensitive topics can be addressed in a context that respects the professional and academic integrity of program participants?
E) Will the overall mix of projects attract students from a wide variety of disciplines?
F) Can the researchers complete a project's major tasks during one (or possibly two) semesters?

3. **Topic**: Policy areas for CERCM projects.
   Action completed: Confirmed suggestion: "CERCM will initially focus on energy use and waste management issues when developing project ideas."

4. ***Topic***: *Project ideas.*
   Action completed: Brainstormed potential projects for ES 600 class (pilot) and Spring 1993 semester. The brainstorming session generated many excellent ideas for project issues and strategies. After the meeting ended Robin and I puzzled over how to best bring some order to these ideas. What follows is a suggestion for how we might organize our thinking.

Issue areas:

Water use: heating and cooling, cleaning, research etc.
Transportation: vehicles
Hazardous materials: medical, research and energy production by-products
Ventilation: fume hoods and uncontrolled air exchanges (leaky windows etc.)
Office paper
Animal and food waste

Problem solving strategies:

Data collection and analysis
- Transportation demand survey
- Waste characterization inventory
- Purchasing analysis

Management and policy
- Demand side management
- Traffic routing
- Bus passes
- Composting of animal and food waste
- Road salt
- Fuel handling and storage
- Outdoor lighting (safety and ornamental)

Education and communication
- Sharing new ideas and past research so as to avoid duplicating effort
- Informing and instructing "environmental behaviors" to campus community members

Technology
- Electric vehicles
- Computers and non-paper communication alternatives

This was a great start. Certainly this list will grow as we continue our work. I think it would be useful at this point however to start identifying specific project outcomes. Let's use electric vehicles as an example. Identify the piece of information you want by posing a research question:

1. How many internal combustion engine vehicles on campus have the potential for conversion to electric motors?
2. What are the technical advantages/disadvantages of electric utility vehicles for small package deliveries?
3. What is the life-cycle cost of a Chevy pick-up truck?

CERCM

Committee for Environmentally Responsible Campus Management
Daniel Einstein–Staff Liaison
(608) 263-5492
E-mail: Einstein@MACC.WISC.EDU

Project Request
UW-Madison Transportation Issues

1. Background of policy issue:

Each day approximately 43,000 students and 16,000 faculty and staff travel to the UW Madison campus for work and study. In addition, hundreds of visitors arrive daily on campus for conferences and meetings. With only 10,000 parking spaces on campus, clearly not everyone can expect to drive to campus and find a parking space. The Transportation Services Department is currently developing a long range strategic plan to deal with the parking situation and other issues related to transit to the campus.

The Transportation Services Department requests assistance with data interpretation and policy recommendations for inclusion in the strategic plan. The plan will address the transportation needs of students, faculty, staff, and visitors within the context of economic feasibility, ecological sustainability, the needs of handicapped individuals and social equity considerations.

2. Project requested by:

Contact person's name Lori Kay, Director Phone number 265-3200
Administrative unit name Transportation Services Department

3. General nature of assistance requested:

Task #1: Review and analyze UW-Madison Department of Planning and Construction transportation surveys from 1989-1991. Collect additional data as appropriate.

Task #2: Develop recommendations in the following issue areas: 1) Ride-Share/Van Pool promotion, 2) policy incentives and technological opportunities for flexible parking permit systems, 3) strategies to increase bus use (routing, timetables, passes).

Task #3: Research and develop effective methods that communicate and promote alternatives to driving cars (without passengers) when traveling to campus.

4. Desired Outcomes:

For Task #1: Graphs and charts that interpret data from the transportation survey.

For Task #2: A prioritized list of four to six recommendations for each of the three issue areas, as described in Part 3/Task #2 above. State the criteria used to make these recommendations.

For Task #3: Create educational and promotional materials that lead to increased use of alternative forms of transit.

5. Timeline:

Project must begin by Sept. 23, 1992
Project must be completed by Nov. 25, 1992

6. Special skills or conditions required for this project:

	Yes	No	Comment
Computer modeling	X		As appropriate
Word processing/desktop publishing	X		IBM and/or Macintosh.
Special interests	X		teaching, graphics, marketing

RFP/LK3

Committee for Environmentally Responsible Campus Management
Daniel Einstein–Staff Liaison
(608) 263-5492
E-mail: Einstein@MACC.WISC.EDU

Project Request

Paper Purchasing and Waste Characterization Study of the Peterson Building

1. Background of policy issue:

The University of Wisconsin, in compliance with state recycling and waste reduction mandates, must decrease the volume of paper waste it sends to the landfill and decrease the amount of non-recycled fiber paper products used on campus. The UW Stores and the Administrative Committee on Recycling requests assistance with data collection, policy recommendations and education program plans to help meet our goals of increased newsprint, cardboard and mixed paper recycling. In addition, we seek ~~strategies~~ input on strategies that will increase the volume and variety of recycled paper products purchased by UW-Madison departments through the UW Stores.

2. Project requested by:

Contact person's name Rex Owens, Director Phone number 262-4569
Administrative unit name UW Stores and Administrative Committee on Recycling (ACOR)

3. General nature of assistance requested:

Task #1: Conduct a paper waste characterization study of the Peterson Building. Review and interpret survey data.

Task #2: Conduct a survey of paper purchasing policies of Peterson Building offices. Describe how the following concerns limit the overall reduction of paper products and/or the use of recycled paper products: 1) technological issues (e.g. non-duplex copiers), 2) quality issues (e.g. how the paper looks or feels), 3) behavioral characteristics of office workers ("...we tried recycled paper once, but...").

Task #3: Research and develop effective methods that communicate and promote paper reduction and recycling policies for use with staff working in the Peterson Building.

4. Desired Outcomes:

Task #1: Develop graphs and charts that communicate the major findings of the waste characterization study.

Task #2: Develop a prioritized list of four to six policy and management recommendations that will reduce paper waste and increase the overall use of recycled paper products. State the criteria on which these recommendations are based.

Task #3: Create posters, newsletter mock-up or other instructional materials (maybe video?) for use with staff working in the Peterson building.

5. Timeline:

Project must begin by	Sept. 23,1992
Project must be completed by	Nov. 25,1992

6. Special skills required for this project:

	Yes	No	Comment
Computer modeling	X		As needed
Word processing/desktop publishing	X		Macintosh or IBM
Special interests	X		Teaching, graphics, marketing

An Overview of the Campus Ecology Research Project

What is the Committee for Environmentally Responsible Campus Management-CERCM?

CERCM is a group of students, faculty, staff, and administrators who work together to improve environmental conditions on the UW-Madison campus. To achieve this goal, CERCM developed the Campus Ecology Research Project. This research program examines the ecological consequences of campus management practices.

How are research projects initiated?

Any member of the university community may propose a research project by completing a Project Request (PR) form, available from the program coordinator. The program coordinator then uses the PR to link prospective researchers with a project client. Working together, researchers and project clients examine and analyze problems and then develop environmentally responsible recommendations for possible solutions. See below for descriptions of research team players.

What types of projects might a researcher pursue?

Specific research activities will vary widely depending on the nature of the project and the skills of the student researcher. Possible projects may include, but are not limited to, the following tasks:

- Collect and analyze energy use data in campus dormitories
- Develop environmental management guidelines for herbicide and pesticide applications
- Create educational or training materials that promote recycling
- Investigate or develop technological solutions to campus transportation issues

Who are the of the players on the research team and what are their responsibilities?

Researcher: A student, working directly with a faculty mentor, conducts research based on tasks outlined in a PR. At the conclusion of the project, the researcher submits a final report to the project client.

Faculty mentor: A professor, working with the researcher, determines the academic content of the project.

Project client: A campus decision-maker (administrator, staff, or facility manager) works with the researcher to identify and locate key data resources.

Program coordinator: The program coordinator links the researchers with the project client and provides logistical support to all project participants.

What happens to the information in the final report?

The content of a research project is considered "classroom information" and can only be publicized upon mutual consent of the researcher and the project client. In all cases, the project client prepares a written response to the researcher's recommendations.

How are projects advertised?

Each semester the program coordinator puts together a topic directory that lists research opportunities as described on PR forms. This directory is distributed to academic advisors, faculty, and students. On the reverse side of this overview is an example of a completed PR.

Daniel Einstein-Program Coordinator
550 North Park Street Room 70
Madison, WI 53706

(608) 263-5492
E-mail: Einstein@macc.wisc.edu

Campus Ecology Research Project

Committee for Environmentally Responsible Campus Management-CERCM
University of Wisconsin–Madison

Roles and Responsibilities of Campus Ecology Research Project Participants

The success of each Campus Ecology Research Project coordinated activity depends on the collaborative efforts of many people. This document details the core expectations for the research project participant. Additional exchanges between research project participants will vary depending on the type of project.

Student Researcher:

- Submit final report to the faculty advisor, the program coordinator and the project client.
- Attend a minimum of three meetings during the course of the semester, as follows:

Introductory

With faculty advisor, project client and program coordinator. This meeting allows the project participants to meet each other formally as well as outline and discuss their expectations for project outcomes.

Mid-semester check-in

With program coordinator. An informal progress report is given to the program coordinator. The student researcher has an opportunity to request additional support needed from the program coordinator.

Debriefing/ Project Evaluation

With program coordinator and project client. At this meeting the student researcher shares the major findings and recommendations of the research project. If the project client has reviewed the recommendations in advance of the meeting, this would be a good time for a discussion of possible follow-up activities.

Faculty Advisor:

- Attend an introductory meeting with the student, project client and program coordinator.
- Assist the student in writing a research plan in conjunction with research needs suggested by a project client.
- Meet with the student, as needed, during the course of the project to provide expertise and direction, as well as, enhance the student's learning experience.
- Provide feedback to the student regarding their final research report.

Project Client:

- Attend an introductory meeting with the student researcher, faculty mentor and program coordinator.
- Assist the student researcher in gaining access to useful resource materials.
- Meet with the student, as needed, during the course of the research project.
- Respond in writing to specific recommendations made in the final research report.

Program Coordinator:

- Coordinate all meetings necessary to address the needs of the project participants.
- Assist all project participants in the preparation and design of research objectives.
- Monitor the project and provide assistance to all participants as needs require.

Daniel Einstein-Program Coordinator
550 North Park Street Room 70
Madison, WI 53706

(608) 263-5492
E-mail; Einstein@macc.wisc.edu

Environmental Studies 600 • Certificate Program Capstone Seminar

Institute for Environmental Studies • University of Wisconsin-Madison
Fall Semester 1992

"Investigating Our Own Backyard: Environmental Analysis of the UW-Madison Campus"

Wednesdays, 5:30 to 8:00 pm • 318 Education Building

Seminar Staff

Evelyn Howell, Professor of Landscape Architecture and Environmental Studies;
Office: 25 Agriculture Hall, phone 263-6964
Office hours: Wednesdays 2:00 - 3:30 pm, Fridays 10:00 - 11:30 am
***David Eagan**, Educational Administration (244-7007 home)
Christine Finlayson, IES – Water Resources Management
Daniel Einstein, IES – Land Resources (832-4837 home)
*DJE, CF, and DFE have desks in Room 40A Science Hall (enter through the door marked Room 30B).
Office phone: 263-5492 (leave message on machine); Office hours: To be announced

The IES 600 capstone is an integrative experience for students completing the Environmental Studies Certificate Program. Seminar participants are expected to draw from their coursework and personal experiences as they work together to investigate a complex environmental problem. We will focus this semester on issues pertinent to the UW-Madison campus: its environmental impacts, use of resources, natural history, and operation as an institution. We will examine how our institution operates, who makes decisions, where resources go, and what improvements can and should be made, from an environmental perspective. Most importantly, we will explore our role here. In what ways do students contribute to UW's environmental impact? And how can we have a voice in the university's evolution toward a more environmentally responsible campus?

We will develop our understanding of UW as an institution -- and as an ecosystem -- through a series of assignments, readings and class activities. Individual and group projects will provide opportunities to conduct timely investigations on issues of your own choosing as well as on assigned topics. Departing from typical seminar format, we will approach our work as though we were a team of consultants under contract with the university. Our task will be to apply our collective skills and resources to help develop strategies for dealing with existing campus environmental problems.

Readings

• Required Books

1. The Campus and Environmental Responsibility, by David Eagan and David Orr. New Directions for Higher Education, #77. San Francisco, Calif.: Jossey-Bass, 1992.
2. The Student Environmental Action Guide, by the Student Environmental Action Coalition (SEAC). Berkeley, CA: EarthWorks Press, 1991.

• Required Readings Packet . Purchase the packet from the Agriculture Journalism copy shop, room B25 of the Agricultural Engineering building (basement, south end), 460 Henry Mall.

("Required" Mug. For those who don't already own the 'little red mug' sold in the two unions, we encourage you to buy one and use it for all beverages.)

When I arise in the morning I am torn between the twin desires to reform the world and enjoy the world. This makes it hard to plan the day.

– E.B. White

Assignments

There will be a variety of assignments, including the individual and group projects which are briefly described here. Detailed explanations of each assignment are forthcoming. All assignments should be typed, printed letter-quality, and double- or 1.5-spaced (except the Seminar Chronicle, which can be handwritten). You are encouraged to use salvaged paper for assignments whenever possible, except for the final team report.

• Biographical Sketch. This is an individual summary of your work experiences, skills, travels, interests, and other activities relevant to your background for this course. Your statement, together with those from other class members, will give us a sense of our collective experiences and strengths. It should be typed, single-spaced, and no more than one page in length. Due by the second meeting of class, Sept. 9.

• Seminar Chronicle. The Chronicle will be an ongoing record of your work in the class. It is a place to note what you have read and what you think about the readings; what you have been doing for your various assignments; who you have contacted and what they said; environmental happenings you notice on campus; questions about the seminar and recommendations for improving it, and so on. As such, it will serve as a means for record-keeping, personal development, and task accountability. Use black ink (you may need to make photocopies) on looseleaf pages (8-1/2 by 11 inches), so the completed sections can be turned in. It will be collected three times for review and comment, Oct. 7, Nov. 4, and Dec. 2.

• Individual Research Project. This short assignment will be included as part of your chronicle. It will be an opportunity to ask a question (on some aspect of campus natural history or resource use) and then answer it . Examples: Einstein's measurement of constant water flow through the Science Hall men's bathroom, and Eagan's discovery of high lead levels in paint in the Stock Pavilion. The due dates for your write-up and oral report will be arranged in class. Several project reports will be presented in each class, from Sept. 23 to Nov. 18.

• Campus Environmental Profile Data Report. The Campus Environmental Profile will be a comprehensive review of the state-of-the-campus-environment, with information drawn from many sources. Among those sources will be the data reports produced by the class, each on a different topic. You will work in pairs on a specific aspect of the campus environment related to either campus natural history or environmental impact. Topics will be selected from a list during the first class, with the final report due by the fourth class meeting, Sept. 23.

• Team Project. There will be two major projects, one on campus paper usage and the other on transportation. The class will form two teams to work on these projects during the middle of the semester. We will start Sept. 30, with the final draft due Nov. 11 and the finished team report due Nov. 25.

• Readings Summaries and Critiques. Each class period we will review readings from the required books, readings packet or handouts. Class members will sign up for specific readings, which they will summarize and critique.

Grading

The teaching staff will use an evaluation strategy that we believe enhances your learning and reduces grade stress. We want grades to serve as a tool for self-improvement; you will have opportunities throughout the semester to improve your assignments after they are reviewed by the teaching staff. Your final grade will be based on a total of 500 points earned in three categories, and calculated on these percentages: A = 93-100%; AB = 90-92%; B = 83-89%; BC = 80-82%; C = 73-79%; D = 65-72%; F < 65%. Extensions will be allowed under extreme circumstances only and must be approved in advance by the teaching staff. All assignments are due at 5:30 pm, at the beginning of class. As in any work situation, it is your responsibility to get things in on time.

Category 1 • Credit/No Credit • 200 points

The following assignments will be graded on a credit / no-credit basis. Your work will either be accepted, returned to you for revision and re-submission, or deemed unacceptable. We will use the guidelines given for each assignment to determine whether it is acceptable for credit. If not acceptable, you will have one week to resubmit, once your assignment is returned to you with comments. For each of these assignments you get either full credit or none at all. We expect that each of you can earn all 200 points, if the guidelines are followed and revisions are done conscientiously and on time.

Point values are as follows:

1) Biographical Sketch	10 points	Due Sept. 9	
2) Seminar Chronicle	40 points	First time:	Oct. 7
(turned in three times)	40 points	Second time:	Nov. 4
	40 points	Third time:	Dec. 2
Individual Research Project	30 points	Scheduled between Sept. 23 and Nov. 18	
3) Campus Profile Data Report	40 points	Due Sept. 23	

Category 2 • Team Project (conventional A - F grading) • 200 points

These two major projects will focus on campus paper use and transportation. Although grades will be given for the final product, you will have several opportunities to get feedback on your own and your team's progress. The final draft is due Nov. 11 and the finished team report is due Nov. 25.

Category 3 • Participation and Colleague Evaluation (conventional A - F grading) • 100 points

We want to emphasize our high expectations for participation in all class-related activities. A seminar of this intensity requires full attendance, as well as constant attention to the many assignments and readings. That is why we have given this category a point-value worth 20% of your grade. Class attendance, assigned presentations, plus self and colleague evaluations of your contribution to the team project will be used to help calculate the point total.

Calendar

Week 1 • Sept. 2
– Natural History Note of the Week. Class introductions
– Overview of the seminar, its purpose, structure, and assignments.
– Introduction to Biographical Sketch, Profile Data Report, Individual Research Project.
– Form pairs and choose topics for the Profile Data Reports.

Readings for next week (handed out in class today):
1) "What is Education For?" 2) "Education and the Ecological Design Arts" both by David Orr.

Week 2 • Sept. 9
– Orientation to UW-Madison as an institution.
– Introduction to interdisciplinary planning and problem-solving approaches, group dynamics.
– Meet with another pair to review and sharpen Profile research designs.
– Introduction to the Seminar Chronicle.

Visitor • Duane Hickling -- Assistant Vice Chancellor for Facilities Planning and Management
DUE: 1) Biographical Sketch
2) Research design for Profile Data Report (bring 2 copies)
Readings: Sign up to present summaries and reactions / critiques of the readings in future weeks.

Week 3 • Sept. 16
– Orientation to UW-Madison as an ecosystem.
– Continued discussion on project design, technical writing, task management.

Visitor • Karen Lawrence -- Grounds Department Supervisor
Readings: Case studies of campus environmental action at other colleges and universities.

Week 4 • Sept. 23
Present findings of Profile reports
Begin Individual Research Project reports.

Visitors • Rex Owens – Director of UW Stores, and Campus Recycling Coordinator.
• Lori Kay – Director of Transportation Services
DUE: 1) Campus Profile Data Report
2) Optional: Turn in Seminar Chronicle pages for review (to see if they are on track).

Week 5 • Sept. 30
– Introduction to the two Team Projects.
– Team meetings to work on problem statements, research design, distribution of tasks.
– Assign team members to task groups.

Week 6 • Oct. 7
– Team meetings: Define task groups, plan strategy for data inventory.
– Planning meetings of task groups.

*DUE: 1) Team problem statements, research design.
2) Task group problem statements, research design.
3) Seminar Chronicle, Weeks 1 through 6.
** We will accept these on Oct. 6th or 8th, in observance of Yom Kippur*

Week 7 • Oct. 14
– Team meetings: Review research design, progress of data inventory. Tentative analysis of data.
– Task group meetings: Revise research design as needed.

Week 8 • Oct. 21
– Team presentations to class on progress thus far: data collected, analysis.
– Team meetings.

DUE: Oral progress reports of team projects.

Week 9 • Oct. 28
– Team and task group meetings.
– Seminar mid-semester evaluation.

Week 10 • Nov. 4
– Work session.

DUE: Seminar Chronicle, Weeks 7 through 10.

Week 11 • Nov. 11
– Presentation of findings of the team projects.

DUE: Final draft of team report. To be returned by Friday, Nov. 13.

Week 12 • Nov. 18
– Team and task group meetings to discuss revisions, last-minute changes.

Week 13 • Nov. 25
– Readings and discussion.

DUE: Team Project Report.

Week 14 • Dec. 2
– Readings and discussion.

DUE: 2) Seminar Chronicle, Weeks 11 through 14.

Week 15 • Dec. 9
– Readings and discussion.

Week 16 • Dec. 16
– Seminar evaluation.

General Notes on Assignments

Assignments for this seminar are the tangible evidence of your progress over the semester. Along with the efforts of classmates, your work is the legacy others can draw from in the future. Possibly for the first time as an undergraduate, your coursework will not be done solely for your own benefit. Thus, these tasks should not be thought of as what you have to do to get a grade; rather think of them as what we, as a class, need to do to get the job done, and done well. Attitude is everything.

By the way, be a stickler for details. Leave behind a trail that later investigators can follow.

- At every opportunity, try to get feedback on your work before you submit it. Ask your seminarmates, or someone from outside the class, to review drafts. The aim is to create clear, logical, interesting, and useful products.
- On all documentary information you collect, write the date and source in pencil along one edge.
- For information acquired from phone calls, interviews, casual conversations, lecture notes, etc., record the date, source, and title/affiliation (if known).
- Format the pages in ways that minimize paper without sacrificing legibility. Be sure to leave enough room for reviewers and staff to make comments.
- Put your name(s), date, and page number on each page of your reports. Use the header function in your word processing program to do this effortlessly.
- Your assignments should appear as professional as possible.

Biographical Sketch

This is to be a brief summary of your academic and life experiences, jobs, skills and travels relevant to this course. The sketch will be used to:

- Tell us what talents and resources exist within our group, so that other members of the "consulting team" know what our collective strengths and interests are; and
- Enable the teaching staff to guide a level of discussion appropriate to your backgrounds.

With these purposes in mind, we would like you to describe your relevant:

- Academic/educational experience and interests, including training;
- Work experience, including volunteer and other unpaid work;
- Non-academic interests and hobbies, and possibly travel experiences;
- Special skills (e.g., computers, graphics, writing, organizational, public speaking); and
- Experience working in groups, and your usual role (chair, writer, spokesperson, member).

Don't feel obligated to describe all of these. Instead, choose those that best convey your unique experiences and skills. The sketch should be typed, single-spaced, and no more than one page in length. It is due by the second class meeting, Sept. 9.

Course Critique • IES 600 • Fall 1992

Next fall, IES 600 may again examine UW's environment. Your criticisms and suggestions based on this year's course will help improve future seminars. In lieu of comment cards this week, please respond to the following questions. Thanks.

Projects: (Profile data reports, individual research projects, team projects)

- *Which projects (or parts of projects) were <u>most</u> worthwhile, and why?*

- *Which were <u>least</u> worthwhile, and why?*

Other Assignments: (Chronicle, reading summaries/commentaries, resume)

- *How did they contribute to the course, and how might they be modified or improved?*

Certificate Capstone: IES 600 is meant to be an integrative, problem- or project-based seminar, requiring you to draw from other IES courses and experiences.

- *How well did it meet that goal? How could it be more integrative?*

If you were in charge: (Please respond on the back of the page)

- *How would you run this class differently, in terms of assignments, readings, speakers, in-class activities? This is the "suggestion box" question. Feel free to comment on any aspect of the course.*

Campus Ecology Research Project
Committee for Environmentally Responsible Campus Management-CERCM
University of Wisconsin–Madison

To: All 600 students
From: Daniel Einstein
Re: Evaluation of CERP Projects-Envir St Fall 1992
Date: April 20,1993

Greetings! I realize how crazy things are for you folks right now--what with finals and graduation coming up--so I'll try to keep this brief.

I need your help evaluating the 600 class. Your input is critical to improving the Campus Ecology Research Project model--the concept behind the big group research project. I'm going to use the information from this evaluation in my Masters thesis and as a way to solicit support for continuing to expand and improve undergraduate environmental studies programs.

It should only take you 15 minutes or so to complete the survey. I know you feel swamped right now, but if you could complete the survey in the next couple of days and return it to me in the enclosed envelope I would be forever grateful to you. (Why do I feel like this is degrading into a Publisher's Clearinghouse pitch?)

Other news:
Your final reports have been distributed to Duane, Rex, Lori, ACOR as well as folks at the Student Environmental Action Coalition (SEAC) and The National Wildlife Federation's Cool It! program. Everyone has been very impressed with your work. If you would like to receive a copy of the revised final report there is a place on the survey to request your Personal "Gold" Plated Copy!

By next week I'll have written responses to your recommendations from Lori and Rex. If you want a copy of this response, check-off the request line on the survey. Suffice to say right now, your recommendations were influential in demonstrating a need for additional long-term research on campus environmental policy. In fact, the report was instrumental in leveraging funding for five paid undergraduate research positions starting this summer. Students will be working on a campus transportation demand management survey, as well as conducting a systematic waste characterization study--based in part on your recommendations.

By the way, Rex was so pleased with the recycling brochure that he ran off a bunch of copies--right out of the report--and sent them off to the folks moving into the new Business School. He has also acknowledged that he hadn't realized that the campus was not going to meet the magazine collection requirement of the recycling bill. He was real pleased that you pointed it out to him--before we completely missed the January 1994 full compliance deadline.

So you see things are going well, but I need to hear from you if we are going to address the weaknesses in the CERP model--and I know you have strong opinions on the subject!

Thanks again for all your support with this project--especially the people who met with me in the focus groups. Take care wherever you end up after graduation.

Daniel Einstein-Program Coordinator
550 North Park Street Room 70
Madison, WI 53706

Tel: (608) 263-5492
FAX: (608) 262-2273
E-mail: Einstein@macc.wisc.edu

Evaluation of Campus Ecology Research Project-
Fall 1992 Environmental Studies 600 Group Project

Several students from the 600 class participated in an evaluation focus group where we assessed some of the unique features of the CERP model. Their statements form the core of this questionnaire. Now we would like to get your opinions. Indicate your level of agreement or disagreement, based on the scale below, for the following statements:

5= strongly agree 4= agree 3= no opinion 2= disagree 1= strongly disagree 0= doesn't apply to me.

Collaborating with other students on a major research project

1.	I learned how to be patient and tolerant of other people's working styles.	5 4 3 2 1 0
2.	I learned how to manage my schedule so I could be in sync with others.	5 4 3 2 1 0
3.	I would have preferred it if our group had appointed student project leaders right at the start.	5 4 3 2 1 0
4.	It was impossible cooperating with people who had different views then my own.	5 4 3 2 1 0
5.	I learned from other student some useful new perspectives on how to tackle complex environmental problems.	5 4 3 2 1 0
6.	I never realized before how difficult it is to coordinate research tasks with so many people.	5 4 3 2 1 0
7.	It was difficult enforcing responsibility-people rarely completed their tasks on time.	5 4 3 2 1 0
8.	I learned not to trust other students or rely on their judgments.	5 4 3 2 1 0
9.	I was frustrated by how some students in my group acted as if there are certain tasks that were not appropriate for my gender. If strongly agree or agree, briefly describe the situation:	5 4 3 2 1 0

Briefly, complete these statements:

10. The biggest **advantage** of working on a group research project, in terms of **learning opportunities** is:

11. The biggest **disadvantage** of working on a group research project, in terms of **learning opportunities** is:

12. The one thing I would **change** about how the group research project was organized (other than establishing smaller group sizes) would be:

13. Research teams for group projects should have no more than _____ people.

5= strongly agree 4= agree 3= no opinion 2= disagree 1= strongly disagree 0= doesn't apply to me.

The project addressed "real world" problems that affect our lives

1. Having a real environmental issue to work on, as opposed to an abstract case study, made no difference to me. 5 4 3 2 1 0
2. The data we collected weren't properly scrutinized for reliability. 5 4 3 2 1 0
3. The skills we learned and developed during this project will be useful in my future career. 5 4 3 2 1 0
4. Doing research on a real problem encouraged me to really find things out-- not make up false data like I do for other reports. 5 4 3 2 1 0
5. I learned how big this university really is in cold numbers- how much work and money are actually involved in operating this place. 5 4 3 2 1 0
6. Having the top administrator for campus facilities management (Duane Hickling) speak to the class helped to motivate me in this project. 5 4 3 2 1 0
7. This project taught me to deal with real people, not just computers and books. 5 4 3 2 1 0
8. Overall the group project was a waste of time. I'll never use the skills we learned. 5 4 3 2 1 0
9. Learning by trial and error is a waste of time. I prefer lectures where we hear the facts from experts. 5 4 3 2 1 0
10. Let students work on pushing the recommendations with the administration after the report is completed. 5 4 3 2 1 0
11. I liked the creative and intellectual freedom that we had to shape the structure of the paper. 5 4 3 2 1 0
12. I liked that instead of just listening to the professor and TAs for 50 minutes we got to work one-on-one with them. 5 4 3 2 1 0

The collaborative working relationship with campus administrators (Rex Owens and Lori Kay) and the teaching staff (Evelyn, David and Christine)

1. It was valuable having an opportunity to work with an administrator/professional role model who is the same gender as I am. 5 4 3 2 1 0
2. I never felt that the administration really cared about our recommendations. 5 4 3 2 1 0
3. The administrator we worked with seemed biased against students. 5 4 3 2 1 0
4. The working relationships between the TA and the students were too close. This interfered with our learning. 5 4 3 2 1 0
5. It was great getting so much assistance from the TA. 5 4 3 2 1 0
6. It would be better if the teaching staff gave more direction on how to organize research activities. 5 4 3 2 1 0
7. I felt more committed to the project because we were told the final report would be reviewed and acted upon by university administrators. 5 4 3 2 1 0
8. The students should select a peer to lead the group so tasks can be delegated. 5 4 3 2 1 0
9. Often it felt like this was the TA's project not the students'. 5 4 3 2 1 0
10. The instructors should assign specific roles and responsibilities for each group member. 5 4 3 2 1 0
11. The presentation of our preliminary findings we did for the panel of administrators was an effective way to learn presentation skills. 5 4 3 2 1 0

Please indicate **how frequently** you were able to **practice or develop** the following skills while working on the 600 group project. Circle the word to the right of each statement that corresponds most accurately with your personal experience:

Often (on 3 or more occasions or for extended periods)
Sometimes (on 1 or 2 occasions or periodically)
Not me (the opportunity existed but it wasn't something I did)
Not Applicable (this skill was not used by anyone in my group)

1. Dealing with people who have different ideas than me.	Often	Some.	Not me	Not Applic.
2. Scheduling my workload to successfully collaborate with others .	Often	Some.	Not me	Not Applic.
3. Getting up in front of a group to discuss a technical subject.	Often	Some.	Not me	Not Applic.
4. Writing technical information concisely and clearly.	Often	Some.	Not me	Not Applic.
5. Editing other people's work.	Often	Some.	Not me	Not Applic.
6. Conducting a face to face interview.	Often	Some.	Not me	Not Applic.
7. Conducting a telephone interview.	Often	Some.	Not me	Not Applic.
8. Finding information in published documents.	Often	Some.	Not me	Not Applic.
9. Breaking a problem into manageable sub-issues.	Often	Some.	Not me	Not Applic.
10. Seeing a complex problem holistically-in a larger context .	Often	Some.	Not me	Not Applic.
11. Judging the appropriateness of an idea as a possible. solution to a problem.	Often	Some.	Not me	Not Applic.
12. Selecting a useful problem-solving strategy for examining environmental issues.	Often	Some.	Not me	Not Applic.

Compared to other classes you have taken at this university, **how effective** was the **600 group project** at introducing/developing/reinforcing these skills:

More effective **Same** as other classes **Less** effective
N/A=Not Applicable: skill not used in the 600 class and/or any other class I took at this university

1. Dealing with people who have different ideas than me.	More	Same	Less	N/A
2. Scheduling my workload to successfully collaborate with others .	More	Same	Less	N/A
3. Getting up in front of a group to discuss a technical subject.	More	Same	Less	N/A
4. Writing technical information concisely and clearly.	More	Same	Less	N/A
5. Editing other people's work.	More	Same	Less	N/A
6. Conducting a face to face interview.	More	Same	Less	N/A
7. Conducting a telephone interview.	More	Same	Less	N/A
8. Finding information in published documents.	More	Same	Less	N/A
9. Breaking a problem into manageable sub-issues in order to understand it better.	More	Same	Less	N/A
10. Seeing a complex problem holistically-in a larger context .	More	Same	Less	N/A
11. Judging the appropriateness of an idea as a possible solution to a problem.	More	Same	Less	N/A
12. Selecting a useful problem-solving strategy for examining environmental issues.	More	Same	Less	N/A

Briefly list your major contributions to the final report (data collection, editing, developing recommendations etc.)

1.

2.

3.

Do you want to receive a copy of your group's final report? Yes_____ No_____

Would you like the final report mailed to you or would you be able to pick it up from my office in Science Hall? (I would prefer saving on postage if at all possible) Mail it _____ I'll pick it up_____

Would you like to receive a copy of the responses we received from the administration? Yes_____ No_____

I was in the transportation group_____

I was in the recycling group_____

My gender Female_____ Male_____

Your Name_____

Even if you don't want to receive anything I'd like to have your name so that I can do some follow-up on this work (maybe in five years?) Of course this is optional. Please be assured that I will never link your comments with your name in my final report or in my conversations with the teaching team or the project clients.

Thanks a bunch for taking the time to complete this survey. Your help is greatly appreciated.
Please feel free to add any additional comments:

Campus Ecology Research Project

Committee for Environmentally Responsible Campus Management-CERCM
University of Wisconsin-Madison

Project Evaluation by Project Client

Please rate the quality of these final report components. Your assessment should be based on your performance expectations for senior undergraduate students.

Scale range 1-10: (1=unsatisfactory, 5=satisfactory, 10=exceptional).

A) Final Report	Rating
Data set is reasonably complete and well documented. Comment: Could have checked through some things better.	6
Data analysis is thorough and incorporates valuable insights. Comment: Some conclusions are not well founded: areas of research vary in quality quite a bit.	5
Data presentation is accurate and persuasive. Comment: Definitely reasonably persuasive; could have been stronger though with stronger data.	7
Recommendations are thoughtful, feasible, and supported by data. Comment: Yes, as far as they went with data: my #1 comment is that I wish theories had been able to be checked and discussed more with me, the client.	7
Prototype materials (brochures, posters, etc.) are in a form that will make reproduction and distribution simple. Comment: Good work.	9
Format of report was concise, readable and professional. Comment: (No comment)	7

Daniel Einstein-Program Coordinator
550 North Park Street Room 70
Madison, WI 53706

Tel: (608) 263-5492
FAX: (608) 262-2273
E-mail: Einstein@macc.wisc.edu

B) Please evaluate the students' recommendations from the final report. Address the following issues in your responses:

- Usefulness of recommendations given your departments objectives.
- Probability of recommendation being implemented in the next 12 months given available resources and institutional culture.
- Additional resources that would improve the likelihood that this recommendation, or a similar strategy, will be implemented (e.g. information, funding, political support etc.).

Bicycling and Pedestrians

More bike racks especially racks that can accommodate popular models of bicycles and locks (p. 8).
Comment: Good, but not a lot of new info. and probably over-weighted in entire report.

Bike lane maintenance (p. 10).
Comment: This was needed research and commentary: good work-hopefully we can follow-up.

Pedestrian safety (p. 10).
Comment: Impractical-re: speed bumps

Night safety (p. 11).
Comment: Night safety section is going ahead and will be piloted this fall.

Flexible Parking

Sticker method (p. 14).
Comment: Problems with this idea should have been checked out further.

Ticket method (p. 15).
Comment: Not practical for us.

Permit card method (p. 16).
Comment: Not well enough researched. There is a version of this that we will likely be implementing that I discussed with students but it wasn't really incorporated.

Vanpool and Carpool

University vanpool and carpool (p. 19).
Comment: Ideas here were never rechecked.

Incentives to vanpool and carpool (p. 20).
Comment: Ditto: we could not, under current law, do these things.

Vanpool and carpool coordinator (p. 21).
Comment: Interesting idea but never discussed with me/client prior to presentation.

Semester fee bus pass (p. 24).
Comment: Again, a good and interesting idea but, politically quite impractical.

Optional rebate for automatic bus pass fee (p. 26).
Campus bus improvement (p. 26).
Comment: These are better proposals.

Transportation Alternatives for the Campus

Centrally controlled transportation system (p. 30).
Comment: Does not factor in the reasons for the current decentralized system but of value for consideration.
Campus shuttle bus (p. 30).
Comment: This is an idea which has a good chance of at least modified implementation.

Central Transportation Information Office (p. 32).
Comment: Excellent! A definite goal for us to aim at.

C) To date have the recommendations or data from the report been useful to you or other staff from your department? Please list how the information from the report has been used:

Yes. It will be even more useful as we continue initiative plans over the next several years.

D) Briefly list the strengths of the CERP model:

Identifies real problems and (CERP) links (up) student interest for research and proposed improvements.

E) Briefly list areas for improvement in the CERP model:

Time is always a problem but 1-2 final "check-out" meetings between students and clients should be required before draft report is presented.

F) Comment on the usefulness of the "Project Request Form". How effective was this form at identifying your department's research needs?

OK. Future forms could make use of completed projects by citing them as examples.

G) Would you be willing to work with CERP next semester on another project? Why or why not:

Yes-I think more "real world" partnerships are a definite plus for both students and clients.

Thank you for your help with this evaluation. Please feel free to provide any additional comments.

I enjoyed the students, class and experiences very much! I hope others benefited!!

Transportation at the University of Wisconsin-Madison: Recommendations for an Integrated System

Report prepared by students in *Environmental Studies 600*
Undergraduate Certificate Program Capstone Seminar
December 1992

Institute for Environmental Studies
University of Wisconsin-Madison

LIST OF CONTRIBUTORS:

Branden Born
Jessie Cannon
Tracy Heelan
Frederick Hirt
Steve Hund
Sonya Jaworski
Kirk Kapfhammer
Lisa Klus
Jenny Lipton
Kelly Mella
Kathy Oppegard
Kari Rieck
Tom Shorter
Jennifer Vena
Berengaria Winkler
Dan Wolff

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Special thanks to:
Christine Finlayson, Teaching Assistant, Environmental Studies 600
Evelyn Howell, Professor, Landscape Architecture and IES
Lori Kay, Director, Department of Transportation Services
Duane Hickling, Assistant Vice-Chancellor, Facilities Planning and Management

For more information contact:
Daniel Einstein
CERCM–Science Hall Rm. 70
550 N. Park Street
Madison, WI 53706
(608) 263-5492
E-Mail: einstein@macc.wisc.edu

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Contents

SECTION 1: EXECUTIVE SUMMARY

Introduction

Our purpose in creating this document was to analyze existing transportation data and create a transportation plan for the UW-Madison campus community. We considered the increasing demand for campus parking and developed several transportation recommendations to deal with this problem. These recommendations were devised to be both economically feasible for the university and environmentally sound for the campus and the Madison community.

Our recommendations are designed to meet the needs of UW-Madison students, faculty, and staff, as well as visitors to campus. Our proposals are designed to lessen the environmental impacts of transportation by reducing fossil fuel consumption and minimizing construction of new parking facilities. Implementation of our recommendations will save the university the expense of construction costs and also save the participants money by reducing the everyday cost of commuting.

When creating our recommendations, we considered the economic backgrounds and abilities of the people that use transportation to and from the UW-Madison campus. Except for the biking plans, all the recommendations allow access to the transportation system by differently-abled individuals and can be used without undue economic burden.

Background information for our transportation recommendations was provided by a number of sources. First, we reviewed the annual transportation surveys conducted by the UW Department of Planning and Construction between 1989–1992. For any gaps found in the data we made inquiries by phone. Next we researched programs that could be used in a long-term transportation plan. In drafting this plan, we incorporated the primary methods of commuting to campus – walking, biking, busing, and driving – into a larger system of transportation alternatives. The transportation alternatives are options that may appeal more to campus commuters than contending with expensive and crowded parking lots. Finally, we looked at ways to promote alternative means of transportation and created prototypes for maps and brochures to inform people about the new transportation plan.

Background

Approximately 60,000 people travel to the UW-Madison campus each day. Their mode of transportation varies according to the season and the distance they must travel to get to campus. According to the 1991 survey conducted by the UW Department of

Planning and Construction, 23% of students and employees walk to campus, 33% drive, 15% bike, and 4% take the bus (Department of Planning and Construction, 1991).

People who choose to drive to campus often have difficulty finding parking places for their automobiles. For the approximately 14,000 people who drive daily, there are only 10,000 parking spaces available (Kay, 1992). Instead of alleviating the parking problem by building a new parking lot or ramp, we propose reducing the number of automobiles used on campus, thereby lessening congestion while opening more parking spaces. In order to reduce automobile congestion on campus, we studied other modes of transportation such as biking or walking and the use of a flexible parking program, vanpools, carpools, buses, or alternative transportation methods, such as light rail.

To examine each mode of transportation closely, we formed the following five topic groups: bicycles and pedestrians, buses, flexible parking, vanpools and carpools, and transportation alternatives. Within each topic group, we examined the successes and failures of the past and present UW-Madison transportation system. Our means of doing this included analyzing data from surveys conducted by the Department of Planning and Construction and by the Department of Landscape Architecture to evaluate current trends in campus transportation. We also researched successful programs at other college campuses and institutions to determine their applicability to the UW campus. Personal observations and interviews with UW-Madison staff, students, and faculty were also used as a basis for information.

Identification of transportation problems

Our analysis of the transportation surveys and our observations on campus illustrated certain problems with the current transportation system. The following problems need to be addressed if the UW wants to encourage people not to drive alone to campus:

Bikes and Pedestrians:

- Safety is a concern for:
    1. female pedestrians who walk at night;
    2. pedestrians at intersections;
    3. bicyclists crossing and riding on the streets.
- There are insufficient bike racks available in specific areas.
- Bike lanes are not maintained adequately, especially in the winter.

Parking and Flexible Parking Systems:

- There are not enough parking spaces available for those who wish to drive.
- Flexible parking systems may inconvenience commuters who must drive to campus on a daily basis.

Vanpool and Carpool:

- Vanpools and carpools are underutilized.
- There is no centralized system where people can get information on vanpools and carpools.

Buses:

- Many people feel that busing is slow and inconvenient.
- Busing, while cheaper than driving, may still be expensive for some.

Transportation Alternatives :

- There is no integrated campus transportation system.
- Alternative transportation methods (e.g., light rail, personal rapid transit, etc.) are not currently available on campus and many have never been applied to a campus setting.

Recommendations

After we evaluated the problems with the existing UW-Madison transportation system, we developed the following recommendations to encourage people to walk, bike, vanpool and carpool, bus, or combine these modes of transportation.

Pedestrians:

- Organize foot patrols to foster a safer nighttime environment for pedestrians.
- Install speed bumps near congested pedestrian crosswalks.

Bikes:

- Install traffic signals that are specifically designed for bicycles to alleviate confusion at busy intersections.
- Improve maintenance of pedestrian and bicycle pathways, especially during winter.
- Install enough bike racks in high demand areas on campus to accommodate all bicycles.
- Consider installing bike racks designed for easy use.

Flexible Parking Permits:

- Sell discounted parking permits that are valid only on certain days of the week to increase access to single parking spaces.

Carpools and Vanpools:

- Establish a university-owned and operated carpool and vanpool program.
- Provide incentives for participation in the program such as:
    1. Providing vehicles,
    2. Paying for fuel used,
    3. *Giving participants convenient parking spaces, and*
    4. Providing participants with bus passes to serve as an alternative means of transport in case of scheduling conflicts.

Buses:

- Implement an annual bus pass program where validated University ID's would serve as unrestricted bus passes.

Transportation Alternatives:

- Develop a fully integrated transportation program on campus. This program would allow people to easily get to campus and then move them efficiently around once they are here.
- Consider future development of a light rail system.

Promotion

In order to gather further information for our recommendations and to promote different modes of transportation, we created a survey that asks questions specific to our recommendations (See Appendix 3). The use and analysis of the survey results should show the relative merits of each recommendation.

In addition, to distribute information about the integrated transportation system, as well as general information on bike and pedestrian pathways, we recommend establishing a Central Transportation Information (CTI) office. This office would allow individuals to research all of their transportation options at one location. The CTI office could also be responsible for publicity of the transportation system. We have also prepared a pamphlet that provides comprehensive information. Other promotions should emphasize the accessibility, environmental benefits, and economic incentives for different transportation options. Advertising should use a variety of media including radio, newspapers, and posters.

SECTION 2: INTRODUCTION

Each weekday approximately 60,000 students, faculty, and staff travel to the UW-Madison campus. In addition, conferences, meetings, and other activities attract hundreds of visitors daily. The approximately 10,000 parking spaces on campus do not sufficiently accommodate the number of drivers commuting to campus. Increased traffic congestion and environmental impacts such as air pollution and consumption of fossil fuels are direct results of an over-dependence on automobiles.

To alleviate campus parking problems it is necessary to develop a more efficient campus transportation system that discourages energy-intensive, individual modes of transportation, while encouraging alternative more energy-efficient modes of transportation. Any new campus transit system should consider economic feasibility, environmental impacts, the needs of differently-abled individuals, and social equity.

The purpose of this report is to describe the current transportation system and its problems and to make recommendations directed at improving this system while developing a more environmentally sound campus transportation system for the future.

Encouraging the use of environmentally sound transportation options, such as walking, biking, busing, vanpooling, or carpooling on the UW campus will create a more flexible transportation system. This flexibility combined with other options, such as a flexible parking system, would provide a short-term solution to the campus parking problems. Meanwhile, technologically advanced transportation systems could be used to address long-term transportation needs.

This report is divided into five sections, each dealing with a specific mode of transportation. The sections are: Section 3, Bicycling and Pedestrians; Section 4, Flexible Parking; Section 5, Vanpools and Carpools; Section 6, Buses; and Section 7, Transportation Alternatives. Maps and tables have been included where appropriate to aid the reader in understanding our analysis and recommendations.

Conclusion

The most pressing transportation problem facing the UW-Madison campus today is too many single occupant cars competing for a limited number of parking spaces. Building new parking ramps and spaces is very expensive, so transportation options other than driving to campus are needed. Our recommendations include: increasing the use of bikes, buses, vanpools, and carpools; implementing a flexible parking program; and investing in technologically advanced transportation alternatives. None of these options, however, can solve the transportation problems by itself. Increased use of bikes, for example, would make the existing need for more bike racks worse.

What we are ultimately proposing is a systemic approach that would combine many or all of our recommendations. We feel that a centralized transportation system that addresses the needs of all people on campus is what UW-Madison should have. Any system should be flexible in order to conquer the problems of today as well as the unforeseen problems of the future.

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SECTION 3: BICYCLING AND PEDESTRIANS

Background

A majority of UW-Madison students bike or walk to campus. These modes of transportation are popular because most of the students live within 1-2 miles of campus. In addition, these are the most economical, environmentally friendly, and physically healthy ways to get to campus. Because of the popularity of walking and biking on the UW campus, we have evaluated the current conditions and any improvements to these conditions that could be made. Our recommendations are designed to increase the number of people biking and walking to campus and thus aid in alleviating the campus parking problem. Along with addressing incentives for biking and walking, we will make recommendations to improve safety, accessibility, and maintenance of bikeways and walkways. We will also discuss the environmental and economic implications of our proposals.

Data used throughout this report was taken from transportation surveys conducted by the UW-Madison Department of Planning and Construction in the fall of 1990 and 1991. The surveys provided important information about popular modes of transportation but because of the limited sample size (only 1% of students and 2% of the faculty and staff were surveyed), the surveys can only provide general information about campus transportation trends. These surveys show that biking and walking are popular modes of transportation but their popularity fluctuates depending on the weather. One survey found that during peak hours of traffic (between classes) more bicycles were being used than cars, therefore creating heavier bicycle congestion than car congestion. Also, the survey found that while there are many bicyclists in the fall, there are considerably fewer bicyclists in the spring, probably because of unpredictable weather. Biking in good weather was found to be second only to walking for student transportation. From the 1800 people surveyed by the UW Department of Planning and Construction in 1991 it was extrapolated that in inclement weather 1,600 students and 400 staff and faculty bicycled to campus (UW Department of Planning and Construction, 1991).

Weather also affects road and walkway conditions. In the past, the plowing of bike lanes on campus has not been consistent, creating slippery conditions that are very dangerous for bike traffic. In contrast, the pedestrian sidewalks have better snow and ice removal throughout the winter season.

Problems such as pedestrian safety are also a concern. In particular, safety at night for female pedestrians has been a problem on campus for years. Although the Women's Transit Authority, Campus Saferide, and other programs are available to provide safe nighttime transit, many people choose to walk. There are well lit routes and walkways on the campus but this is not always sufficient to deter assailants or guarantee safety.

Recommendations

The bicycle and pedestrian task group developed recommendations based on research and information extracted from several sources: the transportation files of Environmental Studies-600; notes from the Alternative Transportation Group of the UW-Greens; conversations with employees of Memorial Union Outdoor Rentals, the UW Grounds Department, the UW Department of Transportation Services, and the Madison Police Department; newspaper articles; and general observations of biking and pedestrian activities. These recommendations include:

- More bike racks are needed on campus, especially racks that can accommodate current popular models of bicycles and locks (e.g. , mountain bikes and U-shaped locks). New bike racks should be installed in specific areas as identified by a campus rack inventory or survey.
- Bike lanes should be adequately maintained, including improved structural maintenance and repair of potholes and snow and ice removal.
- Safety should be improved for pedestrians and bicyclists in busy crosswalks and intersections on campus.
- Walking patrols should monitor the campus at night and provide a safer environment for all students.

Bicycle racks: Results from a bicycle rack inventory and a bicycle field survey conducted by the Department of Planning and Construction have been useful for defining bicycle parking problems and making recommendations to resolve them. For ease of data collection and analysis, the campus was divided into sections by the Department of Planning and Construction (see map, Appendix 1). The Eagle Heights area is not included in our discussion because we feel that it does not have a bike traffic and parking problem.

A bike stall inventory taken in August of 1991 identified 8224 bike stalls on campus. A stall is defined as a space accommodating a single bicycle, while a rack is made up of a group of stalls. Overall, areas F, H, and I had more bikes than stalls while areas B, D, E, G, and J had more stalls than bikes. All of the areas had sites or particular buildings where there was a shortage of bike stalls. The data were only collected on one hour of one

summer day, thus providing a narrow sample size and a potential sample bias. These problems could lead to an inaccurate analysis. More realistic trends could be seen with more extensive inventories or field surveys. For example, a more accurate analysis would result from a survey of bike racks per building rather than bike racks per area.

The Department of Planning and Construction used the 1991 inventory and survey to determine which areas needed more bike stalls. As a result, in the fall of 1992 there was a total of 184 more stalls available in areas B-J. Although these additions were helpful, there is still a shortage of bike stalls at particular locations during peak riding times, which are in between class periods. Through analysis of the Department of Planning and Construction's updated bicycle inventory, 1991 field survey, and personal observations, we have identified some areas on campus where bicycle parking is particularly scarce. Library Mall and Memorial Union, both in area I, have inadequate stall space. Area E has three problem sites: Russell Labs, Henry Mall (specifically the Biochemistry building), and Fred Hall. In Area G, the Noland and Psychology buildings are problem sites. Commerce and Social Science are two buildings in section H where there is inadequate stall space. All of these locations are crowded bike areas where more bike stalls are needed. A student survey could probably provide more accurate information on the subject. Thus we recommend that the Department of Planning and Construction consider this when analyzing past surveys or preparing new ones.

Our primary recommendation is that more bike racks be added in the suggested problem areas. Temporary racks are less expensive to install and maintain than permanent racks and temporary racks have less of an environmental impact than permanent racks. If there are racks on campus that are consistently unused, as shown by the rack inventory done by the Department Planning and Construction, they should be relocated before new racks are bought. We have specific recommendations for the types of racks that should be installed. There are certain types of racks that are much more practical for use with the popular quick-release tires, mountain bikes, and U-shaped locks. Racks that allow the wheel, frame of the bike, and a piece of the rack to be close enough that a small lock can fit around them are ideal. (See Appendix 2 for a diagram of recommended rack types.) We recommend that any new racks installed on campus be one of these styles.

We also recommend that certain types of bicycle racks located against walls or other barriers be reoriented or moved away from the wall. One of the popular rack styles on campus is very accommodating if it is oriented so that the wheel can go over the rack and slide back into the stall. However, if this type of rack is placed too near a wall or oriented incorrectly, it becomes useless (see Appendix 2 for an illustration). It is not uncommon to see these racks empty with bikes locked up to poles and trees nearby. A few places where

this situation occurs are at the Psychology building, Noland, the second level of the Humanities building, and at the Biotron. Our recommendation should be feasible and relatively inexpensive because this style of rack is movable. Ideally, this type of rack should be placed away from a wall so it can be accessible from both sides.

Bicycle lane maintenance: We observed that during the winter bike paths are often neglected by snow removal crews. Biking, especially with the advent of the mountain bike, could be just as easy in the winter as it is during the summer and should be encouraged if the university hopes to discourage driving. The campus surveys show a correlation between less biking and greater driving in the winter (UW Department of Planning & Construction, 1991).

Snow removal from the bike lanes should be made a top priority. On many campus streets bikers are forced to veer into the middle of the road because the sides have too much snow and ice cover and are too slick to provide ample traction for riding. This increases the chances of an accident with another vehicle and can slow down traffic. We must realize that the roads are for multiple use and not solely for automobiles.

UW-Madison should coordinate with the city's bicycle and pedestrian committee to share bicycle lane maintenance, including snow removal. This will aid bicyclists in getting to campus, because people may not choose to bike to campus if the snow is removed from campus but not in the city streets.

The City of Madison authorized $122,500 in the fiscal 1993 budget to purchase a vehicle specifically for the maintenance of bike lanes. This vehicle is designed to use less salt and sand and utilize a sweeper to do most of the cleaning (Madison City Bicycle / Pedestrian Subcommittee, Meeting Minutes 8/26/92). Such maintenance equipment should be considered by the university for future purchase. Cleaning could be done during the same days and hours as traditional street sweeping and the extra snow removal would have a negligible effect on existing snow piles.

All streets on campus should be cleared of ice and snow to increase biker safety, with an emphasis on the main thoroughfares such as Langdon Street, Park Street, University Avenue, Observatory Dr., Charter Street and West Dayton Street near the Engineering building and Union South. With a greater effort to provide biking safety during the winter we believe there would be a good chance that bike ridership would increase, lessening the use of cars.

Pedestrian safety: In order to improve pedestrian safety, it is important to make sure the intersections on campus are less hazardous. We propose installing speed bumps on either

side of some of the more dangerous crosswalks on campus, as a deterrent to speeding. Speed bumps would not inhibit the accessibility to crosswalks of differently-abled people or bicyclists as long as some space was left on either side of the speed bump for them. A couple of recommended spots would be on Langdon Street between the Memorial Union and Library Mall, the intersection of Park Street and Observatory Drive between Science Hall, Memorial Union, and College Library, and at the top of Observatory Drive between the Social Science and Commerce buildings. These spots have heavy motor traffic, bicycle traffic, and pedestrian flow during the day.

In October 1992, the university installed a speed bump in the exit lane of the parking lot at the Clinical Science Center. The speed bump cost approximately $300 and was bolted to the pavement so that it could be removed for snow removal (Wermuth, 1992). The initial cost and installation fees would be minimal and would reduce dangerous speeding at busy campus intersections.

It is also important to consider the safety of bicycle riders at intersections. UC–Davis, a popular biking campus, has specific left turn signals for bicycles at some of their busier intersections. UW-Madison could use such signals at congested intersections such as University Avenue and Park Street and University Avenue and Lake Street. Signals could potentially decrease the number of accidents by making it clearer who has the right-of-way.

Bike lanes in general should be more clearly marked on the pavement to make sure they are visible to motorists and pedestrians who would otherwise not think to look out for a biker. Ideas for better visibility include ground reflectors and fluorescent paint to better illuminate paths at night. Another way to make bike lanes more visible would be to pave them with colored asphalt, which requires less maintenance than paint.

Night safety: The Student Escort Service was formed three years ago to provide safety at night for female pedestrians. It was discontinued because of lack of popularity and publicity. We feel safety measures that supplement the nighttime protection given by city and campus police patrols are necessary. We recommend that a foot patrol walk a "beat" around campus to provide security for pedestrians. The foot patrol could be comprised of campus police, city police, or hired security guards.

Currently, on Madison's South Side there are patrols from a private security service that walk a neighborhood circuit. The guards are trained in self-defense, first aid, and CPR, as well as in general security training (Wisconsin State Journal, 11/2/92). It would be beneficial to the students of this campus to know that there are people who would be around to help them when walking at night. The cost of this security would depend upon

the time and the extent of coverage. For the university, a proposed circuit around the remote regions and the darker areas of campus could be patrolled between the hours of 11 PM and 6 AM. The circuit could include Bascom Hill, Linden Drive and Charter as a possible loop. From consultation with Trek Security, the firm providing the South Madison security, we estimate the cost would be about $350 per week for two guards working seven hour shifts per night. However, the cost would be negotiable depending on how many guards would be needed and for how long they would patrol.

Another approach would be to have campus and/or city police patrol on foot the same campus circuit at alternating intervals, instead of driving. Other recommendations to increase pedestrian safety include improved lighting and emergency phones along campus pathways. We feel that areas around the Humanities Building, the side path up Observatory Drive adjacent to Muir Knoll, and around Steenbock Library and Russell Labs need improved lighting.

Other recommendations: Public outreach is necessary if we really want to provide safer non-motorized access to campus. Biking could be further encouraged with efforts to inform potential bikers about the conveniences of biking on campus. Detailed maps of bicycle routes and bike stall locations could be distributed to encourage more bicycling and to demonstrate its advantages.

The installation of bike shelters on campus would encourage biking in the winter, especially for those people who would otherwise not want to expose their bikes to winter conditions. Plastic tarps or removable plastic overhangs would be suitable for this purpose.

Bike lockers are convenient for riders who commute frequently to the same spot or who are concerned about leaving their bike outside for fear of theft or vandalism. Lockers are relatively compact and could operate on a rental basis.

A bike checkout service would provide a valuable service on campus. It would be simple and would operate in similar fashion to checking a book out at the library. Outdoor Rentals (below the Union Terrace on Lake Mendota) agreed that they would administer the program. A fleet of bikes could be obtained at low cost from police auctions, donations, or company sponsors. Guidelines could be set up for time of use, location of drop-off points, and cost. The advantages would be many, including greater access to areas of interest for people who otherwise are limited in their transportation, such as visitors. A bike checkout service would also increase bike ridership by people who might otherwise use cars. Valparaiso University in Indiana and University of California-Berkeley both have rental programs currently in operation.

Limiting car access on Observatory Drive would be a way to make the campus safer and more scenic to pedestrians. There are many ideas as to what degree a motor ban should be extended. Certainly buses, maintenance vehicles, and bicycles should be allowed to use Observatory Drive. The idea of closing Observatory Drive to vehicle traffic was proposed by the UW Greens but was considered too controversial and was dropped.

Creating more bike lanes would improve bicycle access and safety. In future planning of road and bridge construction, bike lanes should be taken into consideration. The roads should be as much for bikers as they are for motorists.

Bike traffic tickets should be used for safety enforcement and not for criminalizing bicycling to generate revenue. It is our opinion that tickets currently issued by the city of Madison are too costly and over-exaggerate the actual bike "crime." Too often in cases involving a motorist and a biker, the ticketing officer fails to identify the fault of the automobile driver.

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SECTION 4: FLEXIBLE PARKING

Background

The shortage of parking spaces is one of the biggest problems facing the UW-Madison Department of Transportation Services. Currently, there are only 10,000 parking spaces at the university for the 14,000 parking permit holders (Kay, 1992). In fact, the parking space shortage is even greater than these numbers suggest. More people would like to purchase permits but are unable to do so, although a permit waiting list is available. A simple solution to this problem would be to build more parking spaces. But because of the lack of available space for lots and the extremely high costs of ramp construction, the parking problem cannot be solved solely by building more parking spaces. Therefore, a new approach needs to be considered to accommodate the increasing demand for parking.

Flexible parking is one strategy that could be implemented to ease the parking shortage. Currently, a person buys a parking permit that allows him or her to park in a designated lot for the entire day, Monday through Friday. In a flexible parking system people would have the option to buy discounted permits that would allow them to park in a designated lot only part of the week. Flexible parking would allow a single space to be used by multiple cars, thereby creating more access to parking without the need to build new spaces. With more efficient use of existing spaces, additional spaces could be allocated for visitor use.

Recommendations

We researched three types of flexible parking plans that could be implemented on the UW-Madison campus. We have called these three methods the Sticker Method, the Ticket Method, and the Permit Card Method.

The Sticker Method: This plan restricts the days permit holders can drive, either Mondays, Wednesdays, and Fridays or Tuesdays and Thursdays. The existing campus parking permit comes in the form of a colored sticker with the assigned lot number on it. Under our proposed flexible parking plan, three different colors would be used. One color sticker could be used for people who drive Mondays, Wednesdays, and Fridays, with a different color for those who drive Tuesdays and Thursdays. A third color could be used for those

who must use the parking lot every day. Conversion to this system would only require more careful observation by the parking enforcement staff.

One advantage for the university is that this system is very similar to the present system and would not require new technology or the retraining of parking enforcement staff. When combined with a bus pass that could be used at all times, the flexible permit would provide an additional incentive to participate in the program (see Section 6 for more information). Also, a flexible parking permit would be less expensive than a full-time permit. If this system is implemented, it will allow more efficient parking lot use and the university would avoid the need to build more parking facilities. If people occasionally need to drive on days other than their permits allow, temporary permits could be made available. For example, we recommend that the permit holder could go to the Transportation Services Department at least three days in advance to apply for a temporary permit, with only ten such permits allowed each permit holder per year. This method has not been tried on a large campus or other institution before, but we think that because of its simplicity, this method of flexible parking might be feasible at UW-Madison.

The Ticket Method: Another type of flexible parking plan involves a ticket system. Participants would be issued a book of tickets that would contain a specified number of tickets per week. Each ticket would be good for any one day of a specific week. Under this plan, two options would be available: a two-day-per-week or a three-day-per-week driving privilege. The cost of the tickets would be proportional to the number of days per week driven. The days of the week driven could be changed each week, if necessary.

Upon entering the designated parking lot, the driver would insert the ticket into a date stamping device. This would validate the parking ticket for that day, as well as invalidate it for future use. The driver would then place the ticket into a clear plastic ticket holder located in the same place existing stickers are attached. This would make observation of the tickets by parking monitors similar to the present practice. We also recommend that for ease of observation, each week of tickets would be printed on a different color of paper.

The University of Washington in Seattle uses a similar ticket system with good results. Under their system, however, a gatekeeper collects tickets as cars enter campus. Because of the high cost of the University of Washington's system (including personnel, maintenance and liability insurance costs), we recommend using our version of the ticket system. One part of the University of Washington program that we feel should be preserved is a 90% reimbursement of unused tickets (University of Washington Transportation Office, 1991). This would encourage people to drive only when necessary.

This refund could be obtained by submitting the unused tickets at the end of year to the Department of Transportation Services.

The ticket system has two advantages over the existing UW-Madison system and the colored sticker plan. First, monitoring of tickets would be similar to present techniques, assuming that the parking monitors are able to read the date stamped on the ticket without getting out of their vehicles. Second, the system allows flexibility in the days that people can drive. The only possible drawback to this plan is that the system may be overloaded on poor weather days.

The Permit Card Method: A third and highly efficient, but costly, option that avoids the need for tickets or stickers is a barcode or magnetic system. In this system, a barcode or magnetic stripe would be attached to a permit holder's university identification card or a visitor's temporary parking permit. A gate could be installed at every parking lot (like the one currently at the Veterinary Medical School lot), to "read" the cards. This would be an expensive plan to implement, especially downloading the system for visitor permits and liability insurance for gate damage to vehicles. However, it could reduce the number of parking enforcers required.

Implementing a Flex Parking Program

We recommend several incentives to encourage people to change to a new parking system. For instance, all persons participating in a flexible parking plan would receive an annual bus pass included in the cost of the permit. Another possible incentive would be a refund program for taxi fees if a participant in the flexible parking program needed to leave the campus because of an emergency on a day they did not have their car on campus. Taxi receipts would be submitted to the Department of Transportation Services for reimbursement. The University of Washington in Seattle uses a similar policy with much success and little abuse of the system (University of Washington Transportation Office, 1991).

We recommend that pilot studies be set up to test these new parking strategies. Participants would be allowed a semester-long grace period during which they could try the new system but could drop out at any time. If the person previously had a parking permit she or he would be allowed to get it back without penalty.

To insure that those participating in the pilot flexible parking program could get back their full-time permits, not all of the newly open spaces would be reallocated to permit holders. The number that are reallocated could be determined by a survey question asking how interested current permit holders are in a flexible parking program (see Appendix 3).

Those who check "very interested" as opposed to "moderately interested" or "not interested" would help determine this number.

For instance, if 10% of current permit holders say that they are "very interested" in a flexible parking program, then one may presume that those 10% would be the most likely candidates. Therefore, 10% of the newly opened spaces could be reallocated to those commuters who did not have permits before. We suggest this because the initial pilot flexible parking program could result in a loss in revenue because two permit holders sharing a space in the flexible parking program will bring in only slightly more revenue than one full-time permit holder. There would be a potential trade-off between encouraging current permit holders to try the flexible parking program by guaranteeing that they could get their full-time spaces back and a one-time revenue loss during the initial pilot program. However, the one-time revenue loss could be more than accounted for if the flexible parking is successful, since additional parking spaces would not have to be built.

A flexible parking program could increase efficient use of parking spaces even if only a small percentage of the campus participated. For example, if a plan had just 1400 people participating, which is 10% of the current permit holders, they would only use 700 spaces combined. The university would then "gain" access to the other 700 parking spaces.

Another benefit of a flexible parking program is that it would reduce the need to build more parking spaces. Due to space limitations, any future parking spaces will have to be built above or below ground. This type of construction is very expensive and costs between $10,000 and $20,000 per ramp space (Kay, 1992). If establishing a flexible parking program were able to eliminate the construction of 700 spaces, it would save $10 million for the university.

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SECTION 5: VANPOOL AND CARPOOL

Background

There are too many cars and not enough places to park them on the UW-Madison campus. Rather than building new expensive parking lots, we recommend increased vanpooling and carpooling. The only vanpool and carpool programs currently available to all UW-Madison faculty, staff, and students are those operated by the state or county. The UW Department of Transportation Services does not offer its own vanpooling or carpooling program. However, there are vanpools and carpools serving the UW campus that are run by other organizations such as Dane County Rideshare and Vanpool Wisconsin.

Currently, all university vanpool inquiries are referred to the state program, Vanpool Wisconsin. This program is state sponsored but not state funded. The programs receive all of their funding from the vanpool participants. Established in 1977, Vanpool Wisconsin was originally funded by the Wisconsin Department of Transportation (Wisconsin DOT) and designated for state employees only. Because there was not a great demand for the program, the Wisconsin DOT decreased its role. Management of the program within the state agencies has changed numerous times during the last ten years.

Today, there are 68 vans in the fleet, with half of the vans commuting to Madison. According to the UW Department of Transportation Services, there are currently 28 vans participating in this program that travel to the UW-Madison campus. Of these vans, several are used by commuters from the Racine and Merrill areas.

Van maintenance and fuel costs are paid by the vanpool members. The Vanpool Wisconsin office coordinates vanpool riders and commuters and manages the vans and the costs of the program. The office refers inquiries to the existing vanpools. Insurance is covered by each individual vanpool member. Neither the state nor the university will cover the costs of the insurance, because of complications under Risk Management policies, especially for out-of-state participants. There must be a minimum of 11 members per full-size van. Vanpool Wisconsin indicated that if mini-vans are used as well as larger vans, participation in the program may increase because fewer riders would be needed per van. Current promotion for both programs is handled by individual departments in state offices and the university. The programs have also been advertised in local papers and through mail campaigns.

To create our recommendations we reviewed the vanpool programs of the University of Washington in Seattle and Virginia Technical Institute and inquired into the vanpool and carpool programs of TEXACO-Houston and TEXACO-Seattle (Peltier, 1992).

The Dane County Rideshare program, a carpool program, has been in operation since 1979. The program presently organizes carpooling for commuters within a 30-40 mile radius of the city of Madison. Twelve hundred people join the program annually with a 70% retention rate (Paxton, 1992). The program coordinates rides for employees of the state and university, as well as for other area workers who are interested in carpooling. If those informally carpooling outside of the program are included, it is estimated that 20% of all Dane County workers use carpools or vanpools as modes of transportation to work (Vanpool Wisconsin, 1992).

Although there are no state, tax, or corporate incentives for participating in the Dane County Rideshare program, the carpool participants benefit because wear and tear on their cars is reduced. Carpool costs, which average $0.15 per mile, are split between commuters. From 1979 to 1991, Dane County Rideshare estimates that 2,791,000 gallons of gas and $9,400,000 were saved by carpooling. In addition, they estimate that carpooling prevented 304 tons of hydrocarbons from being emitted into the atmosphere during this period, based on annual estimates of 200,000 gallons of gas used and 20 tons of hydrocarbons emitted (Paxton, 1992).

Recommendations

A University Vanpool and Carpool: In order for any program to be successful, there needs to be aggressive promotion, campus coordination, and thorough organization. In addition, the program needs to be easily accessible by the entire campus community. Therefore we recommend that the university establish its own vanpool and carpool programs and purchase its own fleet of vans and minivans, with a number of vehicles equipped for access by differently-abled people.

We recommend that the initial fleet consist of about 45 vans and minivans, which includes the existing 28 vans already used by the University. Since there are 16,000 faculty and staff members, a fleet of 45 vans with an estimated average of 12 participants per van would provide service for 540 participants. Considering the size of the staff, this targeted number of participants is small. There is currently a loan and purchasing program through the Wisconsin DOT that may enable the university to make such a purchase at a discount and/or provide a loan (Kieck, 1992). Because the university is trying to

encourage use of these programs by university staff and faculty, it should serve as the *direct coordinator for such a program. In order to attract more people to the program, the* university should coordinate with the current Vanpool and Rideshare programs to provide incentives to university participants.

Incentives to Vanpool and Carpool: The university's ability to provide incentives and encourage participation in van and carpooling is seen as much more effective than continuing to rely on a state run program. A number of universities and corporations in the U.S., including the University of Washington in Seattle and the TEXACO Corporation in Houston sponsor vanpool and carpool programs for their employees. By providing incentives such as convenience for vanpool and carpool parties and organizing their vanpool and carpool programs "in-house", both institutions were able to attract participants. We recommend that the university provide incentives to vanpool and carpool participants such as:

Incentives to Vanpool:

- Free 50 miles per month of personal van use for the van drivers, monitored by checking the odometer;
- Parking space provided close to the driver's working location for each vanpool vehicle;
- Taxi reimbursement of up to 50% for occasions when a van member may miss their ride due to department meetings, late exams, etc.; and
- Participants provided an annual bus pass at little or no cost (see Section 6 for more information).

Incentives to Carpool:

- Free tank of gasoline per month or discount on fuel for the driver;
- Parking space close to the driver's working location provided for each carpool vehicle; and
- Designated drop-off spaces at each building for easy loading and unloading of riders.

Many of the carpool and vanpool incentives would work in conjunction with one another, i.e., free University transit use, designated drop off areas at each building, and parking access. Increasing the cost of individual parking permits and relocating individual

parking areas to less centrally located parking lots would also be incentives to increase participation in the vanpool and carpool programs.

Vanpool and Carpool Coordinator: To organize the entire program and make it easy to understand and accessible, the university should have its own coordinator for vanpooling and carpooling. An information booth accessible to staff and students, at the Memorial Union, for instance, would be ideal. Computers in which a comprehensive database program is used to coordinate vanpool and carpool groups by area, size, and membership could be used.

A coordinator in each university department should be designated to issue a general transportation survey that would collect data on interest in the program, staff and faculty residential locations, work times, and transportation needs. The coordinator would collect the surveys and give them to the vanpool and carpool coordinator of the UW Department of Transportation Services. Pertinent information would be entered into the database and when an individual inquired about the program he or she would receive a list of existing vanpools and carpools in his or her area.

Promotional methods could include a presentation at Summer Orientation Advising and Registration (SOAR) programs to target incoming students and graduate students who may live off campus. Informational pamphlets could be provided to all departments and the participation of new faculty could be actively sought. Posters, informational presentations, and pamphlets could be presented at department meetings to familiarize staff with the programs. Advertisements in campus and city newspapers and a radio campaign are also recommended.

The potential benefits of vanpooling and carpooling are money saved from reduced gasoline, maintenance, and parking costs and lessened environmental impacts. Careful organization and aggressive marketing of this program, as well as clearly defined incentives, could make this a highly successful program for the university. The university could help set a standard of energy efficiency for the institutions of this county by offering an extensive and organized vanpool and carpool system.

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SECTION 6: BUSES

Background

The UW-Madison's current bus system consists of a designated campus route (the L route) provided by Madison Metro bus system. The route has three components: west campus (route L-W), east campus (route L-E) and central campus (route L-C). The fare for route L is $0.40, which is cheaper than the Madison city bus fare of $1.00. The UW also operates its own late night bus service, offering free rides from 6:30 p.m. to midnight on weekdays and from 6:30 p.m. to 2 a.m. on weekends.

Fewer than 15% of the over 60,000 people who work or go to school at the UW-Madison live on campus. Many of the people who do not live on campus and do not have access to a car rely on the Madison Metro city routes to get to campus and then rely on the Metro campus route L to get around campus. Madison Metro offers a free fare zone in the immediate capital area from 10:00 a.m. to 3:00 p.m. and payment options for citywide riders such as a monthly pass for $26 or a packet of 10 adult tickets for $7.

Weather conditions greatly influence people's decisions on whether or not to ride the bus. Many students and employees who walk or ride their bikes will turn to the bus system when the weather becomes cold, rainy, or snowy. Table 6-1 shows significant revenue increases that results from bad weather (UW Department of Planning and Construction, 1991).

Table 6-1: Annual revenue, in dollars, from city and campus bus ridership by UW students and employees (data from UW Department of Planning and Construction , 1991).

Type of Weather	UW Students	UW Employees
Bad Weather*	City Route: 954,226	City Route: 323,596
	Campus: 103,813	Campus: 4,440
Good Weather**	City Route: 314,520	City Route: 86,040
	Campus: 25,248	Campus: negligible

* Assumes that bad weather occurs in Nov., Dec., Jan., Feb., and March, for a total of 91 working days.
** Assumes the remaining 60 working days will be good weather.
Note: Calculations were made by multiplying the number of students or employees by the fares charged and the number of days the bus was used in each weather type. (All data from UW Department of Planning and Construction, 1991)

Recommendations

Semester Fee Bus Pass: To encourage use of Madison Metro to and around the UW campus, we recommend a semester fee be paid by each student, faculty, and staff member for an unlimited number of rides anywhere the Madison Metro buses operate. It would allow UW students, faculty, and staff, after paying a one-time fee, to ride the campus and city bus at any time just by showing a validated UW ID card.

We estimate that the semester cost to each student, faculty, and staff member would be $18. At this rate, users only have to make nine round trips on the city bus each semester to get their money's worth out of the pass. This proposal is modeled after several successful systems currently in use at the University of Oregon in Eugene, the University of Illinois-Chicago, the University of Colorado-Boulder, and the University of Washington in Seattle.

We established this $18 per semester cost using data from the UW-Department of Planning and Construction Transportation Survey of Fall 1991. This data specifies the number of students and faculty that currently ride buses in the city and on campus in different weather conditions. With this information we were able to calculate the revenue this ridership produces annually (see Table 6-1)

Our final calculation determined the total revenue from the proposed $18 per semester bus pass charge. If the 59,748 students and employees at the university each paid $36 per year, total revenue would equal $2,150,928. The revenue created through the bus pass fees would be somewhat larger than the current revenue received by Madison Metro draws in.

Using our calculations, implementing this proposal would generate an estimated annual $339,000 surplus. The surplus could be used by the UW and/or Madison Metro for any administrative work needed for this system. The proposed $18 per semester fee would be added to students' tuition bills for the fall and spring semesters and also for summer session. This arrangement would be similar to the athletic fee that all UW students presently pay. Faculty and staff could be charged $18 per semester through a salary deduction.

It might be argued that this system would be unfair, since only about 17% of UW-Madison students now take the bus regularly (UW Department of Planning and Construction, 1991). However, such a system could make riding the bus economically feasible for those who presently cannot afford it. It would also encourage people who use

individual automobiles to take the bus, since they would already have paid for it and they would not have to worry about parking.

This system would allow UW-Madison students and employees increased access to buses within the city and it would save gas previously used in individual cars. With this pass ridership is likely to increase as it has on some of the other campuses that have implemented similar programs, like the University of Washington (University of Washington Transportation Office, 1991).

We have evaluated our bus pass recommendation using four criteria: economic feasibility, environmental impact, social equity, and meeting the needs of differently-abled people. Madison Metro currently receives $1,811,883 annually in revenues from UW faculty and student ridership (Table 6-2). If all UW students and employees paid an $18 per semester fee for the pass, the total revenue would be an estimated $2,151,000. This figure represents a $339,000 increase over the estimated annual revenue presently earned by Madison Metro from UW student and employee ridership. Therefore the proposed city-wide pass is economically feasible

Table 6-2: Total amounts currently spent per year by students and employees in all types of weather:

On City Route:	$1,678,382
On Campus Route:	+ 133,501
	$1,811,883

Increased bus ridership resulting from the pass system may reduce the number of people walking and riding their bikes, thus reducing traffic congestion on the streets and walkways of the UW-Madison campus. More importantly, it may get people out of their cars and get them to use mass transit. It is possible to make this system convenient enough so everyone can view the bus system as a viable alternative to driving.

To ensure that the bus pass system is socially equitable, it must be affordable for everyone. Spreading the cost of bus riding over 59,000 students and employees makes busing a viable option for those who do not own a car and cannot currently afford to ride the bus. We feel that many people who do not currently use the bus will find it more convenient under this system.

Madison Metro already offers two plans for the differently-abled, the Metro Plus and the Local Motion, both of which would become more affordable to any university pass holder. The University of Washington is successfully using campus buses that are equipped with wheelchair lifts, which may be a viable option at UW-Madison (University of Washington Transportation Office, 1991).

Optional Rebate for Automatic Bus Pass Fee: Another way of funding the bus pass would be to automatically include it in everyone's tuition, with the option of a rebate for those who did not want to purchase a pass. If the university put a due date or deadline on the rebate, we estimate that less than half of the students would request a rebate. In this case, we would have to slightly raise the estimated cost of the pass to ensure its economic feasibility. A trial semester would be required to see exactly how many students would actually apply.

Campus Bus Improvement: A further possibility would be a more intensive campus bus schedule, somewhat like a shuttle, at least during peak travel times (see Section 7 for more discussion). Information about peak travel times would have to come from Madison Metro, who are most familiar with bus ridership trends. If we are encouraging people to take buses to campus, we need to ensure that they can get around campus nearly as quickly and conveniently as if they had driven themselves and had to find parking. This would also encourage general use of the campus bus system, because if people know that waiting for the next shuttle will not take as long as walking, they will presumably take the shuttle bus.

References

University of Wisconsin-Madison, Transportation Plan, prepared by Bob Hendricks, draft copy, 1992.

University of Wisconsin Department of Planning and Construction, Transportation Survey Results University of Wisconsin-Madison, Fall 1991.

University of Washington Transportation Office, U-Pass User's Guide: A Commuters Handbook for the University of Washington, 1991.

SECTION 7: TRANSPORTATION ALTERNATIVES FOR THE UW CAMPUS

Background

One of our goals was to explore alternative modes and systems of transportation for the UW campus. We worked on alternatives that would meet the needs of students, faculty, staff, and visitors while considering four primary criteria: economic feasibility, environmental impact, the needs of differently-abled individuals, and social equity. Within this context there are two levels of alternatives, which we will call "means" and "systems".

Means are the physical modes of transportation such as cars, buses, bicycles, and pedestrian traffic. Possible improvements to these existing means are technologically oriented; for example, the use of higher efficiency cars and buses.

When we speak of systems, we mean more comprehensive views of transportation on campus. We intend to look at the present system and suggest modifications that will help alleviate campus parking and transportation problems while moving away from dependency on the automobile for transportation. The current problems on campus include a shortage of parking and a need to control traffic congestion.

In conjunction with the two stated levels of alternatives – means and systems – we addressed specific alternatives and based our recommendations upon the four criteria listed above.

Physical Modes of Transportation: Means

In our consideration of other modes of transportation, we compared the automobile with its alternatives, paying attention to travel time, cost, convenience, and safety. The alternatives we considered include: personal rapid transit (PRT) systems, "high tech" trains, alternative parking systems, light rail, shuttle buses and vanpooling. The first two options were eliminated after we applied the four initial criteria. The rest are viable alternatives to cars, and integrate well into our transportation system recommendation. In addition we took into account biking and walking, but refer the reader to Section 3 of this paper for specific information and suggestions.

PRT is an ambitious new technology that is aimed at moving people out of their cars and into a mass transit system. The PRT would have passengers or small groups going to the same destination, traveling in small, fully-automated cars which could seat up to six passengers (Anderson, 1988). The size of the individual car varies depending on the

type of system and how much weight the system can hold. Passengers program the computerized car to take them directly to their destination, permitting them to proceed without intermediate stops.

PRT is an untested technology that focuses on individual rather than mass transit and costs $5-10 million per mile plus a cost of $45,000 per vehicle (Lewis, 1985). To date, a PRT system has not been implemented; however, variations on the technology do exist. Because of the high cost, the individual nature of transit, and the questionable reliability of such a new system, PRT was removed from further consideration.

"High-tech" trains, such as magnetic-levitation "bullet" trains, are used in Japan, England, and Germany. These trains operate on a regional scale, from city to city, rather than short intra-city distances. A double-track magnetic-levitation line is expensive, costing about $15 million per mile (Strandberg, 1991). Thus, economic considerations and problems of scale make such high-tech trains impractical for a campus setting.

Alternative parking systems, such as flexible parking, could be an integral part of an effective parking and transportation system. For further information regarding such parking strategies, see the "Flexible Parking" section, Section 4.

Light rail systems use electrically powered mass transit vehicles that are smaller and quieter than trains or subways, and operate on exclusive rights-of-way or run alongside other traffic. Light rail systems require significantly less energy per rider than buses or cars. In addition, because of their electric engines, light rail systems emit much smaller amounts of air pollutants such as carbon monoxide, nitrogen oxides, and hydrocarbons (Brown, 1991; see Table 7-1). The cost is not excessive and they have been successfully operating for years at such places as Disney facilities.

TABLE 7-1: Pollution Emitted During Typical Work Commutes in the U.S.*

Transport Mode	Hydrocarbons	Carbon Monoxide	Nitrogen Oxides
Rapid Rail	0.2	1	30
Light Rail	0.2	2	43
Transit Bus	12	189	95
Vanpool	22	150	24
Carpool	43	311	43
Auto**	130	934	128

*Based on national average vehicle occupancy rates.
**Based on one occupant per vehicle. All data from Brown 1991

Light rail has recently been constructed in San Diego, in the form of a surface trolley, for about $11 million per mile (Brown, 1991). The UW-Madison could design a one to three mile loop for a total capital investment of $11-33 million. Given this price, and the fact that light rail is well tested, we feel that a long-term plan to incorporate light rail into the campus transportation system is a valid idea. Its development should be seriously considered by the university. This type of development could also be integrated with a Madison proposal for light rail development if the city decides to proceed with such a project. The development of a UW light rail system doesn't necessarily depend on the city's decision to build a light rail. However, it would be much easier for the UW to be incorporated into a city plan, rather than the UW establishing its own light rail system.

Bus lines for the UW depend on a cooperative venture with the city's Madison Metro to serve the campus area. The campus Metro network is generally successful. However, some problems that need to be addressed are cost, wait time, inconvenience, and a student population that is unfamiliar with the bus system. These problems have created a negative attitude towards mass transit that has diminished the use of buses on campus. By incorporating bus pass costs into tuition or salaries, as suggested in Section 6, an economic incentive to ride the bus would be provided.

From a shuttle bus system, the university could phase in a light rail system whenever the university budget would allow. The shuttle would be a good way to move people around campus, and would provide a good indicator for the best future light rail route. The shuttle could be implemented and the system amended until "perfect", then it could be converted into a light rail system.

Integrated Transportation: Systems

Presently, the parking system is decentralized and is separately controlled by each department. The dependence of campus commuters on the automobile has led to parking problems and congestion on campus, in addition to the economic and environmental problems (such as air pollution, acid rain, and fossil fuel consumption) inherent to automobile use. So, rather than supporting the status quo, we propose an integrated, progressive transportation strategy in order to address parking and transportation needs. A full scale systems approach to transportation is needed on campus to minimize our current parking problems. While building parking structures would eliminate some of the current problems, we feel this is a shortsighted type of approach because it does not address future campus transportation needs.

Recommendations

We have developed a two-tiered system that initially gets people to campus, and secondly moves people efficiently around the campus.

Centrally Controlled Transportation: Our assumption is that there are three main groups of people that regularly arrive on campus: students, "regular-hour" staff, and "flexible-hour" faculty. A majority of the campus population, primarily students, lives roughly within a mile of campus and can walk or bike and therefore are not addressed here. We assume that the majority of "regular-hour" staff and "flexible-hour" faculty live further than one mile away from campus.

"Regular-hour" staff members work fixed hours such as 8:30 a.m. to 4:30 p.m. The regularity of their schedules makes them ideal candidates for a vanpool or carpool program. "Flexible-hour" faculty, because of their variable schedule, may choose to drive rather than take a vanpool to campus, allowing participation in a flexible-parking program.

We propose a centrally controlled transportation system that would include flexible parking combined with vanpools, buses, and automobile use. By centrally controlled, we mean that the Transportation Services Department could allocate parking for the campus as a whole, eliminating present departmental control. A full-time staff member may be needed to implement a flexible parking system and work in close cooperation with the vanpool system coordinator. The goals of these staff persons would be to place vanpool vehicles in appropriate and convenient locations and to move a majority of the cars from central "vest-pocket" lots to larger perimeter locations (Kay, 1992). Such relocated commuters would then move about campus using the shuttle bus. This type of approach would open central lots in congested areas and increase parking for differently-abled persons and visitors.

Campus Shuttle Bus: By establishing a frequent shuttle bus around campus, it would become easier to use bus transit, wait time would be lessened, and transportation speed would be more rapid. We recommend that a frequent campus shuttle be established that would be free for all students, staff, and faculty – to be owned, run, and operated by either the university or the city – whichever is more economically feasible. It should also be easy to identify, with the shuttles and signs at the shuttle stops brightly painted (in Badger red, perhaps?). There should be facilities for differently-abled people and it should be able to accommodate visitors who are unfamiliar with campus.

The proposed shuttle bus would be an addition to the Metro service for the campus. It would require minimal wait time – no longer than about five minutes – and this wait time would determine the number of active buses. In other words, during morning and evening rush hours more buses would be in service to meet the higher demand and ensure a short wait, while at slower times fewer buses would cover the shuttle's 1-3 mile loop. The route could easily be altered in the early stages of the shuttle bus system, allowing for needed adjustments. Once the system was operating successfully, light rail could be introduced to replace the shuttle buses. We think an integrated approach which includes a variety of transportation systems would be the most effective way to meet the campus parking and transportation needs.

References

American Public Transit Association. "Mass Transit: The Clean Air Alternative". pamphlet, Washington DC, 1989.

Anderson, J. Edward. "The TAXI 2000 Personal Rapid Transit System". Journal of Advanced Transportation; Vol. 22. pp. 1-15, 1988.

Brown, Lester R. State of the World: A Worldwatch Institute Report on Progress Toward a Sustainable Society. New York, WW. Norton & Co., 1991.

Kay, Lori. Director of the University of Wisconsin Department of Transportation Services, Interview 10/19/92.

Lewis, Philip H. and Fahrlye Sancar, et al. TAXI 2000 Demonstration Study: Selection of Test Site for Individualized Mass Transportation. July 22-October 31, 1985: University of Wisconsin-Madison, 1991.

Strandberg, Keith W. "Mass Transit's Orphan Technology: Maglev Prepares to Come Home." Mass Transit Magazine; pp. 18-21, 1991.

SECTION 8: PROMOTION

UW-Madison's transportation problems may be solved with a systems approach that incorporates several programs. We recognize that implementing an integrated system will have its difficulties, but it is obvious that we must not look to solving only the problems of today, but also those of tomorrow. The alternative systems mentioned have been adopted up to this point, but they could meet our present and future needs if properly implemented.

To find out what these needs are, we have prepared a survey that addresses people's opinions on transportation issues and use of transportation options (see Appendix 3). An analysis of the survey results would illustrate which of our recommendations would be most desired and used by campus commuters. From this information, the Department of Transportation Services could also determine which recommendations should have highest priority. The survey results could also result in refinement of the suggested systems, maximizing usage of transportation systems and minimizing inefficiencies.

Another way to ensure maximum usage is to provide accessible information. We recommend establishing a Central Transportation Information (CTI) office for the university. This office would integrate information on all modes of transportation. The suggested CTI office would have maps of the existing Lightway paths, bike routes, and bike racks, along with the shuttle, campus and city bus routes. The office would also be responsible for centralizing the proposed carpools and vanpools and providing information on their routes and how to begin or join a pool. The CTI office should also have information available on the flexible parking program, such as parking options and costs. Such an office would allow individuals to research all of their transportation options at one location.

The CTI office would also be responsible for promotion of the proposed systems. We recommend advertisements that encourage the use of the integrated transportation system and its components by highlighting its accessibility, environmental efficiency, and economic savings. Advertisements on the radio and in newspapers, both on campus and citywide, should be used. Posters should be made for kiosks and other campus locations (i.e., the Unions and lecture halls). Most importantly though, we recommend an informational pamphlet (see Appendix 4 for an example) that would be available to faculty, staff, students, and visitors through the CTI office, students mailings, and at SOAR.

SECTION 9: CONCLUSION

The purpose of our project was to generate suggestions for alternative forms of transportation to and around the UW–Madison campus. We evaluated our findings by using four different criteria: economic feasibility, environmental sustainability, accessibility for persons with disabilities, and social equity.

We learned that there is a wide variety of alternative transportation strategies available. Some methods require extensive inputs of money, while others are easy to implement and only require organizing, such as carpools.

We feel that what is most needed for alternative transportation options to work is an educated public. Without public support, environmentally sound options will be pushed to the background until the nonrenewable resources have been exhausted.

Most transportation in the United States uses a lot of nonrenewable resources, pollutes the air, and promotes a non-sustainable lifestyle. As global citizens, Americans need to be educated about the environment and how we impact it, so we can make good decisions for ourselves and future generations.

As university students, we are learning these skills. If we could use our knowledge and apply these skills, the UW-Madison could act as a model for efficient, accessible, planet-friendly transport. In this way, students could help to change how Americans think about transportation.

SECTION 10: LIST OF CONTACTS

Bikes and Pedestrians:

Bob Hendricks:	Assistant Director, Planning and Construction 263-3027 / 263-3000
Ron Christensen:	Fiscal Clerk, Transportation Department 263-6666 / 263-6844
John Wermuth:	Grounds Supervisor, Grounds Department 262-2954 / 262-1324
Brian Hendrikson:	Customer Service Representative, Seston Co. (Speed Bumps), 1-800-243-6624
Tabatha Graves:	UW-Greens. Office Coordinator 262-903
Receptionist:	Madison Police Department, Property Room 266-4955

Flexible Parking:

Michael Williams:	Manager, Transportation Systems, University of Washington, (206) 543-5200
Charles Harpin:	Coordinator of Parking and Traffic, University of Illinois (217) 333-7217

Buses:

Bob Whitson:	City of Boulder Transit Authority, University of Colorado-Boulder (303) 441-4260
Mickey Kaplan:	Transit Planner, Lane County Transit Authority, University of Oregon-Eugene (503) 741-6132

Vanpool / Carpool:

Ward Taxton:	Director, Ride Share Program, Dane Co. Regional Planning Commission, 266-9114
Larry Kieck:	Loan Coordinator, Wisconsin Department of Transportation 266-3581
Ron Mainard:	University of Washington in Seattle Transportation Office (206) 543-0450
Frank Peltier:	Coordinator of Transportation, TEXACO-Houston (713) 752-6000

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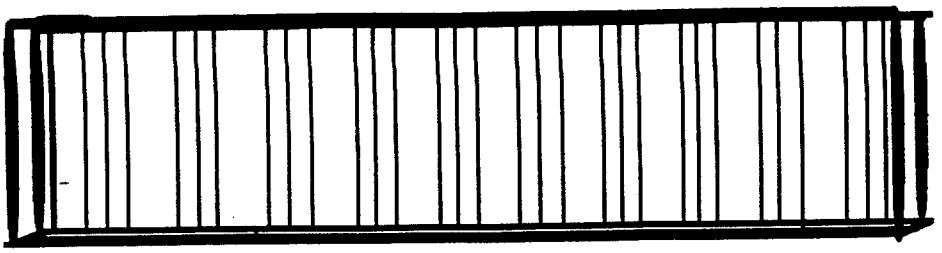
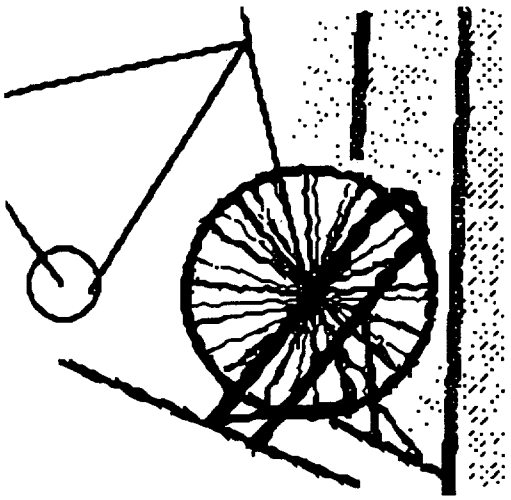
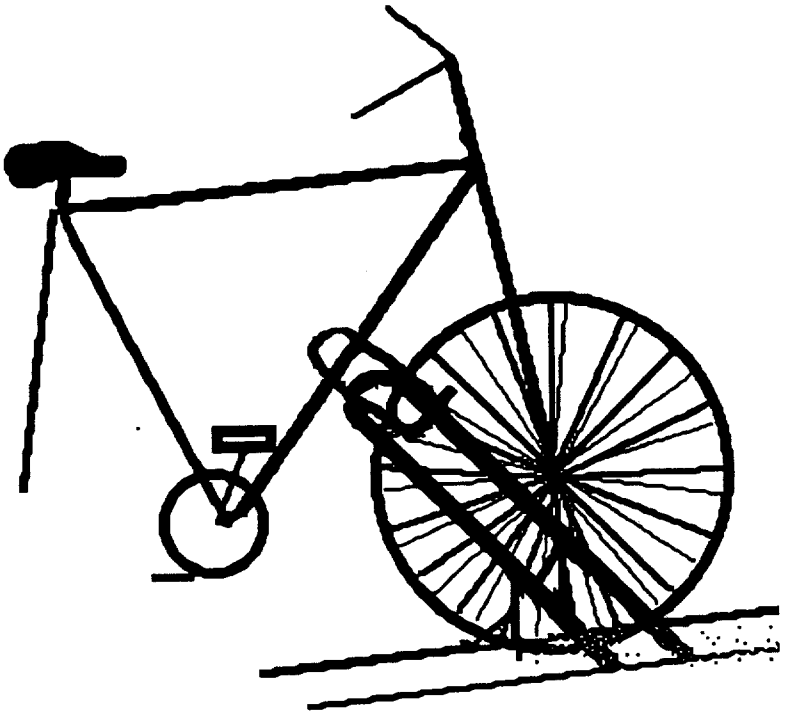


Rack unsuitable for secure locking

Against wall:

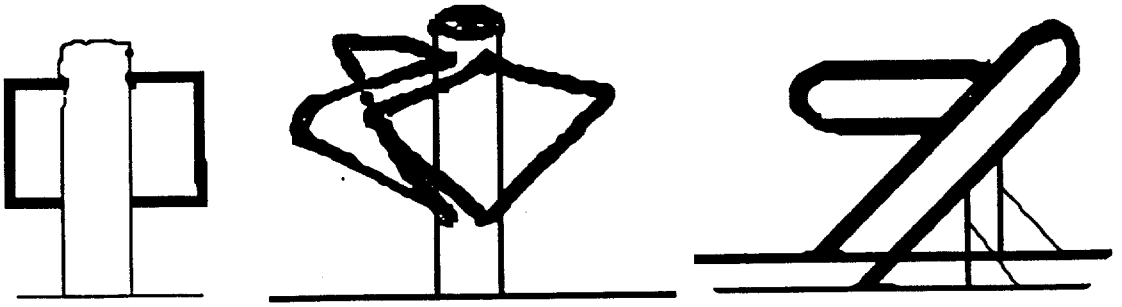


These racks need to be switched around so that modern U-shaped locks can fit.



This style is better for modern thick tires and U-shaped locks.

Other forms of bike racks which are easily used by modern bikes and locks:



Transportation Survey

Questions for all UW students and employees:

1. How do you usually get to campus?
a) walking
b) bicycling
c) driving by yourself
d) carpool or vanpool
e) mass transit

2. Do you live in an area from which it is possible to take the bus to campus?
a)YES b)NO

3. If you answered YES to question 2, do you regularly take advantage of the bus as a way to get to campus?
a)YES b)NO

4. If you answered NO to question 3, would you be more likely to take the bus to campus if you had paid a one-time semester fee in your tuition or had it deducted from your salary?
a)YES b)NO

5. How much would you be willing to pay for an unlimitedsemester-long bus pass if it was added to your tuition or taken out of your salary?
a)$10 b)$15 c)$20 d)$30 e)$100

6. Would you ride in a vanpool if you had reserved parking on days you had personal appointments which would not allow vanpool use?
a)YES b)NO

7. Would you ride in a vanpool if you had a free unlimited bus pass to use at all times, including days you had personal appointments which would not allow vanpool use?
a)YES b)NO

8. Would you be willing to be a vanpool driver if given the benefit of limited free mileage per month for own personal use of the vehicle?
a)YES b)NO

Question for those who walk to campus

9. In your opinion, what is the most significant problem with walking on campus ?
a) safety at crosswalks
b) maintenance of sidewalks
c) safety at night

Question for those who bicycle to campus:

10. In your opinion, what is the most significant problem with biking on campus?
a) availability of bike racks
b) location of bike racks
c) maintenance of bike lanes
d) hazards from bus and auto traffic

Questions for those who drive themselves to campus:

11. Do you believe that more parking space on campus would relieve present automobile congestion?
    a)YES b)NO

12. If you presently hold a parking permit, would you be willing to park in a non-central location for a reduced rate and use a shuttle bus for campus transportation?
    a)YES b)NO

13. Would you be interested in a reduced rate for a permit that allowed you to park only on a limited basis?
    a) very interested
    b) moderately interested
    c) not interested
    d) not sure

14. Would you be willing to participate in a university operated vanpool which picked you up from home and dropped you off at your building?
    a)YES b)NO

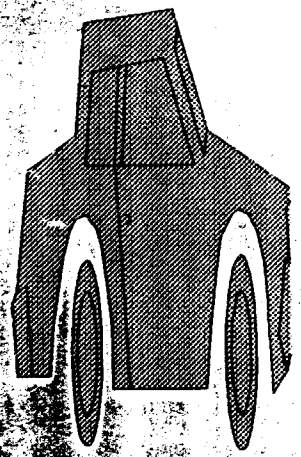
15. Please indicate which days you usually drive to campus:
    a)Monday, Wednesday, Friday
    b)Tuesday, Thursday
    c) all weekdays
    d) varies week to week

16. Please indicate which times you usually arrive on campus:
    a) before 7:45 a.m.
    b) 7:45 - 8:30 a.m.
    c) 8:30 - 9:00 a.m.
    d) after 9:00 a.m.
    e) arrival time varies day to day

17. Please indicate which times you usually depart campus:
    a) before 3:30 p.m.
    b) 3:30 - 4:30 p.m.
    c) 4:30 - 5:00 p.m.
    d) 5:00 - 6:00 p.m.
    e) departure time varies day to day

Question for those who take the bus:

18. If you ride the campus L route or any other Madison Metro routes, do you feel that a one-time fee (at a reduced rate than present annual passes) would be beneficial?
    a) YES b) NO



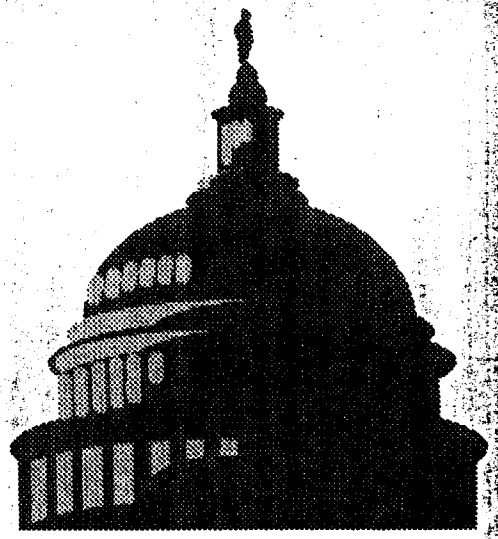
PARKING

Complaints about parking on campus will soon become a thing of the past. The Transportation Office implemented a flexible parking plan which will increase the number of people who can use the parking facilities. In the flex parking system you can buy permits that will allow you to park on a limited basis. Along with the permit you will receive a bus pass that allows you to get to campus on days you can not park. Flexible parking will give you the chance to park on a part time basis. The program will also cut down on the need to build new parking ramps which will save money and green space.

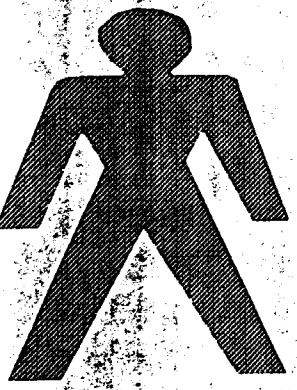
UW-Madison Center for
Transportation Information Office
(CTI)

****

UW-MADISON TRANSPORTATION

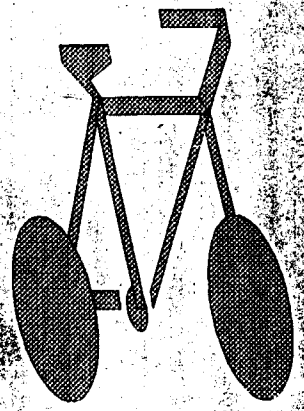


EVERYWHERE YOU WANT TO GO



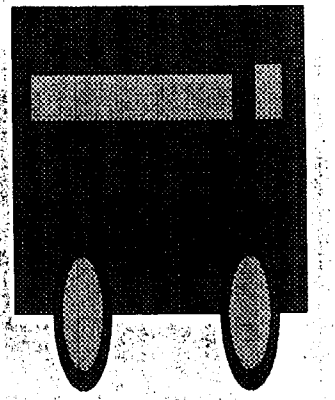
PEDESTRIANS

Walking on the UW-Madison campus has never been safer. To reduce the risks of accidents with automobiles, speed bumps have been installed at busy intersections to slow traffic down. Pedestrian safety at night has been improved by better lit walkways, more emergency phones, and security foot patrols at night.



BIKES

New bike racks that fit the needs of bikes with quick release wheels stand ready for your use all over the campus. If you don't own a bike, or you have friends over for the weekend, you can rent bikes from Outdoor Rentals, which is below the Union Terrace on Lake Mendota. Call Outdoor Rentals at ***-**** for more information. Bike Lanes on campus are clearly marked with signs and lane markers.



BUSES

It is now even easier to ride the bus on the UW-Madison campus. Now with your validated UW-Madison id card you can ride any of the Madison Metro busses in the city for free. This system applies to all students, faculty, and staff. A fee each semester of only $18 included in your tuition, or deducted from your paycheck is the only fee incurred. A campus shuttle has also been established, so with only a five minute wait, you can hop on and zip around campus. Just think of how nice it will be in the rain or snow and in the cold winter months to ride in comfort and warmth.

<u>Madison Metro Transit</u>
Transit Riding 266-4466
Elderly/Handicapped Buses 267-8787

Approved: _____ 1/16/95

Timothy Allen, Professor of Botany — Date