Mission and basic philosophic principles of higher education in agriculture: a case study

Daniel Brian Sherrard

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Mission and basic philosophic principles of higher education in agriculture: A case study

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Iowa State University, 1994
Mission and basic philosophic principles
of higher education in agriculture:
A case study

by

Daniel Brian Sherrard

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CHAPTER I
INTRODUCTION

Education about agriculture in the Western world has been based on the rather simple idea that the application of science and technology to agriculture can increase production and benefit society as a whole (Busch, 1989). The implementation of this idea, first in Europe, then in the United States and later around the world, proved to be a powerful tool, resulting in substantial advances in production and improvements in the living standards of multitudes of rural dwellers. Yet in considering the complex and confusing situation confronting agriculture and rural development today, many observers have concluded that approaches to higher education in agriculture must include far more than the application of science and technology (Wilson, 1990). Future professionals, managers of tomorrow's farms, companies and public entities, researchers, and teachers, must also be skilled in solving problems related to the ethical, environmental and equity issues in production, food safety, policy formulation and a host of other areas (Wilson, 1990; Busch, 1989).

While higher education in agriculture continues to focus on technical training for increasing production and generating the greatest economic return for the lowest investment
possible, the litany of the problems confronting agriculture seems to grow exponentially. The impact of agricultural practices on the environment and food safety, on land use, on the viability of rural communities, on biodiversity, are only some of the more prominent issues confronting agriculture today. Consider the following:

After a half century of steady improvement in the livelihood of America's rural population, fully one-fourth of all rural children now live in poverty. Overall, the rural poverty rate exceeds the rate in the most blighted of America's big cities (McCormick, 1988).

Agricultural activities may be the greatest source of non-point pollution in the U.S. Inadequate or non-existent treatment of wastes from large-scale production of livestock has seriously degraded sources of drinking water, deteriorated aquatic environments, and negatively impacted populations of water dependent wildlife and marine life. Irrigation return flow and agricultural runoff have contaminated surface and subsurface water supplies around the world with sediments, bacteria, nutrients and pesticides.

The green revolution, while increasing the incomes and relative position of "progressive farmers" has promoted production "...based on the logic of uniformity and homogenisation, (in which) uniformity will continue to displace diversity. 'Improvement' from the corporate viewpoint, or from the viewpoint of western agricultural research is often a loss for the Third World, especially the poor in the Third World...Uniformity as a pattern of production becomes inevitable only in a context of control and profitability." (Shiva, 1991:256)

In much the same fashion that the single minded pursuit of economic efficiency and maximized production in agriculture has resulted in a neglect of the many challenges confronting rural communities, our overwhelming embrace of rational and
scientific approaches in agricultural education has led us to undervalue experience as a source of learning and development. In higher education in general, a false dichotomy has been erected between theory and practice. The elevation of theory and the supremacy of knowledge have gone hand in hand with the denigration of practice and experience. Just as the pursuit of economic efficiency and maximization of production have led to a neglect of the social and environmental context, the embrace of the rational and the reification of science and technology has contributed to the lack of personal involvement of the student in the learning process.

Over 50 years ago, Dewey, in contrasting the practices of "progressive" education with traditional approaches, wrote:

To imposition from above is opposed free activity; to learning from texts and teachers, learning through experience; to acquisition of isolated skills and techniques by drill is opposed acquisition of them by means of attaining ends which make direct vital appeal; to preparation for a more or less remote future is opposed making the most of the opportunities of the present life; to static aims and materials is opposed acquaintance with a changing world. (Dewey 1938:19-20)

Much of how Dewey describes education in 1938 characterizes contemporary approaches to higher education in agriculture. This is especially true in areas such as Latin America where cultural tradition and dominant educational practice greatly favor the lecture method of teaching over more participatory or exploratory approaches to learning (Macías-López, 1990).
It is an assumption of this study that the traditional approach (or paradigm) described by Dewey is not appropriate for an educational environment designed to facilitate the learning and formation of future agents of change in agriculture and rural development. A second assumption is that the traditional educational paradigm needs to be supplanted with an approach stressing the interaction and active involvement of the learner with the environment.

In agricultural higher education, the restricted focus on technical and economic considerations, as well as the overwhelming supremacy of theory over experience, reflect philosophical stances which, while infrequently articulated, are clearly discernable. A third assumption of this study is that educators in general, and those addressing agriculture and rural development in particular must, if they are to meet the needs of the rural population and the larger society in the twenty-first century, articulate and critically examine the philosophical assumptions underlying their practice.

The economic, social and environmental challenges confronting agriculture and rural development, require innovative approaches. As mentioned earlier, there is a growing disenchantment with conventional approaches to educating agricultural and rural development professionals. There is increasing criticism that the "land grant" model of higher education in agriculture, with its emphasis on
employing capital and technology for profit maximization, contributes directly to the displacement of rural people and environmental degradation (Hightower, 1972). At the same time, the relatively restricted focus on reductionist science and information assimilation in the agricultural curriculum has increasingly been criticized (Bawden, 1988). Alternative approaches seeking to substitute a focus on the creation of knowledge through experience and a more holistic approach to the food system and rural development are gaining adherents (Wilson, 1990). Early social reconstructionists in the U.S. frequently focused on the centrality of crisis in the development of their critique of education and society (Stanley, 1992). The same adjective seems appropriate to characterize the contemporary situation confronting higher education about agriculture and rural development. Whether it be falling enrollments, rising faculty and student disenchantment, the perception that universities are not serving the needs of the rural population, or a sense that graduates are not receiving the preparation they require to become agents of change in their societies, the problems of higher education in agriculture are enormous. In describing the situation in the U.S., G. Edward Schuh wrote that "The land grant universities have lost their way" (Schuh, 1986:6).

The inability of agricultural universities, research centers and extension services to effectively eliminate hunger
and malnutrition, much less to assure sustained social and economic rural development, has resulted in a certain discomfort among those employed in agricultural universities around the world (Busch, 1989). Increasingly, critics and insiders have suggested that new approaches are required for establishing a new path for agricultural education, research and extension (Schuh, 1986; Bjorker, 1986; Busch, 1989; Meyer, 1993; Connor, 1989; Cambell, 1993).

This study is an inquiry into the philosophy and practice of higher education in agriculture. Through an extensive review of the literature and an inquiry into the approach of one particular institution, the study seeks to contribute to the on-going dialogue regarding the future direction of agricultural education.

This study examines in detail the case of one institution of higher education in agriculture, the Escuela de Agricultura de la Región Tropical Húmeda -- EARTH, (in English, The Agricultural College of the Humid Tropical Region). Utilizing a variety of qualitative methods, the study attempts to describe the development, philosophy and practice of EARTH, locate its philosophy within a larger framework of educational philosophy, and situate its educational practice with respect to the dominant approach to higher education in agriculture. The purpose of the study is to contribute to an on-going dialogue regarding the philosophy and practice of agricultural
education, and to stimulate reflection on the part of those engaged in the development of EARTH and others seeking to positively impact the future of agriculture.

The specific objectives for the study were:

1. Describe important approaches to educational philosophy in general, and education in agriculture in particular.

2. Articulate a philosophical approach which seems appropriate to meeting the challenges of higher education in agriculture for the twenty-first century.

3. Briefly describe the development of higher education in agriculture and relevant characteristics of contemporary approaches.

4. Describe the development, philosophy and educational practice of EARTH based on the researchers involvement in the development of EARTH, the analysis of documents, and interviews with faculty, students and administrators.

5. Formulate recommendations with respect to EARTH's philosophy and educational practice.
An important objective of this study was to describe important approaches to educational philosophy and particularly how they relate to education in agriculture. At the same time, epistemological questions with respect to the applied agricultural sciences were also considered. A closely aligned objective was to identify and articulate a philosophical approach to higher education in agriculture appropriate in light of the challenges facing agriculture and rural development.

Philosophy, in the most basic sense, is the search for understanding and wisdom. Philosophy seeks to provide an overall view of existence, knowledge and value and their interrelationships (Gruber, 1961). Dewey wrote that, "With respect to subject matter, philosophy is an attempt to comprehend- that is, to gather together the varied details of the world and of life into a single inclusive whole, which shall either be a unity, or, as in the dualistic systems, shall reduce the plural details to a small number of ultimate principles" (Dewey, 1916:324). In spite of a rejection of grand metaphysical speculations by many 20th century philosophers in favor of considerations of linguistic analysis (a concern for example, with the concept of purpose, as
opposed to purpose as such), in its most basic sense, philosophy remains a search for understanding and knowledge. Theodore Brameld captured what is perhaps the essential nature of philosophy: "we all philosophize whenever we try to express what we believe about our lives and about our relations to the rest of life" (Brameld, 1971:43).

For many people involved in education, and perhaps especially those involved in vocational education with a self-expressed propensity for "practical" and "concrete" endeavors, philosophy has many negative connotations. This negative opinion of philosophy is based on a common perception of philosophy as an aloof discipline, divorced from the reality of the problems facing individuals and societies, being concerned instead with thinking about thinking, with logic and reasoning (Elias, 1980). This negation of philosophy in education often results in mindlessness in educational practice (Silberman, 1970). Philosophy poses the questions about what we do in education and why we do it, it is what inspires our activities and provides a direction for our practice (Elias, 1980).

In searching for understanding and knowledge, philosophy seeks to make sense out of the world. In the Western intellectual tradition, conceptions about the nature of knowledge and reality vary greatly. In simplistic terms, beliefs can be characterized as ranging along a continuum from
idealism to realism. Idealism holds that the most important element in the nature of reality is mind, spirit, or universal forms. For Plato and his followers, there is no external reality apart from our consciousness of it. For idealists, the world is only understandable through mental activity. The "real" world is composed of ideas and essences. Realism in contrast, holds that the most important element in the nature of reality is matter, that nature is the whole of reality. While having radically different conceptualizations of the nature of reality, idealists and realists are similar in that they both believe that knowledge is definite and that basic ethical standards are unchanging.

Obviously there are a large number of beliefs and theories which derive from, and which belong between the idealist and realist poles. Pragmatism, empiricism and rationalism are all good examples. In addition, there are important differences within the realist and idealist traditions.

Realism has been the dominant philosophical perspective of the industrialized West in the twentieth century. Characterized by the belief that only those things which can be verified constitute genuine knowledge, the dominant beliefs of our age can be described as positivistic, emphasizing scientific knowledge based on a reductionist model, and empiricist. Despite the alternatives presented by post-
positivists and other challenges to this dominant worldview, the validity of judgements and beliefs about the world and the nature of reality continue to depend "...on their so-called objectivity and rationality" (Cambell, 1993:13).

The applied agricultural sciences, like science in general, are solidly reductionist. Reductionism involves gaining knowledge of the natural world by breaking it down into smaller and smaller fragments. This reductionist epistemology permeates and greatly influences all aspects of higher education in agriculture (Wilson, 1990). Such an approach promotes the study of system components, one piece at a time, often at the expense of attempting to understand the entire system (Busch, 1983). While there can be no doubt regarding the power of reductionism as a tool in the inquiry process, there likewise can be little doubt of the limitations of this approach (Busch, 1983). In much the same fashion that the focus on variables in agricultural research often results in researchers losing sight of the complex reality in which their research takes place, reductionism in education about agriculture frequently results in students losing sight of the vital connections between disciplines and areas of study (Wilson, 1990).
Philosophy of Education

The essential question that any philosophy of education attempts to answer is What are the aims of education? Answering this question is an arduous task which requires an examination of related questions regarding the nature of man, of society, epistemological concerns and many others (Cahn, 1970). Contrary to those who profess that philosophical concerns are exclusively the realm of the academic and the theorist, the issues raised in considerations of educational philosophy cut right to the essence of educational practice. Is the primary purpose of education the transmission of cultural values, or the training of skilled workers who can function effectively in a competitive work environment? Who controls the selection and distribution of knowledge? Is any discipline studied to learn a series of facts, or to learn a method of inquiry? Is the role of the teacher that of a mentor, a facilitator, or a fellow searcher? Answering any of these questions as well as innumerable others, requires bringing an individual's educational philosophy directly to bear.

For the purpose of this discussion, philosophy of education is conceived as a critical examination of educational theories. In this context, educational theories consist of a set of overt recommendations for educational practice (Moore, 1982). Educational theories range from those
which prescribe certain educational practices, to general
theories of education which address the larger aims of
education and learning. Plato espoused a certain general
theory of education in *The Republic*, as did Rousseau in *Emile*
and Dewey in *Democracy and Education*. The general theories of
education contained in these works include not only a series
of prescriptions for pedagogical practice, they also address
the larger issues of the aims and purposes of education.

While different authors divide general theories (or
philosophies) of education in different ways, it is possible
to identify and describe five distinct groups and approaches.
These are: liberal, behaviorist, humanist, progressive, and
radical (McNeil, 1990; Gruber, 1961; Elias, 1980). Obviously
these are very general categories and within each group there
exists a range of beliefs and approaches. The behaviorist
group, for example, includes the theories of the "classic"
behaviorists like Thorndike and Skinner, as well as many who
promote their ideas through the expanded use of technology in
education. The group which has been identified as "radical"
includes a wide range of theories and approaches, ranging from
social reconstructionism, neopragmatism and neoMarxism to
approaches influenced by postmodern and poststructuralist
critiques (Stanley, 1992).

Another scheme designed to operationally categorize
educational philosophies has been proposed by Brameld. He
proposed four principle orientations to education: the essentialist, progressivist, perennialist and reconstructionist (Brameld, 1971). The essentialist orientation is concerned with confirming "...those habits of living and expressions of belief that have hitherto prevailed in modern culture" (Brameld, 1971:62). The progressivist orientation is a "moderative" one, seeking gradual change in beliefs and practices. The perennialist position on the other hand, looks to the past and "...celebrates the spirit and principles of an earlier and, for those of such persuasion, a nobler human order" (Brameld, 1971:63). The last category, reconstructionism, is based on the belief that the present culture is no longer adequate and seeks transformation through innovation of cultural designs (Brameld, 1971).

The differences between Brameld's categories and the five approaches mentioned previously are more of form than of substance. The clear distinction Brameld makes between progressive and reconstructionist orientations matches the approach outlined above and is a useful one in highlighting the reformist nature of the former and the more radical, transformative stance of the latter. It is more problematic to fit Brameld's division of essentialist and perennialist philosophies to the categories of behaviorist, humanist and liberal approaches included in the scheme above. Brameld suggests that while essentialism and perennialism are closely
allied, they diverge in how they accommodate themselves to the modern scientific age. He indicates he would include the behaviorist approach within the essentialist tradition, along with many of those included in the liberal, or academic, approach. By the same token, the liberal approach would comfortably include what Brameld terms perennialism with its focus on the rejuvenation of "axiomatic beliefs about reality, knowledge, and value that transcend every age" (Brameld, 1971:263). Humanists might be included in Brameld's progressive category, although the overriding concern of many humanists with self actualization and the extreme student-centeredness of the approach result in an individualism that is anathema to many progressives. For the purposes of discussing the influences of various educational philosophies on education about agriculture, the liberal -- behaviorist -- humanist -- progressive -- radical classification would seem to be most useful.

**Liberal Education**

The modern approach to liberal education, also referred to as academic education, is firmly rooted in the philosophical doctrines of Plato and the idealist tradition. The belief that it is the peculiar and distinctive activity of the mind to pursue knowledge, and that the achievement of knowledge satisfies and fulfills the mind, signifies that the
pursuit of knowledge is thus an essential part of the good life. While humankind is more than pure mind, mind is our essential distinguishing characteristic, and the pursuit of knowledge is the proper direction for one's life. At the same time, the mind is capable of coming to know the basic nature of things through reasoning, and can apprehend what is, in the final analysis, real and immutable. For the Greeks, a comprehensive and harmonious scheme existed in which all knowledge has its place (Hirst, 1965).

At the heart of the academic approach is the belief that for the individual, the value of a liberal education lies in the fulfillment of the mind, and has nothing to do with utilitarian or vocational considerations. Liberal education is defined and justified "...based on the nature and significance of knowledge itself, and not on the predilections of pupils, the demands of society, or the whims of politicians" (Hirst, 1965:115).

Approaches to structuring a liberal education vary. The forms of knowledge approach stresses mastering the general principles and ways of thinking of seven or eight forms of cognitive knowledge. These forms of knowledge are distinguished by sharing certain central concepts, a logical structure by which the concepts can be related, by having certain statements or conclusions that are testable, and has
methods for exploring statements and testing its statements (Hirst, 1974).

The structure in the disciplines approach, championed by Jerome Bruner, emphasizes a fundamental understanding of the underlying principles that provide structure to disciplines. Bruner writes:

There is nothing more central to a discipline than its way of thinking. There is nothing more important in its teaching than to provide the child the earliest opportunity to learn that way of thinking - the forms of connections, the attitudes, hopes, jokes, and frustrations that go with it. (Bruner, 1966:155)

Other approaches to liberal education include St. John's College in Maryland use of "Great Books" to form the core of their curriculum, and a variety of other approaches stressing liberal arts and the academic core (McNeil, 1990). Like the forms of knowledge and the structure in the disciplines designs for education, all of these conceptions "...emphasize liberal learning, organized knowledge, and the development of the intellectual powers of the mind" (Elias, 1980).

At first glance the liberal approach, with its concern for the nature and significance of knowledge, would not seem to be particularly relevant to higher education pertaining to agriculture, which is largely anchored in the practical world of production. Yet programs in agriculture at the university, college, or community college levels are usually offered within a larger academic context, a context developed largely
out of the liberal tradition in higher education. The U.S. land grant institutions, in many ways the dominant model of agricultural higher education worldwide, while clearly established with a focus on the agricultural and mechanical arts, were very much tied to the classical university which was then, as now, the paradigmatic model for higher education. As Justin Smith Morrill wrote: "...it was a liberal education that was proposed. Classical studies were not to be excluded, and therefore, must be included..." (Morrill as quoted in Eddy, 1957:38).

The increasing concern for critical thinking, ethics, and the facilitation of problem solving skills within many programs in agricultural higher education is serving, in some senses, to bridge the gap between the aims of a practical education in agriculture and the liberal tradition (Bjoraker, 1986; Love, 1989; Meyer, 1993; Bonnen, 1986). In listing sixteen areas in which B.S. graduates of the 21st Century must have preparation, Bjoraker places literacy, critical thought, mathematics, history, science, values, art experience and appreciation and an international perspective as the first eight (Bjoraker, 1986).

**Behaviorist**

The behaviorist approach to education can be characterized by the belief that human behavior is determined
by prior conditioning and is largely determined by external forces. Behaviorism claims that consciousness is not a valid concept in predicting or explaining human behavior. For the behaviorist, education is essentially evoking desired responses through the utilization of certain stimuli (Shermis, 1967). Behaviorism has been a potent force in American education during this century and its influence has been pervasive. The widespread use of behavioral objectives, programmed instruction and competency based instruction are all evidence of its impact (Elias, 1980).

The emphasis on determinism and the scientific approach clearly places behaviorism within the realist philosophical tradition. Materialism, or the belief that reality can be explained by the laws of matter and motion, is the conceptual model of behaviorism, which has moved one step beyond Hobbes' "springs and levers" to also explain human behavior in purely physical terms. Bacon and Locke's empiricism and scientific realism, which emphasized the search for truth through an examination of the information gathered by the senses, is a second philosophical antecedent of behaviorism. Finally, behaviorism can be identified as deriving from philosophical positivism which argues that knowledge is acquired through scientific observation and measurement, as opposed to through theology or traditional metaphysics (Elias, 1980).
John Watson has been credited with being responsible for introducing behaviorism to the United States by advancing the idea that psychology is a "...science of behavior and not a study of the mind or mental activity" (Elias, 1980:82). It is B.F. Skinner, who introduced the notion of operant conditioning, who is most closely associated with behaviorism. Skinner maintains that ultimately, through the use of operant conditioning, virtually complete control can be gained over human behavior (Bowen, 1974). Skinner's advancement of a scientifically planned society in which humans are conditioned to behave in exclusively socially constructive fashion is one logical result of a belief in the feasibility and desirability of the behaviorist vision.

In addition to the pervasiveness of the use of behavioral objectives, other widely used instructional methods including programmed instruction, computer based instruction, mastery learning, teaching machines and contract learning are all either based directly on the principles of operant conditioning or associated with behaviorism (Elias, 1980). Arguably the greatest impact of behaviorism on education, however, has been in the area of curriculum design and program development. In his landmark work Basic Principles of Curriculum and Instruction, Ralph Tyler develops a model for designing instructional programs based on the underlying assumption that "education is a process of changing the
behavior patterns of people" (quoted in Elias, 1980:100). Whether developing behavioral objectives, manipulating the environment in order to set up learning situations designed to evoke desired behavior, or evaluating the extent to which behavioral changes have occurred, Tyler's model draws extensively on behavioral theories of learning (Tyler, 1949).

Behaviorism has clearly had a significant impact on education in agriculture. Competency based education, in which the goals and objectives to be met are usually specified in behavioral terms, lends itself very well to vocational education (Elias, 1980). While vocational education is more generally associated with agricultural education at the secondary level, there are nonetheless many similarities between secondary and higher education in agriculture. Furthermore, because behaviorism is based on highly quantifiable phenomena, for example stimulus and response, it, unlike approaches based on subjective concerns, is an attractive approach to many trained in the positivist tradition.

Humanistic

Humanism and humanistic are terms widely used to describe philosophies and approaches to education. The problem comes in attempting to define them. Because there are so many variations of humanism, definitions end up being so imprecise
as to be of little utility. When confronted with the multitude of approaches represented by religious humanists, secular humanists, marxists humanists, existentialists and others, one is essentially reduced to describing humanism as a philosophy concerned with the "improvement of human beings" (Wain, 1987:82), a description which is only noteworthy for not saying particularly anything.

In spite of the difficulties in defining humanism, the term is widely used to describe a certain approach to psychology and education. In contrast to behaviorism, humanistic psychology (and many humanist educators) believes that "behavior is the consequence of human choice which individuals can freely exercise" (Elias, 1980:118). Emphasis is placed on the uniqueness of each individual, and there is an almost unlimited faith in the ability of humans for development and for achieving the "good life" (Elias, 1980).

Based on the positions espoused in the 1937 and 1973 Humanist Manifestos I & II, Elias and Merriam enumerated some essential principles of modern humanism. While clearly not reflecting the views of all who might be identified with humanism, these principles stress the essential goodness of human nature, that humans are essentially free and that human behavior is the consequence of choice. There is a recognition of the individuality and uniqueness of each person and the supreme importance of the self. There is an unlimited faith in
the human potential for solving problems and achieving the
good life. The striving for self actualization as an innate
human characteristic is also identified as a distinguishing
characteristic of humanism. Like phenomenology, humanism holds
that "reality" is what the individual perceives it to be,
rather than what "actually" exists. Consequently, individuals,
because of their distinct perceptions, behave differently. In
this latter sense, there is a very obvious similarity between
pragmatism and humanism. Finally, many humanists share a
belief that humans have the responsibility to develop their
potentialities as well as to strive for the improvement of
society (Elias, 1980:118-121).

The various strains of humanism share origins with the
liberal tradition in education. The term "humanism" is derived
from the Italian humanista meaning teacher of the humanities
(Elias, 1980). The rise of humanism during the renaissance was
in effect a protest against the stranglehold of the church on
knowledge. Instead of viewing knowledge as uniquely serving to
edify Christianity, those identified with the emergence of
humanism shared a belief in the potential of humankind and a
faith in reason as opposed to blind orthodoxy. The
Enlightenment of the 18th century, with its emphasis on
learning, interest in the works of Plato, Aristotle and other
writings from antiquity, and faith in human intellect and
reason, is very much associated with humanism (Elias, 1980).
The most significant manifestation of what could be called humanism has occurred in modern times. Perhaps in response to a number of perceived threats to humanity, beginning with industrialization, the unbridled materialism of the rising middle class, the supremacy of science and a mechanistic approach to philosophy, and more recently the dominance of behavioral psychology, many forms of humanism have surfaced. Existentialism is a prominent contemporary expression of humanism which, while encompassing a very broad group of individuals representing diverse views, articulates a concern for the individual confronted by increasingly bureaucratic societies and institutions and a belief that one's existence precedes and determines one's essence (Cass, 1974).

As humanism in its broadest sense is concerned with promoting the welfare of humanity, education is viewed as an enterprise of great importance (Elias, 1980). What could be called humanistic values are much in evidence in many prominent works of educational thought, including those by Comenius, Rousseau, and Pestalozzi. While expressing diverse philosophical views, they share a conviction that the purpose of education is to develop human potential, which in large measure depends upon a good human relationship between the student and teacher (Elias, 1980).

The goal of humanist education then, is the development of the whole person. This contrasts directly with the liberal
tradition with its emphasis on the transmission of subject matter, and with the mechanistic approach to human behavior and learning espoused by many behaviorists. Humanistic education places the learner at the center of the equation, and it is with the learner that the freedom and responsibility for determining what is to be learned reposes (Rogers, 1983). In fact, because the emphasis is placed on the learner and the process of learning, the goal of humanistic education is learning to learn, and the issue of what is learned becomes secondary (Gill, 1993). Reflecting the centrality of the learner in the humanist conception of education, the role of the teacher is that of a facilitator. As a facilitator, the teacher is responsible for eliciting and clarifying the purposes of individuals in the learning environment, providing a range of resources for learning, providing an appropriate setting for learning and being an active participant in the process (Rogers, 1983).

Finally, in contrast to other educational theories, humanism views education as a highly personal enterprise in which the most effective learning takes place through discovery. Essential to this view of learning is the notion that the motivation for learning is intrinsic to the learner (Elias, 1980). These ideas; that learning is individual, that it takes place through discovery, and that motivation is intrinsic, have many important ramifications for educational
practice, and clearly distinguish humanist approaches from liberal and behaviorist influenced educational practice.

**Progressive Education**

The progressive movement in education in the U.S. has had a tremendous impact on education in general, and vocational education in particular. The emphasis on experiential learning, the importance of making education relevant to the learner, and locating the aims of education within the larger societal framework all characterize the concerns of progressive education. The progressive movement in education owes its origins to a shift away from seeking knowledge in authority and tradition and looking instead to reason, experience and feeling (Elias, 1980). Epistemologically then, progressivism can be placed within the realist tradition, rooted in the ideas of Locke and Bacon and especially the works of Charles Darwin (Elias, 1980). It bears noting, however, that unlike the Thorndike/Watson/Skinner behaviorist vision of reality as discreet and discoverable, most progressives tend towards the pragmatic view that because we know the universe through our senses, and since each individual's senses are unique, it follows that there are as many universes as there are people (Cass, 1974).

Inspired by the revolutionary ideas of Darwin and their application to education by Herbert Spencer with his emphasis
on science as the key to bettering the human condition, the
progressive movement evolved into a powerful force in American
education by the beginning of the twentieth century (Elias,
1980) Not coincidentally, the emergence of progressivism
coincided with a period of intense social and economic change.
Rapid industrialization and massive immigration radically
transformed the social, political and economic landscape of
the country and required new responses to meet changing
societal needs. Progressives viewed education as a key
component in solving the problems engendered by societal
transformation, and indeed viewed education as a key element
in the further transformation of society in positive
directions.

At the risk of understating the diversity represented
within progressive education, some general principles upon
which progressive educational practice is based can be
mentioned. They include:

1. A broadened view of education. Dewey wrote:

   Education must be reconceived, not as
   merely a preparation for maturity, (whence
   our absurd idea that it should stop after
   adolescence) but as a continuous
   illumination of life... Real education
   comes after we leave school and there is
   no reason why it should stop before death.
   (Quoted in Elias, 1980:55).

   Progressives broadened the traditional view of
   education to include both the socialization process
of childhood as well as the lifelong learning of adults. Furthermore, in emphasizing the practical and utilitarian, progressives advocated a sharp break with the liberal educational tradition. Finally, in defining the learner's reconstruction and reorganization of experience as the critical variable in the educational process, progressives went far beyond the emphasis on the experiences of others as related in books which defined the chief methodology of liberal education.

2. Progressives placed the learner at the center of the educational enterprise. In expanding the view of education to include the experiences of the learner, progressives changed the traditional focus of education from subject matter to the learner. Progressives emphasized the human potential for growth and development, and sought to focus on the interests and purposes of the learner.

3. Progressives advocated a new approach to educational methodology. Most progressive educational practice can be characterized as relying on the scientific method. Problem solving approaches, the project method and the activity method, all essentially duplicate the scientific method of inquiry.
4. Progressive education challenged the traditional roles of the teacher and the learner. In contrast to the traditional view of the teacher, progressives viewed their role as that of a facilitator and a co-learner with students.

5. Education, in the view of the progressives, represented a powerful means of effectuating social change. It is in relation to this point that perhaps the greatest diversity of views can be observed within the progressive movement, ranging from those advocating massive change, to more moderate voices calling for social reform (Elias, 1980:55-68).

The leaders of the progressive movement; Charles Peirce in the physical sciences, William James and G.H. Mead in the social sciences, Thorstein Veblen in political science and economics and John Dewey and William James in philosophy, all played a role in the development of the progressive movement in American education (Cass, 1974). The philosophical system which William James dubbed pragmatism, developed out of, or along with progressivism (Cass, 1974). In light of the contribution of pragmatist philosophy in general, and the ideas of John Dewey in particular, to the development of vocational education, and more specifically education purporting to be based upon learning by doing, the following section focuses on Dewey's philosophy.
Dewey was vitally concerned with what he considered the deadness and remoteness of what passes for knowledge. Dewey was a full-fledged pragmatist who conceived of knowledge as that "which enables one to accomplish certain tasks, as that which works" (Gill, 1993:20). West asserts that Dewey rejected epistemology-centered philosophy for its "cloistered and conservative character" (West, 1989). Dewey favored instead an approach to philosophy as a "mode of cultural critical action that focuses on the ways and means by which human beings have, do and can overcome obstacles, dispose of predicaments, and settle problematic situations" (West, 1989:86). The business of philosophy for Dewey is the solution of human problems.

In *Democracy and Education*, Dewey characterizes education as the "process by which social groups maintain their continuous existence" (Dewey, 1916:321). He stresses that education is the interaction of the individual with their total environment, not simply a process which takes place in a school. He goes on to distinguish education among groups which seek only to preserve established customs, from the process which ideally takes place in democratic societies and which seek to secure in individuals "a consciously socialized interest, instead of trusting mainly to the force of customs operating under the control of a superior class" (Dewey, 1916:322). In contrast to traditional approaches to education which focus on the past, on transmitting bodies of subject
matter, for Dewey education involves the ideal of a "continuous reconstruction or reorganization of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent activity" (Dewey, 1916:76). Education for Dewey, therefore, has a direction, from the learner to the world, and he is clearly concerned with the learners ability to act, to alter the environment. What is learned is learned, not simply for the sake of learning, not to preserve cultural values, not even as preparation for the future, but to "reshape the known so as to facilitate the development of the learner's ability to continue learning" (Gill, 1993:22).

Experience, for Dewey, is the "source, goal, and criterion of all cognitive activity" (Gill, 1993:20). Learning is thus necessarily based on experience, and activity becomes the essential element. The importance of experience and activity for Dewey is that it addresses and has the potential to resolve what he saw as a major obstacle to learning: practices associated with the separation of body and mind. A philosopher vitally concerned with dualism, for Dewey the dualism between mind and body resulted in educational practice that separates theory and practice and thought and action.

This understanding of cognition as resulting from an active process explains why the maxim "learning by doing" is almost universally associated with Dewey and his approach to
education, and hence why his ideas are so influential in vocational and agricultural education.

Because experience occupies center stage in Dewey's educational philosophy, he was adamant that experience is not "mere activity", insisting instead it is a "peculiar combination" of an active and passive element. The active part of experience is trying, doing something, while the passive part is undergoing. "When we experience something we act upon it, we do something with it; then we suffer or undergo the consequences. We do something to the thing, and then it does something to us in return: such is the peculiar combination" (Dewey, 1916:139). In contrast to things which simply happen to us, that are not connected to any prior activity on our part, and which Dewey says can be referred to as experience "only by courtesy", learning from experience requires the learner to "make a backward and forward connection between what we do to things and what we enjoy or suffer from things in consequence" (Dewey, 1916:140).

The implication for education of this view of experience is, first, that experience is an "active-passive affair" and not primarily cognitive, and second, that the value of an experience "lies in the perception of relationships or continuities to which it leads up. It includes cognition to the degree to which it is cumulative or amounts to something, or has meaning" (Dewey, 1916:140).
Dewey also insisted that not all experiences are equal, and that great effort must be exercised in the selection of experiences in educational endeavors. In assessing the relative value of experiences, he relies on the notion of growth as the principal criterion. With respect to any experience, Dewey says:

the question is whether growth in this direction promotes or retards growth in general. Does this form of growth create conditions for further growth, or does it set up conditions that shut off the person who has grown in this particular direction from the occasions, stimuli, and opportunities for continuing growth in new directions (Dewey, 1975:36).

That experience leads to growth is fundamental for Dewey, and education based upon experience should foster an individual's disposition to react to new situations with flexibility and curiosity. Traditional education based on studying previously developed solutions, he believed, leads one to respond to a new situation with set solutions, prejudice and static attitudes and beliefs (Dewey, 1975).

Another crucial aspect of Dewey's educational philosophy is his reliance on the "inferential process as a basis for cognitive achievement" (Gill, 1993:24). Dewey repeatedly writes of empiricism and the scientific method as the best means for understanding the world. Knowledge is the result of, and learning is a process of "making inductive and deductive inferences from data and hypotheses for the purpose of solving
specific problems that arise in the dynamic between human experience and goals" (Gill, 1993:25). In this belief Dewey is very similar to Kurt Lewin and Jean Piaget who, like Dewey, viewed the scientific method as "the highest philosophical and technological refinement of the basic processes of human adaptation" (Kolb, 1984:32). Dewey's emphasis on thinking as problem solving is characteristic not only of his views, but of contemporary thought in general (Gill, 1993).

While Dewey, like many other critics of education as simple assimilation of subject matter, stresses the importance of viewing cognitive activity as a dynamic process in which the learner is modified by, and in turn modifies the environment through experience, his view also presupposes that in the learning process the knower and the known are distinct and independent of each other. The educational implications of this view of the cognitive experience are that learners must become accustomed to isolating, analyzing and explaining data derived from experience as reducible and independent parts out of which reality is constructed (Gill, 1993). In the case of traditional educational practice, this would involve Freire's "banking" concept of filling students with facts, concepts and theories. In more progressive educational environments, this involves having students experiment with, manipulate, and utilize what is derived from experienced reality. Both of these cases assume a distinction and independence between the
knower and the known (Gill, 1993). This view of the knower and the known as essentially separate realities, has been challenged by "post-critical" philosophy which suggests that "knowledge is not a thing to be possessed but an activity to be engaged in. In other words, cognition happens, takes place in an ongoing fashion in the interaction between and among knowers and the known" (Gill, 1993:68).

Social Reconstructionism and Radical Education

Social reconstructionism and other "radical" ideas in education have remained largely outside the mainstream of educational philosophy and practice (Elias, 1980; Stanley, 1992). While many approaches to education, for example humanism and many strands of progressivism, have sought to reform society through education, radical approaches seek rather to profoundly alter society. Located outside the mainstream, perceived as utopian and revolutionary, and based largely in the language of critique, social reconstructionism and modern critical pedagogies have been largely excluded from serious consideration in the practice of higher education in agriculture.

The social reconstructionist movement, which began in the United States in the 1920s and gained its greatest influence in the 1930s, can be seen as the precursor to many of the critical pedagogies which have arisen in recent decades.
(Stanley, 1992). At the risk of oversimplification, approaches as diverse as the new sociology movement in Great Britain, critical theory, neo-marxism, structuralism, phenomenology, as well as postmodernism and poststructuralism are included in the category of critical pedagogies (Stanley, 1992).

The significance of social reconstructionist philosophy (as well as the critical pedagogies mentioned above) to education, lies in its focus on the political, social, economic, and moral dimensions of education (Stanley, 1992). In the case of education about agriculture, these are all highly relevant concerns for anyone who conceives of agriculture as more than the application of science to the production of food and fiber.

Reconstructionists were motivated by a belief that the economic system in the United States was essentially biased in favor of the owners of the means of production, and that education can and should be used to solve social problems and reconstruct the social order and establish a more just society. There were significant differences among reconstructionists with respect to the means and ends they advocated, and especially the extent to which they accepted or rejected many of the basic tenets of Marxism. Prominent reconstructionists such as Harold Rugg, rejected Marxist class analysis, arguing that "interest groups" rather than dominant classes had achieved unfair advantages and power in society
(Rugg, 1936). Theodore Brameld, on the other hand, took a more radical stance, particularly in his earlier writings, arguing that the class struggle hypothesis best characterized capitalist society (Stanley, 1992). Regardless of their differences, however, an important commonality of belief shared by reconstructionists is their faith in the power of education to help transform society, and consequently a rejection of other radical and conservative views of education. Orthodox Marxists argued that education had little role to play in the achievement of social change, controlled as it is by the ruling classes. Conservatives, on the other hand, advocated either an elitist position, arguing that there was no sense or reason in educating the lower classes, or argued that education provided an opportunity for anyone, regardless of class position, to achieve economic success solely on the basis of intellect and individual initiative (Brameld, 1971; Stanley, 1992). Perhaps the most helpful manner of describing the diversity of views within the social reconstructionist tradition is as a struggle between pragmatism and more radical models for social transformation (Stanley, 1992). This description highlights the continuum which exists between pragmatism/progressivism and social reconstructionism. Another way to view this struggle is as a tension between utopian thought and values and pragmatic theory.
Since the 1960s, a series of radical challenges to the dominant conservative and liberal approaches to education have emerged. These challenges to a significant extent represent contemporary forms of social reconstructionism. Giroux has used the term critical pedagogy to describe them (Giroux, 1988). Some of the more prominent theories included under the category of radical pedagogy include reproduction theory which portrays the educational system as serving to reinforce the existing power relations and domination in society. Mainstream liberals conceive of schools as essentially neutral institutions serving the needs of all the people and providing vehicles for social mobility. Conservatives on the other hand suggest that while educational opportunities might ameliorate some instances of social injustice, social stratification is a natural phenomena reflecting the range of talents among individuals. Proponents of reproduction theories counter these positions by insisting that the educational system does an extremely efficient job of reproducing precisely the same injustices found in the dominant social order (Stanley, 1992). Bowles and Gintis, in their book *Schooling in Capitalist America*, describe how schools prepare different groups for different roles in a stratified society. They particularly emphasize the role of the hidden curriculum in the process of reproduction, which very effectively and pervasively inculcates values in children such as the supremacy of
intellectual work over manual labor, hierarchy over democracy, and competition over cooperation (Bowles & Gintis, 1976). As Stanley points out, while the reproduction theorists present a more complete critique of education than did the reconstructionists, it is a critique that leads necessarily to pessimism regarding the ability of education to transform society (Stanley, 1992).

Resistance theory, as propounded by Apple, Freire and Shor, accepts many of the assumptions of reproduction theory, yet suggests that while it is true that schools operate within the context set by dominant groups, they remain relatively autonomous institutions in which there exists the possibility for unencumbered discourse. Freire has gained a considerable following with his educational process known as conscientization. Freires' approach involves empowering students to become critical questioners of the social order as a means of sabotaging attempts at accommodating them to the dominant culture. (Apple, 1982; Freire, 1970; Shor, 1986).

An important element in contemporary critical pedagogy is the attempt to revive the social reconstructionist legacy. Stanley (1992) cites the work of Giroux in particular who has written extensively on the reconstructionist contribution. A number of important elements contained within that legacy are emphasized:

1. The belief that "educational philosophy be connected to a wider social philosophy
grounded in a democratic form of life" (Stanley, 1992:114).

2. Using democracy as an ideal to construct social policy, schools should become the locus of efforts to transform society.

3. The belief that education should not be limited to its epistemological or cognitive dimensions; it must be viewed within the larger sociocultural context. As a result, intelligence should not be seen as a competency to be developed for its own sake, but conceived within the framework of the welfare of society.

4. Democracy is more than a theoretical construct; it involves learning through actual communal experiences. Herein lies the obvious connection between schools and their communities.

5. Reconstructionists insisted on the importance of dialogue to the construction and maintenance of a democratic community. Differences are essential to such a dialogical process.

6. Teachers should be viewed as "transformative intellectuals", and as such must be provided the conditions necessary to act according to their own point of view (Stanley, 1992:115-116).

Postmodernism is a term utilized in a wide variety of contexts, and in many different ways. In the most general sense, postmodernism in the social sciences is a rejection of the ability of "grand narratives", for example capitalism, Marxism or positivism, to provide objective grounds for making definitive interpretations regarding human behaviors, cultures and societies (Stanley, 1992). Postmodernism "negates a world that is held together by absolute and universal truth and
universal reason" (Kanpol, 1992:37). According to Latham, postmodernism, in a general sense, is a response:

...across the disciplines to the contemporary crisis of representation, the profound uncertainty about what constitutes an adequate depiction of social 'reality'. Philosophically speaking, the essence of the postmodern argument is that the dualisms which continue to dominate Western thought are inadequate for understanding a world of multiple causes and effects interacting in complex and non-linear ways, all of which are rooted in a limitless array of historical and cultural specificities (Lather, 1991:21).

Postmodernism has, over the past couple of decades, made a significant contribution to what has been characterized as critical pedagogy, by countering the dominance of rationality, science, and possibility for objective knowledge (Stanley, 1992). The postmodernist critique is important to consider precisely because it challenges many of the basic assumptions of the approaches considered above, including social reconstructionism and other critical pedagogies. In challenging the ability of any one philosophy, or indeed any one anything, to make sense of reality, postmodernism stresses the importance of context and the "multiple, nonsynchronous relations between one's identity, social position, and other possible cultural constructions" (Stanley, 1992:167). In challenging the notions of positivism that have dominated Western education and culture, postmodernism suggests that we live in a world of paradox and uncertainty. The relevance of postmodernist thought to radical approaches to education is
that it requires that meaning be subjected to continual reinterpretation. Postmodernism questions whether or not contingent values, such as democracy, freedom and justice, should remain as the primary ground for utopian thought in critical pedagogy.

This is not to suggest that postmodernism is not problematic. Aside from causing a sensation of loss of equilibrium in its rejection of positivism and objective knowledge, many critics on both the left and right have criticized postmodernism for its perceived nihilism and extreme relativism (Stanely, 1992; Lather, 1991). A particularly important objection is that in formulating effective critiques of dominant culture and ideologies, postmodernist have deconstructed "any firm moral, ethical, or political project upon which to justify (the) undoing of the text, subject, truth, and other such terrains which have been the traditional constructions of meaning and agency" (Giroux, 1988a:62).

Perhaps the greatest contribution of social reconstructionism and radical approaches to educational philosophy and practice is their insistence on the primacy of the socio-political context in which education takes place. This insistence is of fundamental importance in education about agriculture because all too commonly in agricultural higher education, the emphasis is placed exclusively on
technical concerns while social and political considerations are ignored, or even more dangerously, denied.

An Approach to Agricultural Higher Education

In the section above, five generalized approaches to educational philosophy were presented. Each of these approaches, with the possible exception of social reconstructionism, is reflected in the practice of contemporary higher education in agriculture. Identifying a single philosophy of higher education in agriculture is problematic. At the post-secondary level, education in agriculture includes a multitude of disciplines including both physical and social sciences. Obviously, in an area as broad as agriculture, and to an even greater degree when rural development is included, the entire spectrum of philosophic approaches is represented. Nevertheless, it is possible to identify the influence of each of the approaches. At the same time, it is possible to suggest the relevance of each approach to a philosophy to guide higher education in agriculture.

While the liberal approach is not usually associated with the applied sciences, higher education in agriculture generally takes place within institutions heavily influenced by the liberal tradition. While the more conservative proponents of liberal education tend to emphasize the transmission of cultural values and traditions to the
exclusion of other activities, liberal education at its best stresses conceptual and theoretical understanding rather than inculcation of a narrow cultural tradition. The essential aims of a liberal education, the development of a person possessing wisdom and a moral, spiritual, and aesthetic sense, while clearly problematic in practice, seem particularly appropriate when discussing the education of agriculturalists for the twenty-first century.

Behaviorism has substantially influenced the modern practice of higher education in agriculture. The widespread use of behavioral objectives in agricultural courses can be pointed to as just one influence of the behaviorists on agricultural higher education. Behaviorism has contributed a great deal to the understanding of the psychology of learning, and has greatly influenced the entire educational enterprise (Elias, 1980). Behaviorists' extreme empiricism and their assumptions about the nature of learning and other psychological phenomena dovetail nicely with the positivist stance of most agricultural scientists. The neglect of the intellect, emotions and a person's "inner life" are likewise compatible with the approach of the hard sciences and the emphasis on what is measurable and observable.

Behaviorism is more commonly thought of as a psychological approach rather than a philosophy of education, and consequently the focus is generally on educational
policies and practices. Nevertheless, Skinner has made it clear that the overriding aim of education is to bring about behaviors which will ensure the survival of society (Elias, 1980). While the survival of society is obviously a matter of concern in any philosophy guiding education, and while the influence of behaviorism cannot be negated in the practice of education, the negation of "humanness" inherent in the approach limits its relevance. By ignoring the affective domain of learning and reducing cognition to stimulus and response, behaviorism has, in a sense, dehumanized the educational process. The education of agriculturalists with the responsibility for balancing competing claims to scarce resources in a socially and environmentally responsible manner implies close attention to the moral and ethical dimensions, a priority which appears to be out of the range of behaviorism.

While it is difficult to identify the actual influence of humanism in agricultural higher education, the aims of the humanist educator are well known. The focus on the learner, the emphasis on personal discovery and meaning, and the assignation of the teacher to the role of facilitator, are among the more important features of the humanist approach. There are many isolated examples of the humanistic approach in higher education associated, as one might expect, with curricula in the humanities and fine arts more so than with the social or "hard" sciences. Notable examples in the United
States include Goddard and Evergreen colleges and aspects of the program at the University of Wisconsin/Green Bay (Conrad, 1978).

The key to understanding the link between progressive educational philosophy and higher education in agriculture is the overriding faith in the scientific method and the positivist paradigm shared by both. In *Experience and Education*, Dewey advocated the "systematic utilization of scientific method as the pattern and ideal of intelligent exploration and exploitation of the potentialities inherent in experience" (Dewey, 1938:86). In Dewey's view, the most important thing for a student to learn is how to think scientifically. Therefore, the chief task of education is to help students employ scientific reasoning (Gill, 1993). The aim then of Dewey's brand of progressive education is learning how to learn, with scientific reasoning serving as the model. Dewey's focus on the power of scientific reasoning was aimed at enabling students to think and make sound judgements regarding the entire spectrum of subjects presented in school, not just the natural or physical sciences. "The methods of science also point the way to the measures and policies by means of which a better social order can be brought into existence" (Dewey, 1938:81).

While Dewey and other progressive educators viewed the scientific method as a model for inquiry, much of higher
education in agriculture involves learning about science and the scientific method without actually practicing it. When the scientific method forms the basis for the learning process, students are actively engaged in solving problems. Learning about science in agricultural higher education (with certain exceptions, see below), is often nothing more than the assimilation of propositional knowledge, with little opportunity for actually applying the scientific method (Bawden, 1985).

The exceptions to this pattern of reducing education about science to the assimilation of knowledge, are nonetheless significant, and to a certain degree demonstrate the influence of Dewey and the progressive education movement on agricultural education. Many agricultural universities, both in the U.S. and around the world, maintain college farms for student experimentation and practice, provide internship opportunities, cooperative education programs and the like. In many (usually non-land grant) institutions, for example the Pan American Agriculture School (Zamorano) in Honduras, the Farm School in Greece, EARTH, and Cal Poly State University/San Luis Obispo, CA., student experience programs figure prominently in the curricula.

In spite of a shared reliance on the scientific method, and aside from the limited opportunities provided students for actual experience as mentioned above, the influence of
progressive educational philosophy on much of higher education in agriculture has been relatively minimal. Where progressives focus on the needs and interests of learners, the importance of problem solving, the centrality of experience, and the notion of social responsibility, a great deal of agricultural higher education tends to focus on the teacher, stress subject matter and the assimilation of knowledge and tends to define its mission more in terms of production and efficiency rather than social goals (Bawden, 1988).

Having characterized social reconstructionism and radical pedagogies as laying outside the mainstream, it is not surprising that their influence on agricultural higher education has been minimal. In the United States, agricultural higher education is largely synonymous with the land grant institutions. Within these institutions, production oriented disciplines such as agronomy, animal science and agricultural engineering tend to define the organizational culture, and it is these disciplines which tend to view social problems and other "externalities" as largely irrelevant to the business of agriculture (Buttel, 1985). In the case of the Latin American university, however, social concerns would seem to play a more central role. At least since the Argentinian reforms of 1918, the university has been identified with social activism, especially efforts at forging a national identity and national independence (Maier & Weatherhead, 1979). While the social
activism of the Latin American university differs in many respects from the social reconstructionist tradition, it shares an abiding preoccupation with social and political concerns. The fact that many Latin American universities, particularly in facultades (colleges) of agriculture, require students to engage in a period of community service, illustrates the degree of social concern.

In order to articulate a philosophical approach which is appropriate to higher education in agriculture and rural development, it is clearly incumbent to clarify the context in which this education takes place. As mentioned at the conclusion of the discussion regarding social reconstructionism, agriculture is a human activity occurring within a complex and dynamic context. It would therefore seem appropriate to begin by specifying that the basis for a philosophy to guide agricultural higher education is the idea of development oriented towards people, as opposed to production (Chambers, 1983). In other words, higher education in agriculture should be focused on a consideration of ends - What is a good society? - rather then emphasizing means - How to increase productivity or efficiency? (Busch, 1983). This concern for the social context of agriculture may coincide with the social reform agenda within the progressive tradition or be more closely aligned with a more radical restructuring
as advocated by social reconstructionists and contemporary critical pedagogues.

Second, because agriculture occurs amidst an almost infinite array of social, cultural, political, economic and environmental factors which together define the rural environment, a philosophical approach should emphasize complexity and change. Such an approach would focus on facilitating the learners' adaptation to a complex and changing environment. While acknowledging its importance to agricultural development, the methods and strategies of positivist science, emphasizing reductionism and increased specialization, are not particularly well suited for such a focus. Strategies which facilitate learners' ability to manage multiple and conflicting objectives, to consider issues of value and ethics and to work together with other people in the accomplishment of shared goals would seem to be called for. Methods of systems analysis and other strategies designed to provide learners with a holistic perspective would seem indicated.

While it has been pointed out that higher education in agriculture has drawn from many philosophic traditions, it is evident that the positivist scientific paradigm dominates agricultural higher education. Even a casual review of curricula in the Colleges of Agriculture of major U.S. land grant institutions, as well as agricultural universities in
many other countries, reveals that the technical/production approach continues to dominate the plan of study, as well as the research, and to a lesser extent, the extension agenda (Bjorker, 1986; Gamble et. al., 1988; Murphy, 1983). It could be argued that the adherence by agricultural professionals to the positivist paradigm and the preoccupation with scientific and economic efficiency has resulted in profound changes in the rural, and consequently the urban landscape. An ever increasing reliance on capital intensive technologies and practices, both in the U.S. and overseas, while dramatically increasing yields, has resulted in immense social and environmental upheaval, including the demise of rural economies, massive rural to urban migration, increased concentration of agricultural production and economic wealth, and widespread degradation of the environment (Hightower, 1972; Bonnen, 1983).

A philosophy for agricultural education must also acknowledge the political nature of education and the normative role it plays in society. A philosophy guiding an educational program geared toward people-centered development would appreciate that the selection of subject areas to be studied, the identification of learning experiences to be engaged in, as well as a host of other decisions, reflect the values and interests of particular segments of society. A great many scientists and others involved in agriculture
insist on denying the political nature of their endeavors, failing to comprehend that science itself is a social process "guided by the shared aims of scientists, aims that are formulated in the political sphere and that are often strongly biased in favor of powerful interests" (Busch, 1983:35). The social reconstructionists in the early part of the century argued this point quite convincingly with respect to general education (Stanley, 1992). The challenge for those involved in agricultural education today is to acknowledge the political nature of their activities and initiate a critical dialogue designed to lead to action in confronting human suffering and environmental destruction. In so doing, care should be taken to avoid the dangers of social engineering and authoritarianism which seem to be potential pitfalls in the approaches of the early social reconstructionists (Stanley, 1992; Lather, 1991). An approach which seems to offer promise in the development of a philosophy of agricultural education for the future is the integration of the postmodernist rejection of absolutes, understanding of the limits of rationality and deep sensitivity to differences, with the abiding commitment of the social reconstructionists to the amelioration of social ills (Stanley, 1992).

An understanding of the limits of rationality, positivism and scientific reductionism does not imply that higher education in agriculture should abandon scientific inquiry,
nor does it call into question the power of the scientific method in advancing the known. Rather, the suggestion is that scientific inquiry be placed within a social and ecological context and that the notion that scientific inquiry is objective and value free be rejected. There is, after all, no "one reality out there" to be discovered. In other words, a philosophical approach guiding higher education in agriculture should be broad enough to include the goal of understanding more about the world through reductionist inquiry, as well as an acceptance that reality is subjective, that knowledge can be questioned and that our activity takes place within a larger social and environmental context that must be considered.

Finally, a philosophy to guide higher education in agriculture should stress experiential learning. In alternating between the worlds of concrete experience and concepts, experiential learning offers the possibility for learners to integrate and apply experiential, propositional and practical knowledge. Learning in this sense is not limited or isolated to specific areas of human functioning, but is instead a holistic process involving the total person "thinking, feeling, perceiving, and behaving" (Kolb, 1984:31). Experiential learning presents the possibility of immersing learners in the dynamic and complex world in which agriculture
actually occurs, forcing them to confront the competing interests and values which abound.

Experiential learning offers higher education in agriculture the means for integrating and acknowledging the social and political nature of agriculture and rural development in the curriculum. At the same time, by embracing different kinds of learning, emphasizing the adaptation by the learner to their environment, and accepting the subjective nature of reality, learners are encouraged to develop their own praxis for dealing with a changing world.
CHAPTER III
DEVELOPMENT AND CURRENT STATUS
OF HIGHER EDUCATION IN AGRICULTURE

Contemporary approaches to higher education in agriculture reflect both the history of the development of the modern university and the evolution of agriculture. The following section highlights certain significant features in this development, focusing on the United States and Latin America, and goes on to describe the educational practice of contemporary higher education in agriculture. In conclusion, some recommendations are offered for educational practice in higher education in agriculture appropriate to meeting the challenges of the next century.

History

Modern higher education in agriculture is intimately linked with the history of the U.S. land grant universities and the scientific research tradition of German universities (Kellogg, 1966). Until the middle of the 1800's, the curricula of the classical colleges were, for the most part, narrowly focused on philosophy, theology, mathematics, Latin and Greek. Colleges were largely reserved for the elite of society, their function was to produce a relatively small number of lawyers, clergy, doctors, civil servants and scholars, their principal
aim was to instill mental discipline, and the focus was on the glories of the past (Niblett, 1972).

While the University of Halle in Germany, established in 1694, and the University of Leyden, opened in Holland a century earlier, have each, at different times, been referred to as the first modern university, most would reserve that accolade for the Friedrich Wilhelm University, generally known as the University of Berlin (Cowley, 1991). Inaugurated in Berlin in 1809, it was organized according to the vision articulated by the philosopher J.G. Fichte. The University of Berlin differed from its predecessors in two important regards. First, scholarly research was to be emphasized in every field and discipline, and secondly, all university teachers were to be first and foremost research scholars (Cowley, 1991). While the founders were by and large philosophers and philologists, chairs in the natural and physical sciences were established. Significantly, they also absorbed the existing academy of sciences and made it an organic part of the university. In a relatively short time, wrote Thomas Huxley in 1896, the German university became "the most intensely cultivated and most productive intellectual corporations the world has ever seen" (quoted in Cowley, 1991: 134). The German universities became a magnet for students from the United States, many of whom upon returning home worked diligently to re-create in the U.S. what they had
experienced in Germany. Aside from the general principle of scholarship and research, they brought with them as well such features of the German university as "the lecture system, laboratory instruction, the seminar, the clinical method, the Ph.D. degree, the elective principle, the semester plan of arranging the academic year, and the methods employed in organizing instruction and research" (Cowley, 1991:136).

The University of Berlin and other modern German universities thus became the model for the development of a new type of university in the U.S. as well. Emphasizing scholarship and especially research, the German model of a modern university seemed particularly well-suited to the United States as the country evolved from a largely agrarian society to an industrial one.

Arguably, the single greatest contribution of the United States to the development of higher education has been the land grant college. The land grant concept embodied two elements which taken together, distinguished it from both the classical/ theological model as well as from the more modern research oriented institutions which developed in Germany: science and democracy. While there were obviously glaring omissions in the democracy embodied in the original land grant concept, particularly with respect to blacks and women, the application of social democracy and emphasis on science in higher education was to have profound impacts (Nevins, 1962).
In the 132 years since the passage of the original Morrill act, the land grant colleges have developed into pivotal institutions in U.S. higher education and have served as a model for the development of literally hundreds of agricultural universities around the world (Busch, 1989).

The origins of the land grant movement in the U.S. can be traced to a number of factors. Increasing misgivings regarding the dominant role of churches in education, continuing attempts to establish a national and state universities beginning with George Washington in 1790, and a growing sentiment in favor of public education throughout the early 1800's, all contributed to creating the conditions for the establishment of the land grant institutions. The most important factor, however, was the emergence of science and the subsequent development of technology. The rise of the industrial revolution, accompanied by a decline in the power of religious dogma, occasioned profound social changes including the rise of class consciousness and the demand for increased educational opportunities.

The establishment of West Point in 1802 marked one the first attempts at developing a more practical college curriculum (Eddy, 1958). The founding in 1824 of the Rensselaer Institute in Troy, New York whose mission; the application of "science to the common purposes of life", clearly anticipated the development of the land grant system,
was another important step in breaking with the traditions of
the past (Eddy, 1958). The Resselaer Institute developed into
America's first genuine engineering college (Eddy, 1958).

In 1823, the Gardner Lyceum in Maine, became the first
school devoted entirely to agriculture. In 1837, the
University of Michigan was chartered with a provision that it
offer "practical farming and agriculture" (Eddy, 1958). From
1850 to 1860, numerous efforts were made to found agricultural
schools and colleges, many of which were successful but which,
usually due to inadequate private funding, had disappeared by
1862 and the passage of the Morrill Act. The Peoples's College
and the Ovid Academy in New York, and the Farmers College in
Cincinnati are three examples of this movement (Eddy, 1958).
Probably the most significant development during this period
was the action of the Michigan Legislature in 1850 in revising
the State constitution to include a provision calling for the
encouragement of a state school devoted to agriculture. By
1853, in response to pressure from farmers, this initiative
was amended to call for the proposed institution to be
separate from the existing state university. When actually
inaugurated in 1857, and reflecting the times, the curriculum
included both classical studies, agricultural subjects and
manual labor (Eddy, 1958). While a small number of other
institutions, most notably in Pennsylvania, were also
established during this period, in the majority of the States
the actual opening of an agricultural college awaited federal assistance.

By the 1860’s, conditions were ripe for the establishment of the land grant colleges. Increasing national wealth, disenchantment with the traditional approach to education, the usurpation of religious dogma by science and technology, and the emergence of democracy, created the necessary conditions for the founding of a new type of university.

One of the men most responsible for the eventual development of the land grant schools was Jonathan Turner. The Turner plan, calling for the establishment of separate institutions devoted to industrial education and supported by federal land grants, was, in the 1850s referred to as "the common man's educational Bill of Rights" (Eddy, 1958). In advocating an education for the working class, education relating to practical endeavors and professions, applied research and experimentation, and the idea that these institutions would be supported by grants to each of the States, Turner anticipated most of the features of the land grant colleges. Turner's plan attracted widespread support and was instrumental in mobilizing and consolidating support for the eventual establishment of the land grant system.

Justin Smith Morrill began his legislative efforts to provide federal support to the establishment of land grant institutions in the late 1850s. While his initial bill was
vetoed by President Buchanan in 1859, a later version of his bill, with substantial changes, successfully passed Congress and was signed by Lincoln in 1862.

While the original intent of the land grant university was to provide educational opportunities to the industrial classes, with the passage of the Hatch act in 1887, the research programs of the various colleges were formally funded. With the Smith-Lever act of 1914, the land grant colleges formally took on the three functions for which they are known today - teaching, research and extension (Kellogg, 1966).

The land grant college, empowered to function on three fronts, thus began its mission of remaking rural America. Although originally embodying the twin elements of democracy and science, science was the means by which rural society was to be transformed (Busch, 1983). As the land grant system matured, what had previously been relatively undifferentiated scientific inquiry in agriculture, developed into increasingly specialized and commodity-oriented avenues of inquiry. As American agriculture also matured and increasingly organized itself along similar lines, the joint focus on commodities was thereby fortified. A consequence of this pattern of development has been the "underfunding and abandonment of problems not directly related to commodities" (Busch, 1983:35). As research and teaching agendas increasingly
focused on productivity and efficiency, these became the ends of scientific inquiry and any deleterious consequences resulting from the achievement of these ends became simply the cost of progress. While Hightower and others have argued that the land grant institutions have become responsive largely to the needs of agribusiness (Hightower, 1973), others assert that the problem is that land grants may in fact be too responsive to farmers. In providing solutions for farmer's immediate problems, the emphasis is on technological "band aids" that alleviate symptoms without addressing root causes (Buttel, 1985).

Nichols argues that while a definitive analytical history of the land grant universitys' impact on rural America has not been written, there is strong evidence that, under the influence of organized agricultural interests, technological improvements have been emphasized at the expense of social concerns of the rural population. At the same time, the land grant universities, for a variety of reasons, have been largely unable to meet the needs of urban populations (Nichols, 1976).

Despite serious misgivings regarding the consequences, both intended and unintended, of the land grant system on rural society, their impact on agriculture cannot be underestimated. A significant proportion of the increases in food and fiber productivity achieved since the passage of the
Morrill act is owed to the teaching, extension and research efforts of the land grant schools. That increases in U.S. agricultural productivity have been so notable; 949% in the period 1870-1960, compared to 453% for the country as a whole, speaks eloquently to the contribution of the land grant model (Nichols, 1976).

Agricultural Higher Education in Latin America

While some of the faculties of agriculture in Latin America date from roughly the same era as do the land grant schools in the U.S., their development has been much more sporadic (Samper, 1965). The precursor of the present National School of Agriculture of Mexico in Chapingo, the School of San Jacinto, was founded in 1854. Five others were established in the nineteenth century; a faculty of agricultural sciences in Colombia, one in Chile, two in Brazil and one in Argentina. The lack of impetus for the development of additional faculties in this period is largely a reflection of the semi-feudal and traditional organization of Latin American agriculture during this period (Samper, 1965). The development of agricultural higher education increased markedly during the present century. By 1939, there were 25 faculties of agronomy in Latin America and by 1964, 65 faculties had been created (Samper, 1965). Schlottfeldt reports that by 1974, there were 117 facultades (faculties) awarding degrees in agronomía.
(agronomy), 57 in veterinary medicine, 25 in animal science, 21 in forestry, 11 in home economics, 4 in agricultural engineering, 2 in fisheries, 1 in edafología (soil science) and 1 in fruticultura (fruit science) (Schlottfeldt, quoted in Saravia, 1985). It might be noted that there is a great deal of confusion in the literature regarding the extent of higher education in agriculture in Latin America. For example, while Schlottfeldt reports a figure of 239 centers of higher education in agriculture in 1974 (Saravia, 1985), Macías-López gives a figure of over 300 as of 1989 (Macías-López, 1990).

Since the second world war, a number of trends can be identified with respect to Latin American higher education in agriculture. First are organizational changes which integrated agricultural faculties into the university. Many of what began as separate institutions operated by ministries of agriculture were absorbed into universities (a notable exception to this pattern is Chapingo in Mexico). This process of incorporation has in many cases been more of form than of substance, as many of the faculties have remained isolated from the larger university. A related trend has been the elevation of the secondary school to the university level. Many faculties of agronomy began at the secondary level as practical agricultural schools, later being transformed into faculties associated with the university. The second half of the twentieth century has also seen the development and
proliferation of postgraduate studies in agriculture, most notably at institutions such as Chapingo and Monterrey in Mexico; La Molina in Peru; Santiago, Chile; Piracicaba and Viçosa, Brazil and CATIE in Costa Rica.

Trends more significant to this study are those that have tended to cause agricultural higher education in Latin America to develop along similar lines as in the U.S. Perhaps the most important has been the pervasive influence of the land grant universities in Latin America since the Second World War. This influence can perhaps be best illustrated by quoting Galo Plaza, the former President of Ecuador, in commemorating the centennial of the land grant schools in 1962:

This far-reaching educational revolution (the land grant schools), which started one hundred years ago and contributed much to make this country the great democracy it is today, is the kind of revolution in education we need in Latin America. Our institutions of higher learning should be capable of offering a liberal and practical education to all who can benefit from it; they should broaden their curricula to prepare students for the multiple demands of modern society; basic and applied research should be an integral part of university work; and, through extension, the university should disseminate useful knowledge for practical living to the entire population" (Plaza, 1962:84-5).

Albornoz writes that the North American research oriented university is to the Latin American university what the German university was to its U.S. counterpart around the time of the creation of the land grant universities. He goes on to say that the U.S. model has practically no competition and has
become the model for the research-oriented university in Latin America (Albornoz, 1979).

Following much the same pattern as elsewhere, higher education in agriculture in Latin America has grown increasingly specialized. Until fairly recently students studying agriculture at most universities were in one group with practically no specialization (Olcease, 1965). By the 1970's, most faculties became organized along similar lines as one would find in a land grant institution with, at a minimum, departments of agronomy, animal science, agricultural economics, and often additional departments of food science, forestry and other specializations (Saravia, 1985).

Another trend which can be identified is the functional integration of research, teaching and extension. Although extension in many Latin American countries is the province of the Ministry of Agriculture, and research is frequently the responsibility of separate institutes associated with the ministry, many universities have attempted to follow the example of the U.S. land grant schools and integrate the three functions within their overall program (Samper, 1965). The extent to which this trend has resulted in the effective integration of these three functions varies widely. Saravia reports that among faculty there does not exist a widespread acceptance that extension should be included among the functions of the University (Saravia, 1985).
In spite of industrial development and alarming rates of rural to urban migration, much of Latin America remains largely agrarian. In many countries agricultural production is characterized by a large number of small, often subsistence producers existing alongside a modern commercial sector producing a relatively small number of commodities for export. One notable result of this is a focus, in many faculties of agriculture, at least rhetorically, on rural development and the need to direct efforts towards serving small farmers. Even a casual review of the literature reveals a recurring theme regarding the need to reorient agricultural higher education in Latin American towards the needs of the sector campesino (small farm sector). Alberto Fujimori, former rector of the Universidad Nacional Agraria La Molina, and now President of Peru, wrote in 1985: "The new professional should have an integral formation permitting him to operate within the complexity of the small farm economy" (Fujimori, 1985:2, translated by the author). Significantly, technical skills are not included among those which Fujimori considers most important for a professional. Skills and values which should determine the nature of the program in higher education include:

* An understanding of the cultural values and "idiosyncrasies" of the small farmer and his society, so as not to violate cultural patterns.
The ability and desire to take advantage to the greatest extent possible, of indigenous technologies that are the product of collective experience.

Promote social change that leads to improving the standard of living of the population, including literacy, infant mortality, and life expectancy, while respecting cultural patterns (Fujimori, 1985).

Macías-López, in a review of higher education in agriculture in Latin America reports a generalized conviction among faculty and students that rural development is "...the leading concept and objective of agricultural education. All professionals and students in the agricultural sciences should orient their education and professional activities to solve the problems and respond to the needs of farms specially low income and small scale farmers" (Macías-López, 1989:131).

This commitment to rural development and social improvements in the sector campesino would suggest the need for major restructuring of educational programs. Instead of emphasizing the formation of specialists, and the assimilation of vast amounts of propositional knowledge, one would expect an emphasis on the formation of generalists who, while familiar with the theories and concepts underlying agricultural practice, would also be skilled communicators, possess considerable practical agricultural skills, and perhaps most importantly, identify with the needs and special problems of the rural population. Nevertheless, in spite of a
course or two in rural sociology and an obligatory semester experience working in a rural setting, the dominant paradigm characterizing the approach to education and agriculture in most Latin American universities remains remarkably similar to that found in the U.S. university.

In reviewing a series of case studies of agricultural higher education from developing countries around the world, Schute effectively captures the limitations of university programs in much of Latin America:

...agriculture in the universities has been oriented almost exclusively towards food production. While not denying the centrality of this mission, it is equally clear that most faculties of agriculture have so far failed to treat agricultural/rural problems in a holistic and integrated fashion...Curriculum development is in a rut in a number of the faculties described in the case studies" (Schute, 1989:302).

Current Status

Reflecting the optimism regarding the promise of science as the key to improvements in agriculture in the U.S. during the postwar era, undergraduate programs in agriculture in the 1940s and 50s were primarily oriented towards science and technology. Curricula emphasized the biological sciences, chemistry and mathematics as well as technical agriculture course work. Coursework in non-agricultural related disciplines was minimal and separated from the main thrust of students programs (Merritt, 1984).
The 1960's were a period of intense growth in higher education in the U.S. (Cowley, 1991). The National Defense Education Act (NDEA) of 1958, passed in response to the Soviet Union's launching of Sputnik, specified that "no student of ability will be denied an opportunity for higher education because of financial need" (Cowley, 1991:192). While the federal government had been involved in assisting higher education since at least 1862, the NDEA set a precedent for federal assistance for a far wider variety of programs. NDEA was soon followed in 1963 by the Vocational Education Act, the Higher Education Facilities Act and the Health Professions Act, the establishment of the National Endowments for the Humanities and Arts in 1965, the Adult Education Act of 1966 and the Educational Professions Development Act of 1967 (Cowley, 1991).

Along with the expansion came innovations in teaching and curricula across the disciplines in the 1960s and 70s (Cowley, 1991). According to Merritt, in the case of higher education in agriculture some of the more important changes were:

1. New curricula and courses in agricultural marketing.

2. The addition of new introductory agricultural courses such as "plant sciences," "animal sciences," and "man and his food," (sic) designed to serve majors and non-majors in both agriculture and liberal arts curricula.

3. More courses in literacy, including the addition and redesign of courses in
technical and scientific writing, speech and communications.

4. The inclusion of new courses in environmental science and studies.

5. A small number of institutions experimented with courses offering a humanistic perspective on agriculture and technology.

6. Some new courses in international agricultural development.

7. An increase in the number of experiential learning opportunities for students, including work study, cooperative education programs and internships (Merritt, 1984:9-10).

In spite of the promise of progress during the 1960s and early 1970s, by the late 1970s sharp economic downturns and lowered public support for higher education resulted in decreased budgets and retrenchment in universities and colleges. One effect of this retrenchment has been, and continues to be, changes in the reward system. Especially in the land grant colleges, cutbacks have resulted in a higher priority given to research activity than to teaching. This trend has negatively impacted the development of new courses and curricular innovation as well (Merritt, 1984). As a result, faculty have increasingly devoted their efforts to traditional discipline areas at the expense of innovation. In the process, approaches emphasizing "problem-oriented, and inter- and multi-disciplinary areas" (Merritt, 1984:10) have suffered.
Edward Schuh concurs that the demands of the university reward structure are such that faculty have moved away from the land grant mission of service to the people through teaching, research and extension. In the university today, "the criteria for promotion is publishing in scholarly journals. In turn people are self- and peer oriented. They do not feel a responsibility to contribute to the institutional mission of solving society's problems. They do research to advance knowledge, publish for peers, and earn consultancies. Generating and applying knowledge to solve today's social and economic problems are not given sufficient priority" (Schuh, 86:6).

Declining enrollments in colleges of agriculture have resulted in "an unstated but obvious de-emphasis of teaching...The message is clear: do an adequate job of teaching but spend most of your efforts in research, because research will be rewarded" (Logan, 1989:76).

The trend away from the innovations of the 1960s and early 70s has continued into the 1990s. Enrollments continue to decline, with 1990 B.S. enrollment in agricultural sciences in NASULGC institutions down 15% from 1981 levels (Litzenberg, 1991). Increasingly one hears mention of the possible demise, merger or other radical transformation of a significant number of colleges of agriculture within the land grant system.

In spite of a generalized "unease" regarding the adequacy of higher education in agriculture, and the efforts of a great many individuals, task forces, and commissions to incorporate new philosophical and instructional approaches into the
curricula of Colleges of Agriculture, undergraduate education in agriculture in the U.S. and elsewhere remains remarkably similar to that of the 40s and 50s. The emphasis in the 90s remains on the reductionist/positivist approach which promotes the study of isolated pieces of the agricultural system, and ignores and attempts to avoid dealing with social or ethical norms as much as possible (Doering, 1992). Students in the 1990s may be required to take additional course offerings in the liberal arts and humanities, yet there are few connections drawn between these areas and agriculture and rural development. At a time when agriculture and resource management issues are increasingly in the public eye and form an important part of the public dialogue, agriculture students clearly require an awareness of the political and philosophical implications of their beliefs, as well as the communication skills enabling them to be effective participants in the public discussion (Thompson, 1992). The former Rector of the United Nations University, Soedjatmoko, in discussing the role of the humanities in universities in the developing world, makes a point that is equally relevant to those in the industrialized nations:

"Universities in developing countries should relate, more effectively than they have done so far, the study of the humanities to both the 'little' and the 'great' moral questions regarding social purpose and national goals, in a national, regional and global context. These questions must include the search for a more humane society in an increasingly technology-
dominated environment" (Soedjatmoko, quoted in Schute, 1989:303).

While many colleges of agriculture are attempting to incorporate critical thinking and problem solving skills focusing on multi-disciplinary and holistic approaches, the paradigm embodied in the College itself is characterized by specialization and reductionism. Despite widespread recognition that experience represents one of the keys to successful learning, experiential learning strategies continue to exist largely on the periphery of agricultural curricula in the university. Finally, in spite of repeated calls over the past decades for the agricultural university to focus on broad rural development, the primary emphasis continues to be placed on relatively narrow technical and production concerns (Wilson, 1990; Chambers, 1983; Coombs, 1974; Hightower, 1973).

Thus, a new approach is needed to higher education in agriculture. The land grant colleges first developed in response to profound changes which had occurred in nineteenth century U.S. society. The emergence of science and technology as the key to progress and development was particularly important in creating the conditions for the establishment of the "People's Universities". The character of the modern agricultural university with its focus on reductionist research reflects this heritage. Yet the environment in which the university operates has changed. Social, economic, political and cultural conditions are profoundly different
from those of 130 years ago when the original Morrill Act was passed. The realization that science alone cannot solve the complex problems facing society has tempered many people's faith in modernist science. In spite of spectacular advances in agricultural production, the welfare of the majority of the people involved in agriculture around the world has not demonstrated similar progress (Chambers, 1983). In the U.S. where agricultural development has been particularly impressive, the erosion of rural communities and the concentration of agricultural based wealth has been marked (Bonnen, 1983). The detrimental effects of modern agriculture on the environment have been extensively documented, beginning with Rachel Carson's *Silent Spring*. At the same time, ever-increasing specialization and changes in the reward structure of the university has resulted in agricultural sciences and scientists more closely identified with specific disciplines and professional societies than with the human face of agriculture and rural society. This same specialization makes the land grant university particularly unsuited to dealing responsibly with the environment. Because the University has become organized and indeed dedicated to disciplinary specialization, the environment, being everything, in effect has no constituency - it is functionally nothing (Gordon, 1992).
Reflecting the generalized "unease" with higher education in agriculture mentioned above, proposals for change are legion. A recent publication of the National Research Council's Board on Agriculture, Agriculture and the Undergraduate, contains many of these proposals. Greater and more effective inclusion of the human, ethical and environmental dimensions of agriculture in the curriculum, a greater emphasis on the social sciences and humanities, and the addition of international concerns in the plan of study are some of the more significant recommendations (National Research Council, 1992).

The centrality of people, rather than production, is an obvious place to begin in transforming educational practice in higher education in agriculture. Too much of current educational practice actually ignores the human presence in the agricultural enterprise (Bawden, 1988). A people-centered approach would place broad rural development as the central concern of education rather than an exclusive focus on narrow technical concerns of production. At the same time, a new approach to higher education in agriculture must place emphasis on complexity and change. Agriculture needs to be conceived of as a highly complex system involving people in the production, processing and consumption of food and fiber. Reflecting this vision, the emphasis of educational practice should be on strategies and techniques that enhance the
learner's ability to deal with agricultural issues in a broad and holistic fashion (Wilson, 1990; Foster, 1991). Where current practice focuses on reducing complex situations to more easily manageable situations, learners, through curricular as well as co-curricular activities, should be encouraged to actively focus on problematic situations in agriculture and rural development.

Improved educational practice in higher education should be designed to facilitate the learners gaining an appreciation of the complexity of the agriculture enterprise as well as a more holistic perspective. Such practice might include a variety of curricular innovations, including the inclusion of courses focusing on agricultural systems or subsystems in place of conventional courses organized around separate subject or discipline areas. Faculty and/or student structured learning experiences, focusing on actual agricultural problems, and occurring within or outside the university/college environment, are another example (Bawden, 1983).

An important feature of an approach centered on people and emphasizing complexity and change is the consideration of ethical and social norms within the agricultural and rural development context (Doering, 1992). Expanding beyond a view based only on science and integrating the identification and assessment of countervailing social and ethical concerns
should be the first step in facilitating learners appreciation for the complexity and multi-faceted nature of the problems facing agriculture. This is obviously not a simple task. It involves designing learning experiences so that students can differentiate between facts and values and become more adept at understanding their respective roles in decision making. Students must also be provided with a context beyond their own values and beliefs upon which they can base critical decision making. Finally, opportunities which require students to observe and participate in decision making should form an integral part of undergraduate agricultural training.

Reflecting the philosophy articulated in the previous chapter, higher education in agriculture should involve more than acquiring propositional knowledge (knowing), learning practical skills (doing) and gaining an appreciation for the complexity and value laden nature of the agricultural enterprise. A further aim should be the formation of an agriculturalist committed to functioning as an agent of change. Propositional knowledge, practical skills and insights into the complexity of agricultural systems, without a parallel commitment to action to benefit the rural population and the environment, are of little use.

Such a commitment to action is clearly not "taught". It derives from a comprehensive understanding of the problems confronting agriculture, first-hand experience with the
realities of agricultural production, rural life and natural resource management, exposure to faculty and other mentors who demonstrate social and environmental responsibility through their actions, and finally, open and honest dialogue.

**Experiential Learning**

A change in educational practice which holds promise for transforming higher education in agriculture in the ways discussed above is the adoption of experiential learning strategies. In focussing on process as opposed to content or outcomes, experiential learning is particularly well-suited to the complex and changing world of agriculture and rural development. In focussing on the subjective nature of learning, experiential learning is centered on the learner, rather than on the teacher or the subject matter. Perhaps most importantly, experiential learning encourages the integration of propositional learning and the acquisition of practical skills within a context of real world problems (Bawden, 1988).

Experiential learning theory presents an alternative way to view the learning process and the dichotomy between theory and practice, knowing and doing. Rather than the "empty organism" behaviorist theories of learning based on an empirical epistemology, or the more implicit theories of learning that underlie traditional educational methods based on rational, idealist epistemology, experiential learning
theory seeks to redress the dichotomy by integrating theory with practice. Experiential learning theory emphasizes the role of experience, consciousness and subjective factors, rather than the assimilation and recall of abstract symbols, and behavioral outcomes. Kolb proposes that instead of conceptualizing experiential learning as an alternative to behavioral or cognitive theories of learning, it should rather be viewed as a "holistic integrative perspective on learning that combines experience, perception, cognition, and behavior" (Kolb, 1984:21).

Experiential learning theory as expounded by Dewey, Kurt Lewin, Paulo Freire and others, defines learning as a process in which thoughts and concepts are created and modified by experience. Dewey, in *Experience and Education*, describes how learning transforms the impulses and desires, derived from concrete experience into purpose. Purpose differs from the original impulse and desire in that it involves a "...plan and method of action based upon foresight of the consequences of action under given observed condition in a certain way" (Dewey, 1938:69).

Conventional approaches to learning are in large measure based on the empiricist philosophical tradition of Locke and others (Kolb, 1984). The notion that constant and fixed elements of consciousness, or discreet and unchangeable mental particles, exist has profoundly influenced conventional
approaches to learning. From this epistemological viewpoint, our patterns of thought are formed by "...various combinations and associations of these consistent elements..." (Kolb, 1984:26). The logical consequence of this viewpoint, and the one that influences conventional education, is that if elements of thought are fixed and constant, it should therefore be possible to define learning in terms of outcomes, whether that be a quantity of accumulated facts, or a series of behavioral responses to determined stimuli.

Conventionally, students studying agriculture have been taught a multitude of propositions in the form of scientific facts, theories and principles. They have also commonly been provided opportunities to put some of these propositions into practice in the laboratory and (less often) in the field. Students have thus gained both propositional and practical knowledge. The relative balance between these two types of knowledge has been a point of debate between agricultural educators and students for decades. The explosion of propositional knowledge has required ever more emphasis on theory in the curriculum, thus reducing the opportunities for practical application (Bawden, 1988).

Reflecting this tradition, conventional curricula has been essentially based on the transmission of a large body of propositional knowledge. Conventional approaches to learning have stressed the importance of preparing students for
involvement in their chosen field by exposing them to the fullest possible coverage within the appropriate disciplines. Conventional learning can be characterized as being based largely on abstractions and theories, limited largely to the classroom and laboratory, relatively standardized, with the teacher serving as transmitter of knowledge and the learner relegated to a passive stance (Conrad, 1978).

From a psychological standpoint, conventional learning follows an information assimilation pattern, which, according to Coleman, occurs through a discreet series of steps. First is the reception of information, for example via a lecture or book, in which words are the symbolic medium. The second step is assimilation and organization of the symbols received in order to understand a general principle. The next step involves making an inference from the general principle to a particular application, and the last step is to move from the cognitive and symbol processing to the realm of action. This last step "...involves all the previous three but here the knowledge gained is actually applied. Only when this step has been completed can the person be said to have completed the learning so that the information initially received is useful to him in his everyday action" (Coleman, 1976, p. 51).

In contrast to this, "problem based" or "problem solving" approaches or, what might be more productively referred to as experiential learning approaches, confront learners with
"real-world" problems. Such a strategy represents a fundamentally different approach to learning and knowing (Bawden, 1985; Kolb, 1984; Rogers, 1983). In Kolb's model of experiential learning, learners alternate between the realms of experience and concepts as they attempt to understand their environment and function more effectively within it (Kolb, 1984). In integrating theory and practice, with action of some sort generally occurring at the beginning of the sequence, motivation is intrinsic (Coleman, 1976). The action which occurs supplies the subjective need for learning from the outset.

Conclusion

Contemporary approaches to higher education in agriculture have been heavily influenced by the traditions of the German research university and U.S. land grant institutions. The approach has changed little over the past decades and can be characterized as emphasizing technology and science as the means to increase production and economic efficiency, often at the expense of social equity and environmental quality. A result of the focus on science and technology has been an inordinate emphasis placed on the transfer of propositional knowledge in the educational process. While much of the original impetus for the creation of the land grant institutions in the U.S., as well as many of
the early agricultural institutes in Latin America, lay in the need for practical education, the explosion of scientific knowledge over the past century has resulted in a steady erosion of emphasis placed on the acquisition of practical skills. In much the same fashion, opportunities for students to learn through immersion in, and exposure to, actual problematic situations in agriculture and rural development have been sacrificed to the necessities of imparting ever larger quantities of propositional knowledge.

There is a need to instill in learners an appreciation for the complexity and dynamic nature of agriculture. An emphasis on reductionism, while a powerful tool in scientific inquiry, must be balanced with more holistic alternative inquiry strategies. Experiential learning represents one such alternative, providing learners direct contact with actual problematic situations in agriculture and rural development.
...But perhaps the greatest inhibitor of important research has been a fallacious view of social research itself held by the scholars of higher education [who] still subscribe to the notion that colleges and universities can be and should be studied scientifically (George Keller, 1985:9)

This study was designed as a qualitative case study of higher education in agriculture. The issues of interest in the study were what constitutes an appropriate philosophy(ies) for higher education in agriculture and how educational practice might be transformed to conform to such a philosophy. The assumption of the study is that, whether articulated or not, practice in higher education is guided by philosophy, and that it is philosophy which should inspire activity and provide direction to practice. The particular case examined in the study was the Escuela de Agricultura de la Región Tropical Húmeda.

The study began by discussing different philosophical approaches to education and attempted to articulate an approach appropriate to the particular conditions of higher education in agriculture. The development of higher education in agriculture was described, and dominant contemporary approaches were discussed. The section dealing with the development of higher education in agriculture concluded with
some recommendations regarding transformations of current practice to bring it into line with an appropriate philosophy.

The next phase of the study involved interviewing EARTH students, faculty and administrators. The interviews were conducted to explore the opinions and views of those involved in EARTH regarding the institution's educational philosophy, especially with respect to the integration of theory and practice in agricultural education, as well as other issues of relevance. EARTH documents were also analyzed to clarify an understanding of the institution's philosophy.

Using the information gathered from the interviews, along with the conceptual framework developed with respect to educational philosophy and practice in agricultural higher education, a series of conclusions and recommendations was developed with respect to the particular program at EARTH.

This chapter begins with a brief background in which the investigator's background and interest in the study is explained. This introductory information is followed by sections regarding methods, population and sample, instruments, procedures, data analysis, trustworthiness of study and limitations.

Background

One of the means suggested by those advocating naturalistic or qualitative inquiry to enhance the usefulness
of research is for the investigator to outline his or her background, beliefs, and interest in the subject (Reason, 1981). In addition to providing readers relevant information about the investigator, such an exercise serves to bring to one's attention personally held beliefs, attitudes and values which could potentially color the inquiry.

The investigator is a member of the faculty of EARTH and has been the coordinator of student admissions. The undertaking of this study coincided with a two year leave of absence to pursue a doctoral degree in agricultural education. The investigator began an association with EARTH in 1986, during the initial stages of the project. First as an employee of California Polytechnic State University, the lead institution in a consortium of United States universities providing technical services in the development of EARTH, later as a contractor for the United States Agency for International Development/Costa Rica Mission, and finally as a member of the faculty, the investigator has worked in a variety of capacities for the institution. During the period in which the investigator was responsible for administrative issues associated with coordinating the services of the support universities, he became increasingly interested and involved in the development of EARTH's academic program. As a participant in the deliberations of the original curriculum task force, composed of faculty from Cal Poly, Rutgers, the
University of Nebraska and independent consultants, and later, as the coordinator of the curriculum review process undertaken by the EARTH faculty in 1990, the investigator had the opportunity to be involved throughout the initial curriculum development process. Participating in the creation of an entirely new educational institution is a rare opportunity and one for which the investigator is especially grateful.

Based on personal experience, reading and observation, the investigator came to the EARTH project with a great deal of skepticism regarding the ability of agricultural higher education to meet the challenges confronting rural society and the environment. With its emphasis on the technical and economic issues related to increased production and profitability, conventional approaches to agricultural development seemed singularly unprepared to deal with issues of social and economic equity, environmental degradation, and related concerns. The investigator also harbored doubts regarding the ability of conventional programs to graduate an agriculturalist with the practical skills, experience, and self confidence required for assuming positions in either production agriculture or grass roots community development. This problem seemed particularly acute in Latin America, where the majority of graduates have traditionally been channeled into the public sector.
The investigator was especially appreciative of the opportunity to participate in the development of EARTH because he believed (and believes) that the school's curricular and co-curricular programs had the potential to rectify many of the limitations inherent in conventional approaches to agricultural higher education. The emphasis on curricular integration and systems approaches were seen as a means of providing learners a more holistic view of agriculture and rural development. The focus on experiential learning and learning by doing was adopted as a means of providing students the motivation, practical experience, and contact with the field which is so often lacking in conventional programs. The physical location of the school in a rural area of the humid tropics and the development of a continuing education program serving communities of the region were seen as a means of grounding the learning environment in the realities of the humid tropics. Finally, the institutional commitment to social and environmental responsibility were viewed as essential elements in the development of future agents of change in agriculture and rural development.

An important motivation in the investigator taking a leave of absence and pursuing an advanced degree was to gain distance and hence greater perspective on EARTH and the role it is playing in the education of agriculturalists for the humid tropics. The decision to undertake the present study
reflected a desire to deepen his understanding of the job
EARTH is actually doing in implementing a new approach in the
education of agriculturalists.

**Methods**

The first three objectives of this study were addressed
through a review of literature, reflection on personal
experience as a student and teacher, and dialogue with peers.
The fourth objective, which relates specifically to the
development, philosophy and practice of EARTH, was addressed
largely through qualitative means. These included analysis and
interpretation of documentation related to EARTH, personal
experience, and a series of interviews with EARTH students,
faculty and administrators. The fifth objective, the
formulation of conclusions and recommendations, involved an
interplay between the insights gained from the review of the
literature and the research conducted at EARTH.

Qualitative methods were selected to address the
questions raised in this study because the essential aim of
the study was to develop an understanding of a complex human
activity; in this case, higher education in agriculture. The
study was not concerned with issues of "how much" or "how
little", nor was it concerned with prediction. The emphasis
instead was on examining the philosophy and practice of
agricultural higher education in general, and seeking an in-
depth understanding of stakeholders' perceptions and attitudes regarding the same issues in the context of a specific institution.

Some of the more significant features of qualitative research include the lack of predetermined hypotheses, and the use of data which usually consists of descriptions of settings, people, things, concepts and ideas (Lincoln, 1985). In qualitative research one does not manipulate variables or administer treatments. The role of the researcher is instead to "observe, intuit, sense what is occurring in a natural setting—hence the term naturalistic inquiry" (Merriam, 1988:17).

Rather than relying on a survey, questionnaire or other instrument for gathering data, in qualitative research the researcher is the primary data collection instrument (Merriam, 1988). The centrality of the researcher is a critical element in qualitative research, and is the source of both strengths and weaknesses in the approach. While many "hard scientists" view qualitative methods as too fuzzy, soft, unstructured, and essentially subjective, for proponents the fact that data is mediated through a human instrument is what imparts its power. It is the presence of the human instrument, in a process of adaptation to the research environment, that ensures that the meaning of an incident or phenomena is captured. On the other hand, the centrality of the human instrument places a great
responsibility on the investigator that does not necessarily exist in the case of quantitative research.

Where quantitative inquiry is based on positivism and is concerned with acquiring objective knowledge, the qualitative approach reflects a phenomenological perspective, concerned with discerning the meaning that events have for the persons being studied (Patton, 1991). These represent two very different perspectives, each involving a set of assumptions about, in the words of Patton, "(a) what constitutes the social world, (b) what are the proper goals of inquiry into the behavior of persons living in the world, and (d) how data are collected and analyzed" (Patton, 1991:390).

Positivist inquiry is based on the assumption that the fundamental reality of the world consists of physical objects and processes. The positivist believes that human behavior is determined by a priori rules and processes or are the product of mechanical forces acting within the organism and the environment. The qualitative approach, on the other hand, assumes that "the fundamental reality of the world is mind" (Patton, 1991:390). Rather than reducing a phenomena and explaining it in terms of physical processes and structures, the qualitative researcher attempts to explain what people know and how they use what they know.

With respect to epistemology, positivist approaches to inquiry assume that the facts are there in the "objective"
world to be "discovered" if the proper methods are adhered to. The mind senses phenomena, extracts relevant information and then "meshes the information with preexisting neurological or cognitive structures" (Patton, 1991:390). Most qualitative approaches on the other hand, posit that our knowledge of the world is not direct, that it rather depends on our experiencing the world and then our cognitively re-presenting this physical reality. It is precisely because humans are involved in this process of re-presentation that qualitative researchers are interested in describing how events are understood by those under study (Lincoln, 1985).

With respect to the goals of social research, the focus in quantitative research is on the causes of changes in the social world and human behavior. Because the world is always and everywhere subject to causal laws, the assumption is that, through scientific methods, the causes for such changes can be discerned in the physical or psychological processes that determine human behavior. Through a process of (detached) observation and the drawing of inferences, the researcher attempts to explain human behavior in terms of a physical system of cause and effect relationships (Patton, 1991). Qualitative inquiry is more concerned with understanding than discerning causes. In the case of social research, qualitative inquiry seeks to comprehend the perspective of those under study with respect to social phenomena.
The philosophical approach to higher education in agriculture advocated in this paper emphasizes a learning process that balances scientific inquiry with a concern for the social and environmental context in which agriculture takes place. It is suggested that experiential learning strategies offer an effective means of implementing such an approach. It is no coincidence that just as experiential learning emphasizes the role of subjective experience and consciousness, these are also important features of what has been variously termed the qualitative or naturalistic paradigm (Lincoln, 1985), or "new paradigm research" (Reason, 1981).

Qualitative inquiry is based on the belief that there are multiple constructed realities that must be studied holistically. In stressing the subjective nature of learning and the role of individual consciousness, experiential learning theory seems to point in much the same direction. Positivist science, like the information assimilation model approach to learning, stresses instead the propositional and objective nature of knowledge. Where modern science posits that there is a single and tangible reality that can be fragmented into variables and predicted and controlled, conventional approaches to education assume that knowledge is equivalent to subject matter to be "covered" in a curriculum.

Experiential learning suggests that knowledge is created by the learner through a transformation of experience. This is
analogous to the idea inherent in naturalistic approaches to research that the researcher "and the 'object' of inquiry interact to influence one another; knower and known are inseparable." (Lincoln, 1985:37). Approaches to education which stress the transfer and assimilation of knowledge on the other hand, are analogous to quantitative inquiry, in that they both embody a dualism between the knower and the known. Conventional approaches to learning assume a separation between the learner and the "material to be covered". Similarly, the positivist science tradition suggests that the "inquirer and the 'object' of inquiry are independent; the knower and the known constitute a discrete dualism." (Lincoln, 1985:37).

In much the same fashion that the attitudes, beliefs and worldview of the learner are seen as integral factors in experiential learning, a basic tenet of qualitative research is that inquiry is influenced by the value system of the researcher. Positivist approaches to research on the other hand, assume that inquiry is value-free, a condition that is considered essential and which is presumably guaranteed by the objective methodologies employed.

The purpose of this study was to examine the attempts at integrating theory and practice at EARTH through experiential learning strategies and describe how stakeholders perceive the results of these efforts. The study was based on the author's
personal experience, first in the creation of the school, and later as a member of the faculty. In addition, extensive interviews were conducted with EARTH faculty, students, and administrators, as well as visiting faculty and students. As the study focused on a particular institution, attempts to provide a rich and thick description, presents findings utilizing prose and literary techniques and is based on inductive reasoning, it would best be characterized as a case study (Merriam, 1988).

While the methods employed in qualitative case study research, primarily interviews and observation, are not unique to this type of research, the purpose -- the knowledge learned -- is different from other research knowledge. Because the knowledge gleaned from case study research tends to be more concrete and more contextual (rooted in a particular context) and because readers bring their own experiences and understandings to a reading of a case study, generalizations are induced as new data for the case is added to old data (Merriam, 1988).

The describing the development of EARTH, the emphasis has been placed on describing the evolution of the curriculum, particularly those programs which are more obviously experiential in nature: work experience, student enterprise projects and the internship.
Population and Sample

The case study focused on EARTH. EARTH was designed for a student population of 400, although the population at the time of this study was somewhat below capacity. At the time of the study, there were about 33 faculty members employed at the school, although that number is expected to eventually increase to about 40. In the study, 59 open-ended interviews were held with students, faculty, administrators and long-term visitors to EARTH. Thirty-four interviews were held with students, twenty with faculty, two with administrators, two with student interns from a United States university and one with a visiting professor from a large midwestern land grant university. Of the student interviews, ten were with first year students, eight with second year students, one with a third year student and 15 with 4th year students. The reason that only one student from the third year class was interviewed was that the researcher's visit coincided with the third year internship and consequently all the third year students were off-campus, with the majority of non-Costa Ricans out of the country. Three internship sites in Costa Rica were visited and informal discussions were conducted with interns and their host supervisors. In addition to the 59 "formal" interviews with students, faculty and administrators, the researcher had the opportunity to meet informally with a great many more during the two week visit and discuss related
issues in far greater depth, and in many cases candor, than in the actual interviews.

The selection of those to be interviewed was based on a number of factors. In the case of students, an effort was made to include students from all of the nationalities represented at EARTH. Due to circumstances beyond the control of the researcher, it was impossible to interview students representing three countries: Mexico, El Salvador and Bolivia. In addition, a significant number of women were included in the group interviewed, primarily because EARTH has identified the participation of women in the institution as critical. Nine female students were interviewed which represents 26 percent of all those interviewed, as opposed to approximately 16 percent of the student body. Aside from achieving national and gender diversity, the selection of individuals to be interviewed was based on including a diverse group in terms of overall satisfaction with the institution, academic performance, and degree of involvement in co-curricular activities.

Instruments

The primary instruments employed in this study were a search of relevant literature and interviews with respondents. With the exception of three interviews conducted with respondents whose native language was English, all the
interviews were conducted in Spanish. While a number of questions were developed for the interviews, they were only designed to "break the ice" and initiate a discussion (see Appendix A for sample questions). Frequently, many of the questions were not actually used. The researcher opted instead to follow-up on comments made by the respondents. This method of conducting interviews is consistent with the principles of naturalistic research which emphasize an understanding of the participant's view of a phenomena. In open-ended interviews, the respondent "...plays a stronger role in defining the content of the interview and direction of the study..." (Bogdan, 1982:136).

Procedures

This study involved a dynamic between two distinct sorts of research procedures. The first was based on a review of the literature relating to education in general and higher education in agriculture in particular, while the second involved developing a better understanding of learning about agriculture in the context of EARTH. This understanding was developed through an analysis of relevant documentation and in-depth interviews with EARTH students, faculty and administrators.

This research was approved by the Iowa State Human Subjects Review Committee (see Appendix D).
Data Analysis

In accordance with accepted methodologies of naturalistic research, data analysis began with data collection. Simultaneously analyzing data as it was collected allowed the researcher to make adjustments in the study as it proceeded. The researcher maintained a field log throughout the development of the research project, from the writing of the research proposal, through the end of the data analysis phase. The research log was particularly important for recording information gleaned through informal discussions.

The analysis of the interview recordings was carried out over several months. The audio tapes were repeatedly reviewed, and particularly relevant and revelatory comments made by respondents were transcribed. Data, in the form of quotations, summaries of comments, and insights arrived at by the researcher, were classified into broad subject areas, or "thinking units" (Ely, 1991). Some of these units for example, were called 'the balance between theory and practice', 'work experience program', 'internship', and 'student/faculty interaction'.

Following the division of data into categories, and the subsequent reduction of categories through the elimination of redundancy, overriding themes were identified. These themes are statements of meaning that run through the data and which tend to "highlight explicit or implied attitudes toward life,
behavior or understandings of a person, persons or culture" (Ely, 1991:150). Many of these themes were identical to the critical issues identified during the data collection phase. Examples of the themes that emerged were:

A generalized perception that EARTH is different from the norm in higher education, particularly with respect to developing professionals with both practical and analytical skills and experience.

The lack of faculty consensus on a learning paradigm that embodies the EARTH approach to education.

The importance of having students engage in strenuous field work as a means of inculcating humility and achieving an understanding of the reality of agriculture in the humid tropics.

A perception that a critical feature of the EARTH culture that differentiates the institution from others is the nature of student/faculty interactions. A sense that with growth, the dynamic may be changing.

The importance of inter-cultural experience in student's professional development. The ability to understand and get along with individuals from different cultural backgrounds.

Internship was an eye opening experience. While at first I felt completely lost and even scared, I learned I was good, and had a lot to contribute.

Work experience is not about learning the latest in microbiological taxonomy. Its about learning what commercial farming operations are all about from the bottom up. Its not "against" learning, its simply a different kind of learning. To the extent possible its not a simulation where students cultivate 10 square meters of cassava and then extrapolate out to a commercial scale planting, they are actually working a commercial scale planting.

Psychologically work experience is very important. In many countries, agronomists are office types, suit & tie folks who don't get out to the field and who, if they did, would have little idea what to do.
EARTH graduates should be able to do practical things with facility.

The major value of the enterprise projects is learning to deal with people problems. The technical problems encountered are formidable and important, but the problems that come first to people's minds in interviews, and the ones that really proved difficult to overcome were usually interpersonal problems within the groups.

The integration of theory and practice provides a sense of purpose, a sense of knowing why and for what reasons things are being done.

A big question: how to reconcile the philosophy of the school which stresses graduates going back to their "communities" and acting as change agents in some way, and the reality that perhaps the majority of students talk of going on for advanced degrees. What is the implication of this for the learn by doing emphasis at EARTH?

**Trustworthiness**

The literature regarding qualitative inquiry suggests that the standard criteria for determining the worth of research findings -- internal validity, external validity, reliability and objectivity -- are not appropriate to the naturalistic paradigm. Instead, credibility, dependability and confirmability are proposed as measures of trustworthiness (Lincoln, 1985). Recommended procedures for lending credibility to research findings include prolonged engagement, persistent observation, triangulation and peer debriefing (Lincoln, 1985).

In this study, the researcher was thoroughly familiar with the research site, having been associated with EARTH
since its inception. To the extent that prolonged engagement serves to limit misinterpretation, build trust, and understand the "culture", it would seem that the necessary conditions were satisfied.

Just as the researchers long term relationship with the institution meets the conditions of prolonged engagement, it implies the opportunity for persistent observation as well. (It should be noted that there are dangers in both prolonged engagement and persistent observation which are discussed in the following section regarding limitations).

While triangulation can mean many different things, in the context of this study it refers to the use of multiple sources (respondents) and different kinds of sources. Not only did different individuals provide information, but similar information was solicited from different classes of respondents, i.e faculty, students and administrators.

Peer debriefing is an important means of enhancing the credibility of research findings. It involves the investigator discussing the research with a knowledgeable peer, exploring aspects of the inquiry that might otherwise remain implicit in the researchers mind, exposing biases, and helping the investigator become more aware of personal values and how they might effect the research (Lincoln, 1985).

The researcher had the opportunity to engage in intensive debriefing while engaged in the interview process at EARTH
with two members of the faculty who share an interest in the areas addressed in this research. This opportunity proved extremely useful in clarifying issues and, most importantly, in providing alternative perspectives and interpretations.

Limitations

A limitation inherent in the design of this study was that it was restricted to the case of one particular institution of higher education in agriculture with its own history, constraints, potentialities and institutional culture and identity. As such, the description, discussion, conclusions and recommendations are not intended to be generalized to other situations. Nevertheless, it is hoped that the discussions regarding the philosophy and practice of agricultural higher education provide a context for placing the study within the larger sphere of agricultural education.

A second limitation of the study is that the investigator was unable to return to EARTH for an extended stay during the data analysis phase. This would have provided opportunities to pursue lines of inquiry which emerged once the researcher had departed Costa Rica. While doing so was not crucial to the study, it would have enhanced the richness of the discussion.

Both persistent observation and prolonged engagement have pitfalls. The most obvious is a tendency to identify too closely with the subject under study and lose a degree of
professional judgement. In the case of the present study, this is a particularly relevant concern due to the author's close association with the institution over time. This limitation was partially overcome by the investigators' two year leave of absence, which provided distance and a greater perspective on EARTH. An awareness of the risks involved is another means frequently cited as a way to avoid the limitations of persistent observation and engagement (Lincoln, 1985). A degree of skepticism regarding the phenomena under study is another measure often recommended, and in this case adopted by the investigator, to ameliorate the potential risks of close identification with the object of study.
CHAPTER V

EARTH - DEVELOPMENT AND PHILOSOPHY

The present chapter presents an abbreviated history of the development of EARTH based on a review of available documentation and the author's involvement in the events described. It proceeds with a brief analysis of EARTH's approach and philosophy to higher education in agriculture as stated in the colleges' mission statements and other documents. The second part of the chapter relates the results of interviews conducted at EARTH in October, 1993. Analysis of the interviews resulted in the identification of common themes which are presented, in addition to which selected excerpts of the interviews have been included.

History

The Agricultural College of the Humid Tropical Region -- in Spanish the Escuela de Agricultura de la Región Tropical Húmeda (EARTH) -- was inaugurated March 26, 1990. The creation of the school was the result of a collaborative effort between representatives of agriculture, education, and government within Costa Rica, the United States Agency for International Development (USAID), and the W.K. Kellogg Foundation.

A number of factors can be cited which together made the establishment of EARTH possible. One of the more important was the turmoil in Central America (most notably in Nicaragua and
El Salvador but also including Panamá), and the importance to U.S. foreign policy of a stable and firm ally in Costa Rica. The most visible manifestation of U.S. presence in Costa Rica during this period was the activities of the United States Agency for International Development (USAID). Other factors important in the creation of EARTH included the emergence in the 1980s of private higher education in Costa Rica; an increasing emphasis, in Costa Rica as well as in other Latin American nations, on the private sector as the engine of development, the support of key individuals in the Monge government (1982-6) for the creation of the school, the presence of an AID Director with close ties to many of these same individuals, and finally, a growing sense among many educators, policy makers, and others that new approaches were necessary to address agricultural, rural development and environmental problems.

The perceived threat to U.S. interests represented by the Sandinista revolution in Nicaragua, the insurgency in El Salvador and the increasing tensions between the Reagan administration and the government of Manuel Noriega in Panama, resulted in a tremendous increase in the level of bilateral assistance from the United States to Costa Rica in the mid-1980s. Reflecting the perceived importance of Costa Rican stability to United States policy in Central America, the USAID/Costa Rica mission grew to a size out of proportion to
the country's size or relative development needs. One of the principle means by which the U.S. sought to strengthen the Costa Rican economy and enhance bilateral ties was through economic stabilization assistance. Considerable financial resources were provided for balance of payments support. The economic crisis which began in the 1970s throughout Latin America had, by the early 1980s, begun to seriously challenge the development model Costa Rica had followed since the 1948 civil war. Crippling foreign debt obligations resulting from unrestrained growth of the public sector, the failure of import substitution industrialization to substantially alter the traditional reliance on a relatively small number of agricultural exports, and downturns in the global economy, taken together caused a reevaluation of the role of the State in national development (Fallas, 1982; Gonzalez-Vega, 1984). Strategies for structural adjustment and a new emphasis on the role of the private sector were important results of this reevaluation.

A primary goal of structural adjustment is a reduction in public expenditures, an obvious result of which is a contraction in the public sector. As the process of structural adjustment began to be seriously debated in Costa Rica in the early 80s, it became clear that government would no longer be in a position to provide abundant employment opportunities (Fallas, 1982). In the case of Costa Rica, with a highly
centralized governmental structure which traditionally assumed responsibility for meeting many of society's needs, and which was heavily involved in promoting and conducting agricultural research and development, this represented a watershed change for agricultural graduates. The results of a 1983 survey indicated that fully 86% of recent graduates of the University of Costa Rica College of Agriculture were employed by a public entity, with the single largest employer being the Ministry of Agriculture (Anderson, 1983). As it became increasingly obvious that opportunities in the public sector would become scarcer, those involved with agriculture and higher education began to contemplate the preparation of graduates for careers in the private sector.

Thus structural adjustment, the contraction of the public sector, and privatization went hand in hand with an increasing skepticism regarding the role of the State in development. Conversely, there was widespread interest in the potential of the private sector to provide future growth and employment (Mas, 1983).

As privatization increasingly became the call of reformers throughout the 1980s, education was not excluded. In the ideology of the Costa Rican State which emerged from the 1948 civil war, higher education was seen as serving the needs of national development and was necessarily viewed as a public endeavor. Private universities were viewed as counter to the
democratic ethos of modern Costa Rican society and consequently were prohibited by law. Among a great many other reforms of the 1980s, the restrictions on the existence of private universities were removed, and a number of private institutions began to appear.

The 1980s also saw increasing interest, in Costa Rica as in many other parts of the world, in environmental issues, particularly deforestation and habitat destruction. During the 1970s the exploitation of many previously "untouched" areas of the country by farmers, loggers, ranchers, and others, particularly in the humid lowlands, had accelerated. By the 1980s both national and international calls were being heard for the conservation and protection of the humid tropical regions of the country. Agriculture, involving land clearing for grazing and crop production, as well as lumbering, was probably the activity most associated with environmental destruction in Costa Rica. It is also significant to the creation of EARTH that beginning in the mid-80s many international donors, including USAID, began including environmental protection components to their development programs.

Strong bilateral ties between Costa Rica and the United States, the economic crisis, increasing disillusionment in Costa Rica regarding the role of the state in development, the emergence of private higher education, and an increasing
emphasis on the environment thus set the stage for the creation of EARTH. The only things lacking were a group of sufficiently influential people to lobby for the creation of such an institution, and the required resources. The latter became available as a result of the heavy infusions of United States economic support funding that had been directed to Costa Rica during the early 80s. USAID and the Government of Costa Rica controlled a large pool of funds in local currency on deposit in the Costa Rican central bank. The utilization of these funds required the signing of cooperative agreements between USAID and the Government of Costa Rica, and because the funds constituted an important portion of the Central Banks reserves, the use of these funds was highly restricted. The establishment of endowments was seen as one way to protect the reserves of the Central Bank while providing long-term financial stability to development efforts.

A relatively small group of Costa Ricans, including Rodolfo Cortes (a prominent agri-businessman), Jorge Manuel Dengo (founder of the nation's public utility and vice-president in the Arias administration - 1986-1990), and Carlos Manuel Castillo (economist, Minister of Economy and candidate to the presidency in 1990), in coordination with the government of Luis Alberto Monge and USAID/Costa Rica under the leadership of the Mission Director Daniel Chaïj, formed the required group of influential leaders that initiated the
discussions leading to the creation of EARTH. The plan that emerged from these discussions was to dedicate a significant amount of local currency funds on deposit in the Central Bank to establish an endowment in benefit of a new agricultural college for the humid tropics.

It is beyond the scope of this study to investigate the motivations of those responsible for the establishment of EARTH. Nevertheless, over the course of his association with EARTH, the investigator has had considerable interaction with many of these individuals, and it seems apparent that what guided these individuals in their efforts to establish EARTH was a deep commitment to education and its ability to contribute to the solution of society's ills. At the same time, many shared a belief that the humid tropics, although historically perceived in Costa Rica as fit only for the cultivation of bananas, possessed great potential for agricultural and economic development. Some of them were also aware and concerned about environmental pressures being exerted on this fragile ecosystem by an expanding population and the use of agricultural technologies developed under very different climatic and soil conditions. For these individuals then, EARTH was a response to the challenge of developing the potential of the humid tropics. The school's mission was envisioned as preparing professionals capable of responsibly
managing both the agriculture and natural resources of the region.

As a preliminary step in the development of the project, the W.K. Kellogg Foundation was asked to finance a study to determine the advisability and feasibility of creating such a school. The Foundation agreed, and a study was undertaken by a three-person task force composed of Dr. Glenn Taggart, President Emeritus of Utah State University, Dr. Luis Carlos Gonzalez, then Dean of Agriculture at the University of Costa Rica, and Mr. Eduardo King Carr, an expert in agricultural education from the Universidad Federal Fluminense of Brazil. Based on conversations with educators, producers, industry representatives, development professionals and governmental leaders, the team recommended that a new school be created, with the objective to "develop appropriate cultivation and management techniques for the lowland humid tropics and to train the human resource base to develop and extend this knowledge" (EARTH, 1984). They went on to recommend that the school utilize a learning by doing approach to ensure that graduates possess not only technical knowledge in agriculture, but the practical experience and confidence gained through actual field experience.

The recommendations of the task force formed the basis for the project paper prepared by USAID/Costa Rica. The project paper was then forwarded to USAID/Washington for
consideration. An important step in the approval process was a review of the project by the Board for International Food and Agricultural Development (BIFAD), a policy advisory group to USAID. BIFAD approved the project in 1985, after which it was officially approved by USAID.

In addition to the large commitment of Costa Rican Colones to the project, USAID, through its Regional Office for Central America and Panama (ROCAP), financed the dollar grant portion of the project as part of a larger initiative to strengthen regional initiatives in higher education. In addition to providing approximately $26 million in USAID grant funds to finance construction costs and initial operating expenses for EARTH, the project also included funds for strengthening CATIE (Centro de Agricultura Tropical de Enseñanza e Investigación) in Turrialba, Costa Rica and the PanAmerican Agriculture School (Zamorano) in Honduras. Combined with the local currency funds contained in the proposed endowment in the Central Bank, this $26 million raised the USAID commitment to approximately $115 million for the establishment of the school.

Despite the use of public funds to establish the new agricultural school and its location in Costa Rica, the school was to be a private, international institution governed by an international Board of Directors and Trustees. In order to be recognized as an international institution, and receive the
corresponding fiscal exemptions, it was necessary for the Government of Costa Rica to enact special legislation recognizing the school and providing it international status. As the plans for the school became public, opposition was encountered, particularly among members of the university community. The opposition centered around three principal issues. First was a concern regarding the establishment of private institutions of higher education. As mentioned above, until the early 1980's, such institutions were not permitted by Costa Rican law. Secondly was a concern about the role of the U.S. government, through USAID, in the creation of the school. This was a period of rising tensions in Central America, and many people, particularly within the universities, were highly suspicious of U.S. motives. Finally, there was concern on the part of professional agriculturalists and students in higher education in agriculture about the potential competition for increasingly scarce employment opportunities that graduates of a new institution would provide. Among other actions, a protest march was staged from the main campus of the University of Costa Rica to the national legislature that received considerable coverage in the national media.

While causing considerable delays, those opposed to the establishment of the new school were ultimately unsuccessful. In October of 1986 the National Assembly passed the enabling
legislation for the creation of EARTH. After the passage of the legislation, USAID contracted California Polytechnic State University (Cal Poly - San Luis Obispo), Rutgers University and the University of Nebraska, with Cal Poly as the lead institution, to provide technical assistance in the development of the new school. Cal Poly was selected largely based on its reputation as a teaching institution and its familiarity with learning by doing in agricultural education. The assistance to be provided included all areas in the development of the school, including the initial design of the academic program, the specifications for the design of the physical plant, staffing, recommendations for the formation of the Board of Directors and the selection of the school site.

The law creating EARTH specified that the school be governed by a Board of Directors, while the assets of the institution would be managed by a Board of Trustees. The original Board of Trustees consisted of five members: Dr. Norman Brown, President of the Board and President of the W.K. Kellogg Foundation; Mr. Rodolfo Cortes, representing the Board of Directors and President of a coffee company in Costa Rica; Dr. Max Lennon, President of Clemson University; Dr. Robert Carbonnel, President of Del Monte Inc.; Mr. Randal Teague of Vorys, Sater, Seymour and Pease, a Washington D.C. law firm. The law specified that the original Board of Directors would consist of 12 members, four of whom were to be Costa Rican
representing the agri-business, educational and governmental sectors. The original members were: Mr. Rodolfo Cortes (Costa Rica), President; Mr. Salvador Alemany (Puerto Rico), Vice-President, Ing. Guillermo Malavassi (Costa Rica), Secretary; Ing. Isabel Abreu (Dominican Republic); Eduardo King Carr (Brazil); Ing. Jorge Manuel Dengo (Costa Rica); Mr. Luis Alberto Monge (Costa Rica); Dr. Glenn Taggart (USA); Dr. Robert Carbonnel (USA); Mr. David Fledderjohn (Guatemala/USA); and Ing. Jose Elias Sanchez (Honduras).

A 3,000 hectare farm located in the lowland Atlantic region was chosen as the site for the school, about 80 kilometers from both San José, the capital, and Puerto Limón. The farm was chosen for its location in the humid tropics, good access to the new highway linking San José and Limón, and its diversified agriculture, including 300 hectares of bananas in commercial production, extensive pastures for beef cattle production and approximately 300 hectares of humid tropical forest reserve. A site at the very center of the property was selected for the construction of the campus which included classrooms, laboratories, faculty offices, library, administrative offices, student dormitories, academic farm installations and a large faculty housing area.

The design of the campus was based on educational and environmental criteria. Reflecting the learning-by-doing nature of the curriculum and the desire for maximum
faculty/student interaction, each classroom was designed to include an outdoor area to permit the extensive use of demonstrations and hands-on activities. To encourage close faculty/student interaction, classrooms were designed for a maximum of 25 students, with sufficient space to allow for dividing up classes for small group interaction. Faculty offices were oriented on open corridors to enable students to visually ascertain if a faculty member was in his or her office and ensure that students would not be required to pass through the vigilance of a secretary to speak with a teacher. Buildings were designed and situated in such a manner to maximize ventilation and minimize the use of air conditioning.

Evolution of the Curriculum

In the report financed by the Kellogg Foundation, as well as in USAID documents relating to the creation of EARTH, the need for agricultural professionals possessing technical knowledge and practical experience was emphasized. The initial planning documents called for the creation of a relatively small institution of approximately 400 students, including both males and females, with a student to faculty ratio of approximately 10:1. The student body was to be selected from all Central American countries possessing humid tropical regions (Guatemala, Belice, Honduras, Nicaragua, Costa Rica and Panamá), although this was later expanded to include the
humid tropics of all of the Americas, and the students were all to live on campus.

Beyond the focus on agriculture and natural resource management utilizing a learning-by-doing approach, however, little else was specified about the academic program in the original planning documents. Under the leadership of Dr. Richard Merritt of Rutgers, representatives of Cal Poly, Nebraska and Rutgers developed a draft curriculum plan. The plan stressed the integration of hands-on, learn-by-doing experiences with a thorough knowledge and understanding of the principles that underlie practice in the preparation of a generalist in agriculture and natural resource management. An important influence on the curriculum that resulted from this effort was Dr. Merritt's work as Director of the National Agricultural and Natural Resources Curriculum Project jointly sponsored by the U.S. Department of Agriculture, the educational community and the food and agriculture industry. As reported by Wilson, this project identified six long-term priority areas for curriculum development, including "...systems analysis in food, agriculture and natural resources; problem solving; ethics and public policy; social and cultural aspects of domestic and international agriculture; energy use in food and agriculture; and integrated reproduction management" (Wilson, 1990:vi). Other important concerns addressed in EARTH's curriculum development
effort included the development of a strong entrepreneurial outlook in the graduates, as well as a commitment to applying their knowledge and practical skills for the well-being of their communities.

Reflecting the emphasis on systems analysis, subject area or discipline specific introductory courses (biology, chemistry and botany for example) were not included. Instead, propositional knowledge, particularly relating to the biological and physical sciences, were included in courses such as *Tropical Crops Production, Principles and Practice* and *Tropical Animal Agriculture*. In the tropical crops course, basic plant anatomy, taxonomy and physiology would be presented within the context of study of the principal crops of the tropics. The learning objectives for such a course are fundamentally different from those found in a more conventional curriculum structured so that a system — crop production for example — is reduced to its constituent parts. A student's study is then focused on the parts in isolation, with the expectation that the student will later integrate the parts and arrive at an understanding of the system. This approach has proven quite successful in the past in the training of professionals for scientific agricultural research, precisely because it mirrors the positivist/reductionist approach to inquiry (Busch, 1989). Like the conventional approach to teaching and learning about
agriculture, the scientific method dictates that systems be studied by reducing them to their smallest units and holding variables constant. The reductionist approach, in the context of education and research is a powerful tool for understanding the parts of systems, yet it does not necessarily equip professionals for managing the dynamism and complexity of systems that derive from more than an understanding of its parts (Wilson, 1990; Bawden, 1986).

The emphasis in EARTH's academic program was placed on preparing a professional capable of responsibly managing agricultural production and natural resources, and the proposed curriculum focused on the agricultural production system as a whole. Within this framework, instruction in the foundations of the natural and physical sciences was to be provided, as it was recognized that reductionism is one among many appropriate tools in confronting the complexity of production systems. The overall focus of the curriculum, however, emphasized a more systemic approach, and encouraged students to apply methods of inquiry emphasizing the social and environmental dimensions of the production system.

Three courses in particular included in the original curriculum proposed by the group led by Dr. Merritt reflected the focus on systems analysis. The first, Food, Agriculture and Natural Resources of the Humid Tropics, mentioned above, was designed to introduce students to the physical and
socioeconomic characteristics of the humid tropics, as well as the use of alternative approaches to inquiry. Students would be encouraged to confront and analyze complex issues in the humid tropics, all the while attempting to recognize and reconcile social, environmental and other "soft" considerations, with the scientific, technological and related "hard" aspects (Merritt, 1987; Bawden 1986).

The second course, titled Physical and Chemical Processes, was designed to explore inorganic, organic and biochemical processes and enhance student's understanding of fertilizers, pesticides, herbicides and controlling chemical processes. The study of the relationship of such physical concepts as light, mechanics, mass and velocity to agriculture were also included. The third course which exemplified the curricular focus on systems was Respiration, Nutrition and Transport. Scheduled for the third year, this course was to focus on the comparative anatomy of plants and animals, the biochemical and physiological function of nutrients in life processes, and the classification and utilization of feeds.

Based on a widely shared perception that the majority of graduates of higher education in agriculture are seriously deficient in written and oral communication skills (Northeast Higher Education Committee, 1982; Love, 1989; Mawby, 1985), the EARTH curriculum strongly emphasized the building of effective communication skills. The first six trimesters
contained a series of courses in Spanish and English communication, the communication process, the role of communication in agriculture, and oral communication skills including presentations, conducting meetings, interviews and effectively utilizing media.

Reflecting the recommendations expressed by the drafters of the original Task Force report, learning-by-doing and the development of an entrepreneurial spirit were heavily emphasized in the curriculum. A supervised work experience component, involving a sequential program of activities designed to provide hands-on opportunities to explore and experience the responsibilities of persons engaged in humid tropical agriculture was included throughout the 4-year plan of study. A student enterprise project experience was also proposed that called for small groups of students to plan, organize, implement and market — under the supervision of a member of the faculty — cropping, livestock or other agricultural production projects. Finally, the third trimester of the third year of study was dedicated to an off-campus internship in a setting compatible with the career goals of the student, and in harmony with the objectives of the College.

In 1989, the draft curriculum proposed by the support universities was approved by the Board of Directors of EARTH. Beginning late the same year, a small group, consisting of the
"chief of party" and part-time consultants from the support universities and newly hired EARTH faculty and administrators, began the task of developing actual courses from the short one, or two paragraph course descriptions developed by the original curriculum team. In March 1990, actual implementation of the curriculum began with the first group of students: 52 men and 8 women, representing Costa Rica, Panama, Guatemala, Honduras, Nicaragua, Belize, the Dominican Republic and Ecuador. As the faculty began to forge an independent identity, it became clear that most members of the faculty were very much in agreement and quite comfortable with the institutional emphasis on learning-by-doing, the importance of developing an entrepreneurial spirit in students, the notion of horizontal integration among courses, the critical need for communication skills, and the focus on graduating a generalist in tropical agriculture. Very few, however, had any understanding of either the theory or method of system analysis in undergraduate agricultural education. Even more importantly, since almost all those involved in administering and teaching the curriculum were new to the institution and had not been involved in the development of the curriculum, a sense of ownership of the plan of study was lacking. As a result, before the first year was completed, the faculty decided to undertake a review and revision of the curriculum.

Among the tasks identified in this process were:
A review of the mission, purpose, and objectives of the institution as articulated by the Board of Directors, and the identification of criteria and principles which should guide the curriculum development process (for example an emphasis on learning-by-doing, focus on the humid tropics, and the responsible management of natural resources.)

The development of an "exit profile" of EARTH graduates defining those skills, areas of knowledge and attitudes which graduates should possess.

The development of a strategy to cope with differences in the academic preparation and extent of students' backgrounds in agriculture. Based on experience with the first class, there was considerable concern regarding the lack of adequate quantitative skills and background in natural sciences, chemistry and physics.

The inclusion of humanities, social sciences, and ethics in the curriculum. There was also a desire to strengthen co-curricular activities (clubs, participation in cultural activities in San Jose).

A determination of the time a student must dedicate to satisfactorily meet the requirements and complete course work and field activities.

The resulting process, while arduous for a faculty actively engaged in building a new institution, proved instrumental in developing teamwork among the faculty, as well as in instilling a sense of ownership of the revised curriculum. The revised plan presented to and approved by the Board of Directors differed from the original plan in a number of respects:

A more logical sequencing of courses in the area of animal production.

A modular approach to the quantitative skills course during the first trimester as a means of providing remedial instruction, and the inclusion of
additional courses in quantitative skills (calculus).

The inclusion of an introductory course in the natural sciences.

The elimination of areas of emphasis in the fourth year and the addition of electives.

The replacement during the fourth year of the work experience course with experience in research -- an opportunity for students to participate in on-going research activities or, with a faculty member, initiate new research projects.

The inclusion of additional discipline specific courses, including statistics, soils, post-harvest technology and marketing.

Many of the changes can be attributed to the deficiencies of many students, particularly those from rural areas, in mathematics and the sciences. More significant to this study is that many of the changes proposed by the faculty served to weaken the focus of the curriculum on systems analysis and increased the emphasis on technical subject matter. This change highlights a difference in approach to education between many of the EARTH faculty and that advocated by the National Agriculture and Natural Resources Curriculum Project. While the latter focused on systems analysis, critical thinking, and the cultural and social aspects of agriculture, the former tended to place more emphasis on transmitting technical subject matter knowledge. Second, because there was little coordination between those involved in the original curriculum development effort and those involved in its implementation, the majority of the new faculty did not
understand the theoretical rationale for the "soft" focus of the curriculum, nor had they any experience in working with such a curriculum. Perhaps most importantly, the shift toward problem solving, critical thinking and alternative inquiry methods in education is an enormously difficult task. Most students, faculty and administrators are very comfortable with the transmission of knowledge model of learning, and traditionally one of the most important measures of success of an institution is based on the extent of students' propositional knowledge.

The curriculum that resulted (see Appendix B) from the 1990 faculty review process could be characterized as highly experiential, with evidence of both a systems approach and a more conventional transmission of knowledge model.

A September 1993 modification of the Costa Rican law creating EARTH, expanded the power of the University to award academic and professional degrees. As a consequence, the decision was made to award a Licenciatura degree rather than a Bachiller (B.S.) degree as originally specified in the law. With the licenciatura degree, graduates will be recognized as Ingenieros Agronomos (usually translated as agricultural engineers but signifying professional agriculturalists and not limited, as the translation implies, to the engineering aspects of agriculture). The licenciatura is the degree more commonly recognized in Latin America, generally requiring the
preparation of a thesis. It would generally be considered more prestigious than a B.S. degree.

While the change occasioned only relatively minor modifications of the curriculum, one is struck by the impact of the change in terms of the academic atmosphere of the institution. In interviewing faculty, the investigator was told by several individuals that they perceived a palpable shift in emphasis from teaching to research as a result of the change in degree. This issue will be returned to in the following chapter.

**Description of Experiential Learning at EARTH**

Experiential learning strategies have been identified as offering promise in redressing the dichotomy between theory and practice and exposing students to the dynamic and complex world of agriculture and rural development. The following section describes the three programs or courses in the curriculum which are most readily identified as experiential: work experience, enterprise projects and the third year internship. While the focus here is placed on these three courses, it should be stressed that the EARTH faculty are strongly encouraged, and that many do strive, to infuse experiential learning strategies throughout the curriculum. In internal documents, these strategies have been described as learning-by-doing, and encouraging student involvement through
the application of "newly acquired skills or knowledge to the solution of problems which have relevance and meaning to that individual" (Wilson, 1992:2).

EARTH's work experience program has undergone significant transformations since its inception. Initially, the program called for students to rotate among a dozen or more work stations on the campus and the university farm, spending a relatively short period of time, perhaps two to three weeks, at each station. Each student was to work at their assigned station from 6 a.m. to 11:00 a.m. on Wednesdays and Saturdays, for a total of 10 hours per week. The stations included grounds maintenance, crops, animal and forestry units on the college farm, construction, instructional support (library, computer center, administrative offices), and maintenance and service (cafeteria, warehouse, farm shop, laundry, etc.). During a student's first two years, the activities were to be largely exploratory, general and less technical in nature. During the two trimesters on campus in the third year, the experiences were to be more focused and geared to a student's specific career goals.

During the first year it became evident that the work experience program required major revisions. Students complained of a lack of relevance of many of the activities to what they were doing in other classes and the large number of work stations resulted in severe logistical problems and
extreme faculty workloads. As a result of a number of revisions over the first three years of the program, the number of work stations has been reduced and the focus of the program have been narrowed to strictly agricultural activities during the first two years. As presently organized, there are four modules (the new term for work stations) the first year:

1. Maintenance of annual crops
2. Maintenance of perennial crops
3. Forestry
4. Cattle production

The second year includes six modules:

1. Banana production
2. Spices and medicinal plants
3. Natural resource management
4. Mechanization
5. Pest management
6. Animal production.

The first and second year modules emphasize the application of relatively basic skills in humid tropical agriculture. In the maintenance of annual crops module for example, students might spend two weeks training yams on trellises, while those in maintenance of perennial crops spend an equivalent time filling nursery bags for planting cacao. Work experience differs from other courses in that the focus is on student participation in the routine activities of crop, animal and forestry production. To the extent possible, the experience is equivalent to that encountered in a commercial operation, and students are expected to carry out tasks as they would as an employee of such an enterprise. This has
proven difficult for some to appreciate. Faculty in particular have difficulty in accepting this objective of work experience and often attempt to transform the course into an extension of their laboratories. A one-hour weekly discussion period is scheduled as part of the course. This discussion is designed to provide students the opportunity to discuss and evaluate the weeks activities, suggest alternative means of accomplishing tasks, and explore topics of interest related to the module. In practice these discussions often do not take place as students are simply too tired from field work and coordinators do not insist on attendance.

In the curriculum review process described earlier, it was agreed that students needed more "people skills" and experience in actual community situations. The faculty felt that the curriculum lacked opportunities for students to come into contact with small producers and local communities, to gain experience in directing personnel and for gaining job seeking skills. Modules designed to provide such skills were therefore included in the third year. The four modules which were developed were:

1. Community work
2. Professional experience
3. Experience with farmers
4. Personnel management

In the first module, a neighboring small community is selected and students identify the principle problems confronting the community, the existing systems of community
organization, and projects which the inhabitants of the
community would like to develop. The students, together with
members of the community, plan, organize, and execute projects
for the benefit of the community. The communities selected are
relatively impoverished, with many of the inhabitants
beneficiaries of land reform programs. Examples of the
projects in which the students have participated include
school gardens, organizing youth sports activities, and
providing agricultural oriented short courses. The general
objectives for the module are that students acquire experience
and develop skills in community development, and actively
participate in educational programs with producers,
housewives, young adults and children.

Students in the professional experience module are
expected to identify two or three sites within the campus that
correspond in some way with their career goals. The student is
then responsible for contacting the supervisors of those
campus operations, requesting an interview and soliciting
"employment". If a supervisor agrees, they together develop a
work plan and the student has the responsibility for carrying
it out. In this module, students have worked for the
commercial banana operation, the commercial beef cattle
operation, in forestry, in academic units (library and
computer center), and in other farm and service operations.
The principle objective of the module is for students to gain
job seeking skills and experience in a position related to their individual career goals.

In the experience with farmers module, individual students are paired with local small farmers. During the scheduled 10 hours of work experience each week, the student works alongside the farmer in whatever the day's activities might be. The principal objective of the class is for students to gain skills in communicating with small farmers and learn more about small farm operations. While this module is seen as being particularly valuable for students from non-farm families, those with farm backgrounds indicate strong support for the module as a means of participating in the daily life of a farm which is perhaps quite different from what they are accustomed to.

Since it is likely that the majority of EARTH graduates will find themselves in supervisory positions at some point in their professional lives, a module in personnel management was developed. In this module, students supervise first and second year work experience modules. The students are responsible for working with the module coordinators in implementing the objectives established for the modules. As supervisors, they direct and organize the field work of the module, assist in resolving interpersonal or other problems which arise in the course of the module, participate in evaluating the performance of the students in the module, and take
responsibility for leading discussions and analyzing, together with the students in the module, the problems encountered during the course of the module.

Overall responsibility for the work experience course rests with a faculty coordinator. Each module has a coordinator as well, while actual supervision is often the responsibility of a staff member or a third year student.

In the fourth year, the objective of the work experience course shifts to providing students an opportunity to gain hands-on experience in research. The syllabus for Experience in Research describes the course as developing skills in the planning and execution of field work in different branches of applied agricultural research. Students work in groups defining a research problem, developing a research proposal and research protocol, carrying out the research and preparing a research report. In its present state, the requirements involved in this course are similar to those for the completion of a thesis in conventional agricultural programs throughout Latin America. Two significant differences, at least in theory, are that at EARTH most students carry out research projects in groups and, unlike the thesis project at many universities, the emphasis is placed on the utilization of research skills and abilities in solving the problems of the inhabitants of the humid tropics, rather than the production of a "scientific", academic thesis.
Involvement in Student Enterprise Projects (in Spanish, Proyectos Empresariales Estudiantiles) provides students an opportunity to carry out an entire production project from beginning to end. Starting the first trimester of the first year, students form small "companies" of 4-6 students, select a project (crop or animal production), conduct pre-feasibility and feasibility studies, seek approval for a loan from a committee composed of students, faculty and a local producer or expert, carry out the project and market the product. After canceling their loan with the school (plus interest), students receive 75% of the net return, with the school retaining 25% to compensate for those projects which lose money. Students may choose to continue with the same group throughout the four years of the program, or form a different group for succeeding projects. During the first three years, the majority of the projects have involved crop production, largely of export crops, nevertheless, animal production projects are now becoming more common.

The primary objective of the enterprise projects is for students to gain hands-on experience in planning and executing commercial production projects. In theory, the enterprise projects is seen as instilling an entrepreneurial spirit in students while providing many their first experience in market agriculture. The projects are also an opportunity for students to experience the challenges of working in groups.
The third year internship is the third "course" which exemplifies EARTH's experiential approach. The internship is required for all students and takes place during the third trimester. The majority (87% of 1993 graduates, 76% of members of the class of 1994) do their internship in their home country, with a smaller number opting for placement in second countries (Brown, 1994). Most internship placements have been with commercial agricultural enterprises, either individual farms, cooperatives, corporate producers or agricultural services firms, although a significant number have been with research institutions, agricultural and community development foundations, and other non-profit organizations. Of the forty-four 1993 placements, 31 were with commercial enterprises and 14 were with non-commercial entities.

As a part of the internship experience, each student is expected to undertake a community study, similar to a "rapid rural appraisal", as a means of enhancing their understanding of the area in which they are working. They are also required to develop some sort of community development activity, the selection of which should ideally be determined between the intern, the host and community members. Examples of particularly successful projects have included recycling centers, organic gardens, and pesticide safety workshops.
Institutional Culture and Climate

Peterson has described an institution's culture as the "deeply shared values, assumptions, beliefs, or ideologies of members" and climate as the "common member perception of attitudes toward and feelings about organizational life" (Peterson, 1990:7). Institutional culture "serves to emphasize an organization's unique or distinctive character" (Peterson, 1990:6), while climate is more concerned with current perceptions and attitudes. Institutional culture and climate are essential elements in providing members an understanding of the purpose or meaning of their organization.

As an international institution, EARTH is highly diverse. In addition to the many nationalities represented, there is a great deal of diversity in terms of socio-economic status. Yet, the institutional focus on the humid tropics and the commitment to a learn-by-doing approach to learning does provide a distinctive character and degree of cohesion. After extensive interviews with students, faculty and others, it is the researchers impression that, perhaps quite naturally, a degree of this cohesion is being sacrificed with the growth of the institution. As additional faculty are hired and the student body increases to 400, it seems inevitable that EARTH's mission will begin to be interpreted in new and different ways. Faculty and students increasingly will have different opinions about the relative importance of acquiring
technical/scientific knowledge, attitudinal change, and hands-on experience in production, natural resource management and rural development. In the same vein, while many references are made to the sustainable development of the humid tropics, it is increasingly clear that a shared vision is lacking regarding what constitutes sustainable systems for the humid tropics, and indeed the extent to which the humid tropics should be used or preserved. This issue will be returned to in the final chapter.

If there are doubts about the extent to which students and faculty share values and beliefs, the same cannot be said with respect to attitudes towards the institution. The challenges of establishing a new institution have created an almost palpable institutional spirit and pride. Upon returning to EARTH after a 15 month absence, the investigator was struck by the degree to which faculty and students discuss the institution in proprietary terms. The sense of ownership and identification with the school is practically universal and probably best exemplifies the institutional climate.

Faculty Culture

While members of the faculty come from very dissimilar educational and cultural backgrounds, most were attracted to EARTH by a shared commitment to learning by doing, working closely with students, both in the classroom and the field,
and a desire to participate in a new, innovative, and evolving educational program. As primarily a teaching institution, EARTH has tended to attract faculty who place a higher personal priority on teaching than research. There is increasingly, however, a desire on the part of many faculty to engage in applied research projects with students. The new emphasis on student participation in research is partially attributable to curricular changes resulting from the decision to award a *licenciatura*, rather than a B.S. degree. More importantly, student involvement in research is seen by many faculty members as a means of improving student's problem solving skills.

The organizational structure of EARTH's academic program reflects a commitment to disciplinary integration. Departmental forms of organization have been avoided, and while alternative structures have been implemented, what eventually might prove to be the most suitable organizational structure remains an open question. During the initial three years, while the faculty was still fairly small (beginning with 8, and growing to about 25), the entire faculty met together under the leadership of the Academic Director. While committees were formed to study issues requiring additional consideration (for example the development of a course evaluation instrument or grading policies), the majority of discussions involved the entire faculty. The focus of faculty
meetings was divided between routine logistical and communication issues (materials procurement, transportation and scheduling concerns), academic issues (review of course syllabi, integration between courses, curriculum modifications) and an effort to track the progress of students, especially the identification of those students experiencing academic or other difficulties.

As the number of faculty increased to approach the full complement of 40, it became increasingly unwieldy to meet as a single group. A decision was made to organize the principle faculty meetings according to instructional levels, with those teaching courses to the first, second, third, and fourth year students meeting separately under the leadership of a Coordinator. The Coordinators of each level then meet on a weekly basis with the Academic Director to discuss issues of mutual concern and to relate what had emerged in their individual groups. In addition, a number of standing committees were organized to support the distinct activities of the academic program, including the library, student affairs, admissions, the continuing education (outreach) program, the academic farm, the computation center, etc.

Finally, provisions were made for the entire faculty to meet together once a month to discuss issues of common concern.

Other important factors in the decision of many faculty members to teach at EARTH were the salaries and the level of
resources available for teaching. While faculty at many institutions of higher education in Latin America must take on additional employment to augment meager salaries, work in deteriorating physical facilities and lack access to even the most rudimentary teaching aids, faculty at EARTH receive salaries comparable to junior faculty at U.S. universities and colleges, work and teach in modern and well-equipped facilities, and are encouraged to take advantage of faculty development opportunities.

An important feature of the contractual relationship between faculty and the institution is that faculty are hired for two year contracts with no provision for tenure. While this arrangement seems to be satisfactory to the majority of faculty, there are those who expressed misgivings and believe that open dialogue, particularly between the faculty and administration, is hampered by a lack of job security.

Student Culture

A growing student population has resulted in an increase in diversity. Not only are more countries represented, but students increasingly come from diverse social and economic backgrounds, with widely different degrees of academic preparation and levels of experience in agriculture. Motivations for studying at EARTH increasingly vary as well. When queried, the majority responded that they chose EARTH for
its focus on agriculture and for the wide range of experiential learning opportunities offered. Others indicated they chose EARTH based on the institutional commitment to the sustainable development and conservation of the resources of the humid tropics. Other reasons given included a desire to study in another country, the opportunity to study alongside students from different countries, the perception that an EARTH degree will provide graduates with a high degree of prestige, and for many students, the availability of a scholarship to study at EARTH.

In spite of the diversity of backgrounds and the possibility of defining distinct subcultures within the student population, as has been done at numerous North American universities (Kuh, 1990), the most notable characteristic of the student body is its closeness and solidarity. While this phenomena shows signs of weakening as the institution grows, the newness of the school, the school's unique focus on humid tropical agriculture, the relatively small student body, the fact that all students reside on campus, and the rigorous regime of study and field work, have served to stimulate the development of a strong group identity among students.

The degree of solidarity is clearly evident when a student is in danger of leaving the institution for failing a course. Because students move through the curriculum en masse,
there are no provisions made for repeating a course. Consequently, a student must abandon EARTH for a year if a course is failed. Provisions are made for a recuperation exam, usually taking place one week after the final exam, in which a student is given a second chance to pass. Commonly, a group of students will meet with the teacher of the course or the Academic Director to exert pressure to change the failing grade or seek other recourse to avoid the student's leaving. It is quite common for peers of a failing student to provide tutoring and exert intense pressure on the student to pass the course. Another example of the high degree of student solidarity were the efforts of the first class of graduating students to ensure the presence of every graduating students' parents at EARTH for the graduation ceremony. The majority of the EARTH student's families could not afford to pay even a portion of the travel costs to attend, so it was necessary for the students to raise the money through a variety of fund raising schemes. Students from Costa Rica and those from other countries whose families could afford to travel contributed equally to the successful campaign to raise the thousands of dollars required to finance parental travel.

One feature of the institutional culture that is of great importance, judging by the sheer number of comments one hears, is the relationship between faculty and students. The low student/faculty ratio, an architectural design favoring close
and constant interaction, having students and the majority of the faculty living on campus far from population centers, essentially obligates students and faculty to develop close relationships.

Most faculty indicate that a very significant amount of their time is devoted to one-on-one contact with students. Such contact is by no means limited to class consultations or related projects. Depending on the individual faculty member, a great deal of time is devoted to advising and counseling of students. Many professors report that they fill the role of substitute parents for some students who have left their families for the first time. On the academic level, while the quality of the interaction between teacher and students is similar to what might be expected at the undergraduate level, the quantity of the interaction is what distinguishes EARTH. Almost without exception, faculty say their relationships with students at EARTH are a great deal more intense than had been the case in previous teaching positions.

**EARTH's Stated Mission and Approach to Learning**

To better understand EARTH's programs and approach to learning, it is necessary to examine the philosophical stance of the institution as articulated in various documents and as perceived by participants. It is also useful to locate the philosophy of the school within the larger framework of
educational philosophy, and the philosophy of agricultural education in particular.

EARTH has formulated statements of institutional mission which, to a certain extent, articulate a philosophical framework. The most recent statement of mission was developed in 1994. It begins by stating that EARTH is a private, not-for-profit international university, dedicated to education in the agricultural sciences and natural resources as a means of contributing to the sustainable development of the humid tropic region. It goes on to state that the mission is to:

Be a leading university in education, committed to the formation of professionals in the vanguard, with ethical and human values, possessing an environmental and social conscience, as well as an entrepreneurial mentality.

Generate knowledge in a critical and innovative spirit.

Facilitate training, community development and the interchange of relevant information (EARTH, 1994:1, translated by investigator).

While this statement contains very important elements and defines in general terms the University mission, it is perhaps not as useful in understanding the institutional philosophy. It is worthwhile to underscore the following: (1) the notion of contributing to the development of the humid tropic region, (2) the dedication to education in agricultural sciences and natural resources, (3) the emphasis on the formation of values
(ethical and human) and social and environmental consciousness, (4) the development of an entrepreneurial mentality, (5) the concept of generating knowledge and (6) the dedication to activities outside the university, namely training, community development and information exchange.

The next section of the mission statement, entitled Valores y Principios Guias de EARTH (EARTH Guiding Values and Principles), states that in order to accomplish its mission, certain principles define the institutional culture. The most basic is that "Human beings are the center of our efforts". Deriving from this premise are others, including the following:

The services and products of the university are directed at improving human life in harmony with the environment.

The quality of the university's activities depend on the people who form the university (staff, faculty and their families and students), as well as the farmers, business people, professionals and other people who interact with the university.

A quality work environment, emphasizing personnel improvement and development, excellent human relations and team work, is emphasized as the means of accomplishing common goals.

Participation is encouraged in the continuous improvement of the processes of the University so that individuals develop their capacities and feel the satisfaction of forming part of a team.

The university curriculum and the training activities provided through the continuing education program form the process by which participants develop the skills, knowledge and attitudes which permit them to make a contribution to the development of the region.
The generation of knowledge, by research, experimentation and innovation, contributes to improving the educational process, and by extension, the formation of the participants, as well as the sustainable development of the region.

Clients of the university are identified as students and their families, producers, business people, donors, visitors, professionals, institutions, communities, countries, as well as other persons and entities that utilize university products or services. (Ibid:3-4)

This section, in addition to its emphasis on "continuous process improvement" and "total quality management" is very explicit in focusing on people. It is clear in identifying human resource development, and not the generation of knowledge, as the principle mission of the school. Nevertheless, while fairly specific in identifying participation and teamwork as the keys to personnel development and improvement, this section is not particularly helpful in understanding how this orientation towards people is linked to learning.

One would expect the section of the mission statement titled Educación de excelencia (Excellence in education) to be the most useful for identifying the philosophical approach of the university. While it describes certain aspects of the curricular program and provides some clues to the university's orientation to learning, it is not particularly helpful in gauging the underlying rationale for program structure or emphases.
The focus on human resource development is placed in the larger context of the "sustainable, harmonious and rational development of the humid tropics" (page 5). Even more fundamentally, the document states that the "methodology and educational content are established by means of a participative process based on the necessities of the region" (Ibid:5). Unfortunately, the process by which the methodology and content are determined is not described, nor are the necessities of the region.

The document goes on to list aspects of the program which guarantee the quality of learning and the formation provided students. Many of the concerns mentioned previously are included, as well as a few new ones. They include:

Curricular innovation, including:
- active participation of the student
- learn-by-doing
- work in teams
- research and experimentation
- continuous learning.

Commitment to return to the countryside and become involved in its sustainable development.

A review of other documents, including the university catalog and a variety of unpublished material, reveals that the 1994 mission statement provides as clear a statement of institutional philosophy as has been articulated to the present. The 1992-3 Catalog of the College, for example, states that the philosophy of the College calls for the participation of the student in an active learning process
(EARTH, 1992). It goes on to state that this participation shall be achieved through the deliberate integration of direct experience with the knowledge and principles which underlie practice.

The catalog also states that it is the University's philosophy to offer co-curricular programs that encourage students' personal and social development, as well as providing an opportunity to apply their knowledge and skills.

Finally, the Catalog says that multiple opportunities will be provided for faculty, students, staff and members of the community to work together to achieve mutual goals and common interests, in an atmosphere that contributes to the personal and professional development of the individual (EARTH, 1992).

In summary, an analysis of EARTH documents provides a great deal of information on the mission of the institution, but considerably less with respect to the philosophy that underlies its mission and practice. Important elements of EARTH's philosophy can be identified, especially the overriding institutional dedication and commitment to the sustainable development of the humid tropics. What is clearly lacking in this statement of purpose is a more precise vision of what constitutes sustainable development.

The centrality of people is repeatedly identified as the focus of institutional efforts. Human resource development is
the means by which EARTH seeks to make a contribution to the development of the humid tropics. The development of human resources is envisioned as involving academic, humanistic and ethical dimensions. Finally, with respect to EARTH's approach to education, active student participation in the learning process is stressed, through learning by doing, teamwork, and applied research and investigation.

It appears that EARTH's approach to higher education in agriculture shares an emphasis on people centered development, experiential learning, and an (albeit somewhat limited) commitment to social change with the approach outlined at the conclusion of Chapter 2. EARTH's written materials do not evidence an emphasis on complexity and change in the curriculum to the extent that does the approach advocated in this study. Finally, the notion of encouraging students to utilize alternative modes of inquiry in addition to reductionism does not seem to form a part of EARTH's philosophy. These issues will be returned to in more detail in the last chapter. Attention will now be turned to the results of interviews with EARTH students, faculty and administrators.

Results of Interviews

The purpose of the interviews was to understand more about respondents' perceptions of EARTH, and their understanding of the institution's approach to learning and
educational practice. Respondents were queried about their perceptions of EARTH as an innovative institution of higher education, the integration of theory and practice in the curriculum, and more specifically, their experiences and feelings about three courses identified as the most clearly experiential in the curriculum -- work experience, enterprise projects and the third year internship.

**Students**

The first questions posed to the students interviewed were designed to "break the ice", gain an understanding about their backgrounds, their decision to study at EARTH, and their feelings about academic and social aspects of life at EARTH. The interviews then focused on the role of theory and practice in the academic program (focusing on the work experience, enterprise project and internship experiences), how the learning process at EARTH might differ from what they had experienced previously in school, changes in their attitudes since coming to EARTH, and their future plans. Interviews were open ended, and participants were encouraged to discuss other concerns relative to EARTH and its programs.

Among the 34 students interviewed, 10 were first year students, 8 second year, 1 third year and 15 *pioneros* (pioneers -- fourth year students and the first group to study
at EARTH). Of the 34, 9 women were interviewed. Their nationalities were:

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costa Rica</td>
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</tr>
<tr>
<td>Dominican Republic</td>
<td>5</td>
</tr>
<tr>
<td>Guatemala</td>
<td>4</td>
</tr>
<tr>
<td>Colombia</td>
<td>3</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>3</td>
</tr>
<tr>
<td>Belize</td>
<td>2</td>
</tr>
<tr>
<td>Brazil</td>
<td>2</td>
</tr>
<tr>
<td>Ecuador</td>
<td>2</td>
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<td>Honduras</td>
<td>2</td>
</tr>
<tr>
<td>Panama</td>
<td>1</td>
</tr>
</tbody>
</table>

A relatively large number of Costa Ricans were included in the sample as they make up a approximately 35% of the total student body, and also because there is a great deal of diversity among the Costa Rican students in terms of educational and class backgrounds.

In terms of their high school education, 10 of the students came to EARTH from Colegios Agropecuarios (agricultural high schools), some with 5 year degrees (involving a fifth year of more specialized agricultural study), others with 4 year degrees. One of the female students graduated from a technical high school where she studied to be an electrician. Five graduated from relatively prestigious urban private high schools. The rest studied in either public or private nonvocational schools in towns and small cities.

Sixteen of the students could be classified as coming from strictly rural environments, with the rest sharing a more urban background, ranging from small towns to capital cities.
Classifying the participants according to economic status was more difficult due to the problem of comparing economic conditions across national lines, as well as a certain reticence to discuss personal financial matters. On the basis of responses to very general questions and the investigators prior acquaintance with many of the students, they could be roughly classified as coming from low, middle and high income backgrounds. Of the 34 students interviewed, 17 could be considered as coming from lower income backgrounds, 8 from middle class families, and 9 from relatively higher income families. The students ranged in age from 17 to 26.

While it is difficult to generalize about a group as diverse as the students interviewed in this study, they do possess certain traits and characteristics in common. EARTH students in general tend to be risk takers and adventurers. At the risk of engaging in dangerous cultural stereotyping, it is probably fair to suggest that young people in Latin America have less desire to leave home (especially to a foreign country) than do their counterparts in the United States. The simple fact that these students had done so, automatically sets them apart from many of their peers. Their enthusiasm for studying in an institution with an unconventional approach to learning is a further example of their willingness to take risks.
In the admission process through which these students were selected by EARTH, demonstrations of leadership and leadership potential play a significant role. Perhaps most importantly, EARTH's selection process tends to favor individuals who are in some way dissatisfied with the status quo, who feel the need for change. For some it might be the desire to be the first in the family to achieve a college education, for others a commitment to social change, and for still others, a desire to become a different kind of agriculturalist from the norm. Needless to say, assembling a student body made up largely of leaders, risk takers, and individuals dissatisfied with the status quo presents its own set of problems. That, however, is an issue beyond the scope of this study.

Motivations for Studying at EARTH

The dominant theme that emerged when the students were asked about their motivations for studying at EARTH, was that they were first attracted to, applied, and later made the decision to matriculate at EARTH based on the opportunities for applied experiences in agriculture and the possibility of integrating theoretical and practical work. Typical comments included the following:

When I heard that EARTH had 3,00 hectares of land, with commercial and teaching farms, a forest preserve and cattle production - I knew it was the school for me.
I can't see the point of learning about agriculture if I can't practice it. I don't learn that way. If I'd studied agriculture in my country I wouldn't have been able to do anything in the field until the third or fourth year.

In my high school we spent a lot of time in the field learning about the problems of agriculture first hand. I don't think I could spend four years in a classroom without the opportunity to keep learning that way.

I spent a year at a 'traditional' university and never did anything related to agriculture. When I first heard about EARTH and the plans to relate all the classroom activities to the field, I decided to change.

Sentiments similar to these were echoed in the majority of the interviews, and agree with the investigator's experience in interviewing candidates for admission while coordinating the student admission process at EARTH. That the learn-by-doing approach is distinctive and clearly attractive to a segment of the university-bound student population, particularly in Latin America where many programs in agriculture are especially theoretical and divorced from practice, is undeniable. Some students, much like the one quoted above who studied in a high school agriculture program, know from experience that they learn best when provided opportunities for integrating theoretical and practical work. Others may apply to EARTH based more on a negative perception of 'traditional' educational methods than on a positive image of learning by doing.
Many of the students' responses revealed a tendency to draw a sharp distinction between theoretical learning and the attainment of practical skills. Many students, perhaps as a consequence of their prior exposure to formal education, tended to denigrate the value and importance of theoretical understanding, even to the point of adopting an anti-intellectual stance glorifying the role of the field level production worker. While this tendency appears to be strongest among beginning students, it is by no means restricted to them. Some students indicated they were attracted to EARTH because, unlike 'traditional' universities, there is no requirement to take a year of generales (general studies) which they feel is irrelevant to their needs. "Why should I study literature, anthropology and all that other stuff when what I want to learn is agriculture?" is how one student put it.

Another factor which many students indicated as having been important in their decision to apply to EARTH was the opportunity to live and study in an international environment. As might be expected, many non-Costa Ricans indicated that they applied to EARTH in part for the opportunity to travel and get to know a foreign country. Both Costa Ricans and students from other countries indicated that they considered living with students from throughout the Americas an important part of their education. It is worth noting that the longer a
student had been at EARTH, the more importance they seemed to attach to this aspect. Practically without exception, fourth year students indicated that the development of relationships with fellow students from different countries was one of the most important features of their time at EARTH.

A final factor which many students mentioned as important in their decision to apply to EARTH was the possibility of financial assistance in the form of a scholarship or loan. In countries where resources for financing even a relatively low cost public higher education are scarce to nonexistent, the prospect of a scholarship is extremely attractive.

Life At EARTH

Student's responses to questions about their lives at EARTH served to reinforce the popular wisdom that most learning at college takes place outside the classroom, laboratory and library. As mentioned above, a key theme that emerged in student's comments was that the opportunity to develop relationships with students and faculty from different backgrounds was immensely important to their development, both as people, and as professionals. As a student from Brazil said:

Since coming to EARTH I have had to deal with more conflicts and misunderstandings than in all my life before. I have learned so many new ways to talk to people who are different from me, who know different things, who believe different things, and who even talk different ways, that I now feel able to deal
with just about anything that life presents me in the future.

A fourth year student from Guatemala stated in no uncertain terms that the insights he had gained about living and working with others while at EARTH were what made the experience particularly worthwhile:

It's true that we've studied agronomy, animal science, ecology, and much more, but I think all those things will change completely by the time I'm really going strong in my career. But what I've learned from my compañeros will help me in getting along with co-workers, the 'boss', producers and maybe even my future wife and family throughout my life!

A related aspect of living at EARTH that was mentioned by many students was that their horizons had been significantly expanded by the experience of studying at the university.

Before I left home, my whole world was my family and my town. Over the past two years I've met people from all over the world, I've eaten their food, I've shared my life with them...I'm not sure how I'll be able to live again in such a small environment as I did before coming here.

This statement from a second year student from Colombia, reflects similar sentiments from many others. Other students mentioned the opportunity for contact with visitors to EARTH as having served to expand their view of the world. A Nicaraguan student went into great detail in listing the people he had met at EARTH, including presidents of foundations, ministers of agriculture, officials of international development institutions, business people, small
and large agricultural producers, tourists from all over the world and students from the Americas and Europe.

Two negative aspects of living and studying at EARTH that were frequently brought up by students was the perception of "living in a bubble", and the heavy work load and lack of time for nonschool related activities. The physical isolation of EARTH, the tendency for a relatively closed society to develop on the campus, and the gap between the resources available to EARTH and those available to communities of the humid tropics, taken together created in many students' minds an almost tangible barrier between them and the larger community. "There's lots of talk at EARTH about two-way bridges with the community, but even on the personal level, most people have little contact with the world beyond the entrance to the school." "EARTH is so unreal, it's not like any other place in the tropics. I feel very far away from the problems I see when we visit small farmers or even visit Pocora [the nearby town]."

The issue of work load (both for faculty and students) has been a matter of concern since EARTH was first established. Many students expressed frustration that they had so little time for personal relationships, getting off campus, and even sleeping. A fourth year student expressed a common perception when he described how at times he found himself doing things without giving even a thought to the "whats" or
"whys" -- he simply knew they were part of an assignment and "...usually I didn't even have a minute or two to think about how it related to anything else I'm supposed to be doing."

A second year student talked of how many hours she was dedicating a week to school related work:

...work experience: 10 hours, my enterprise project usually requires 8-12 hours, 12-16 hours in class a week and at least another 15-20 studying. When I finish work experience at 11:00 a.m. on Saturday, all I want to do is sleep the rest of the week-end. My roommate asked if I wanted to play in the volleyball tournament, but I honestly don't see how anyone can find the time."

Theory and Practice

With the exception of a group of students who seemed to have adopted an anti-intellectual posture with respect to the study of theory and propositional knowledge, a great many students expressed that the "balance" between theory and practice, as measured in hours or class sessions, is not the crucial issue. Instead, they talked about how practice, whether it be in a corn field, cattle pasture or classroom, helps them grasp what they're learning by offering opportunities for application and provides motivation and purpose for further learning. Contrary to the expectation of the investigator, many students rejected out of hand the notion of quantifying and trying for a 50-50 balance between theory and practice. Comments made included the following:

It's the mix of theory and practice that keeps my interest, not the amount of either one. Applying
what I read, discussing it with my group and adapting things to our own situation is what makes it real and worthwhile to me.

I studied in a high school where we practically never got to practice anything except futbol (soccer). I came to EARTH because I wanted to get experience doing real things and perfecting practical skills. Now, after being here for awhile, I don't think about that anymore. Most of my classes have both practice and theory and I don't think of them as separate.

You shouldn't think of practice as only taking place in the academic farm. In our chemistry class the professor constantly had us trying to solve new problems and think of the chemical side of everything.

It's not the balance between theory and practice that helps me learn. It's more that the material is real to my life, that I can see how it fits together with other things I know. If I have to use it in some way, even better, because I probably won't forget it then!

A number of students mentioned how integrating practical, applied activities with more conceptual work provides opportunities for students with different aptitudes and abilities to excel. A fourth year student elaborated:

I'll never forget the look on -------- face the first time we went out to the field and he showed those guys from San José (Costa Rican private school students) how you really swing a machete!

Most of the students interviewed displayed enthusiasm and a fairly sophisticated understanding of the importance of integrating practice and the study of propositional knowledge. For the investigator, the extent of student's awareness and thoughtfulness with respect to the learning process was the greatest surprise emerging from the interviews. That the
extent of this awareness was much greater among fourth year students than beginning students probably speaks well for what has taken place in EARTH over the past four years. The process by which students become aware of the learning process, and even more importantly, by which they become proactive in determining their learning environment, is certainly an important topic for future research.

Discussions of the integration of theory and practice in the curriculum inevitably lead to considerations of the three courses which embody EARTH's stated commitment to learning by doing -- work experience, enterprise projects and the third year internship. The work experience program, in particular, has been a subject of contention since EARTH was inaugurated. Some faculty have pushed to scale back the extent of work experience because of the time and energy demands it places on students and faculty. Some students and faculty have criticized the program for involving too much repetition and relatively low-skilled manual labor. During the first year in particular, students are apt to complain about the lack of variety and the dearth of opportunities for reflection and analysis.

A question posed to all the participants in the interviews was whether or not they believed work experience should be eliminated. In the case of students, responses were not only very spirited but also emphatic. With only one
exception, all of them expressed strong support for work experience. The most common rationale provided for maintaining the program related to the development of attitudes:

In our countries, the agrónomo (agronomist) is usually the tie and coat guy working in the bank or the ministry who pats the campesino on the back and then checks his hands to see if he got any manure on his palm. He wouldn't know how to hold a machete, and even less would he know what it's like to weed a platanal (field of plantains). If work experience teaches humility and comprehension of what its like to work in the field, it's probably the best way we could spend our time.

Many EARTH students came with little experience in the field. Sure its important for us to learn about photosynthesis, fertilizer recommendations and that kind of information, but if you don't know what the life of the producer is like, you'll be just like the graduates of the UCR (Univ. of Costa Rica) who go to the campo scared they'll actually have to work some day!

The best thing I've learned in work experience is humility. Working in the field under the sun, the rain and in the mud is something you learn about by doing it, not reading or having someone tell you about it. People that do this kind of work all their lives deserve respect, and I feel humble now when I listen to a campesino talk about how he does things.

At first, we Dominicans thought work experience was a total waste of our time. We'd studied agriculture in high school and didn't need to be volando machete (swinging machete) and sacando zacatón (eliminating a particularly noxious weed). Nevertheless, looking back, I think the experience of work experience taught me more about getting a positive attitude toward work and manual labor than anything else I've done here.

If someone is studying agriculture, and thinks that working in the field for the morning is worthless, they're wrong. You would never get the little details that make the difference between a real professional and an agrónomo (agronomist) in name only.
For me, work experience is key because it helps students develop good attitudes towards work. Students learn they have responsibilities for keeping the academic farm clean and looking good.

It's a key course in developing mística (spirit, identification, commitment) among students for the school, for agriculture and for the humid tropics.

I would protest against eliminating work experience because it has given me a much clearer idea of the kinds of problems that are encountered on a commercial scale. It's not the same working with a small plot of yuca (cassava) as it is working with a 2 or three hectares - the problems are completely different. For example, before I didn't understand what a huge job it is to put all the trellises in for yams, doing it on a 10 meter by 10 meter plot doesn't give the idea.

A fourth year student observed: "It was a great course - very practical, we had to resolve all kinds of problems. But in my opinion it has now fallen down in quality. It's become too programmed, and students don't have to improvise as much as we did during the first year of the program."

Expressing a very different opinion, another fourth year student said: "The course is getting much better. Students now have exposure to the bananas and other crops that we didn't work with during our first year."

As students discussed the work experience course, the words that surfaced most frequently were attitude and humility. This is probably understandable given the extreme socioeconomic stratification that characterizes the societies to which many EARTH students belong. The desire to break down the barriers that have traditionally defined the relationship between the educated and the uneducated, and the economically and politically powerful and powerless, is both a reflection of the idealism of university students and the result of the
relatively high ratio of EARTH students from underprivileged backgrounds.

Another theme that emerged is the role work experience plays in exposing students to agricultural production on a scale approaching what they would encounter in a commercial operation. Many students expressed sentiments similar to the one quoted above stressing the difference between experience gained cultivating a demonstration sized plot as opposed to a commercial scale operation.

One student expressed largely negative feelings towards the work experience course. He indicated that he already possessed, or doubted the importance of the skills, knowledge and attitudes that are to be gained from work experience. He indicated that his time would be more profitably spent studying or working in a laboratory, than working in the field.

With the exception of this one student, all the students expressed very positive opinions of work experience and, in general, seemed to feel that it contributes greatly to the formation of graduates. Many also expressed opinions about how the experience could be improved. Most commonly, they talked about how the reflection/analytical component of student's (and faculty/staff) involvement in the course should be enhanced. A number of students discussed occasions when they performed tasks in work experience without understanding why,
and too often, felt that they lacked the opportunity to analyze, question, and reflect on what they were doing.

A number of students expressed strong support for revisions in the work experience course that would result in increased contact with local farmers. They indicated that the work experience course should play a greater role in promoting the integration with the larger community. They supported the trend towards having students work with local farmers as a part of the work experience course.

Finally, a number of students brought up the issue of discipline with respect to the work experience program. Most of the comments were made by fourth year students and expressed a feeling that the requirements for work experience, particularly in terms of punctuality, hours required, and the difficulty of the work involved, had become increasingly lax. Undoubtedly, many of these remarks reflected the tendency of those who have passed through a long and arduous process, in this case four years of work experience, to view it as a sort of initiation, and to disparage the experience of subsequent initiates as somehow less demanding. If one accepts the notion that an essential purpose, perhaps even the central purpose, of work experience is attitudinal, then obliging students to demonstrate responsibility and to gain experience and appreciation for the routine tasks involved in agricultural production becomes an issue of concern.
Identifying a single dominant theme in student's discussion of the enterprise projects was exceptionally easy. Faculty and EARTH documents stress the acquisition of business skills and the fostering of an entrepreneurial mentality through involvement in the projects. Students on the other hand, continually referred to what they felt they had learned, or were learning, about resolving problems -- more often than not problems between members of the group:

In my first group, three of the people were from San José and wanted to go home every Saturday after work experience. The other three, from other countries, ended up with too much work to do on the project Saturday afternoons and Sundays. We fought about this for quite awhile until we finally reached an agreement that they wouldn't go home every week-end and would try and put in extra time during the week.

I was the only women in my group and the compañeros usually treated me like I wasn't there. I didn't participate in most of the discussions and felt like I was wasting my time. I had to prove to them that I could do work in the field, and when I didn't know how to do something or didn't do it well, I could tell they thought it was because I am a women. Even after talking with the group, I felt as if they would never change. I'm now in a different group that has another woman, and we've talked a lot with the compañeros, and so far they treat us just like everyone else...While you can't always control who you work with, I am going to be sure in the future to let people know that I want to participate in everything and be a part of everything I do.

The first group I was in had many problems trying to get everyone to work. We would schedule work days and only half the people would come. We argued all the time about it. We finally resolved the problem by deciding that the person who didn't show (without a really good reason) would not get credited the hours worked, and would also get credit (hours) for previous work taken away. After that everyone did a lot better.
My group had trouble with personal problems between members of the group. After we got started working on our project proposal, the situation started to get pretty bad with arguing and fighting about all kinds of things. What finally brought the group more together and solved some of the problems was sitting down all together and talking about what was causing the problems. It turned out that it was mostly caused by misunderstandings and things that had nothing to do with the work of the project.

Early one morning a tractor that was working on a road construction project destroyed a part of our planting of *marginata* (an ornamental foliage plant). As soon as we heard about it we went out there, estimated the damage and took photos. We wrote a formal *denuncia* (complaint) to the administration of the school and don Carlos Hernandez recognized the mistake and took responsibility. After quite a few meetings and negotiations, the administration agreed to pay us an amount of money for the damage. We felt satisfied with the money and it allowed us to finally realize a profit on the project in spite of the damage.

You remember the problem we had? No one wanted us in their group, remember? They thought because we were women we couldn't do the work in the field. It was a horrible experience and made us feel really bad. Well, we decided to form a group with mostly women and a couple of guys who also hadn't been included, because he felt bad about the whole situation. Even though we didn't make any money in the end, our group worked really well together and it was a good experience.

In their comments, students continually referred to problems among members of the group and the means used to resolve them. In some cases, problems were never resolved and the groups broke up, while in others, once the problem was solved, the group continued working together on a new enterprise project. Another frequent comment was that the initial decisions regarding who would be included in each
group, and once conformed, what kind of project to engage in, were the first times many students had participated in group decision making without an authority mediating the process. In listening to students talk about the projects, the investigator was impressed that, in an institution which stresses the importance of teamwork and the development of human relations skills, the enterprise projects represent perhaps the most important source of hands-on experience in this area.

Many students, concurring with the perceptions of the faculty, stressed the importance of the acquisition of business related skills resulting from involvement in the enterprise projects. The comment of a fourth year Dominican student was typical: "The projects taught me the steps one has to go through to actually do a project - prepare a budget, discuss feasibility, convince the banker or those with money. After this I feel able to do a project in the world beyond the school." A fourth year Costa Rican commented: "Its one of the things that actually makes EARTH different. It's an opportunity to put it all together." Many students reminisced about being completely lost when they first started work on their projects, and having to find and utilize previously unknown resources to prepare their project proposals. Other students commented that they didn't think they would have understood many of the concepts involved in considerations of
economic feasibility if they had been presented as part of a traditional class, whereas having to apply the concepts in their project proposals obliged them to really learn.

Students also had many criticisms of the projects. Most can be divided into two groups. The first were observations about the organization of the course, the lack of support services, the excessive hours required by many projects and the problems encountered in marketing commodities produced. The second class of critiques concerned attitudinal issues. The lack of attention to environmental issues in the course and the emphasis on making money and a perceived neglect of equity concerns and learning were the concerns mentioned most frequently.

Comments regarding the first group of concerns included:

The weekly class never related to what we were doing in our project. It was like having two different classes and I never understood what the criteria used for grading us were. The professor didn't help us with the technical problems we had, and wasn't very helpful with the trámites (administrative procedures) you need to do to get materials.

We should have had better technical assistance. It seemed like our professor advisor didn't have the time to help us in the way he should have. We would have had a more successful project and learned more about ______ if he had worked with us more closely.

The bottleneck with the enterprise projects is marketing. If the school had good markets to sell what the projects produce, it would make things much better. We all live here on campus and it's very hard to make contacts with buyers and we also have little access to telephones and no time. Maybe as time goes on and relationships develop...
In our project we got advice from a local grower and exporter of ornamental plants. He said to make any money, you have to learn who all the people in the country are who export, learn who pays well, who pays on time, who you can trust, and how to get them to pay you the most for your product. He said we should hang around the airport, at the shipping building and get an idea of who ships what. But how can we do that as students?

During the first year we had a yuca (cassava) project. It was a great experience but we planted too much and had to work like crazy to keep it under control. The school should make sure students don't get into that situation, you just get too tired and end up getting behind in class and can't do any of the other things you want to do.

Many, if not most, of these criticisms have already been addressed in modifications of the course. More than anything else they are a reflection of the newness of the program, and in all likelihood will be resolved over time. The second group of criticisms, according to students, are another matter. These critiques go deeper than concerns of support services or marketing opportunities, and thus are more difficult to resolve. The following comments illustrate well the nature of these critiques:

The projects are an environmental disaster. Every project has to include an environmental impact study to get approved, but students often just copy what other projects have prepared and spend their time working on the economic analysis. The people who decide if a project is alright don't consider the environmental part - they just look at the technical part about agriculture and the numbers. I don't think most projects do things any different than do most producers in Guacimo (a nearby town) or other places, but EARTH is supposed to be different.

The part of our proposal about ecology and sustainability was poor. We just said we'd do the
project in a sustainable way, but didn't say how. When we had problems with fungus, the only thing considered was fungicides... Was it the best decision? I don't know, but maybe we should consider other things. It seems that our concern was really to make money, and if chemicals are the way the advisors say to go, well that's what we do. I know producers have to make money, and they have to use chemicals, but maybe we should be trying ways that could make money without quite so much chemical products - according to what I understand, that's what IPM is all about.

It bothers me when the only thing people want to know about your project is how much money you made. I heard a professor talk the other day about how much so-and-so project made, and how much that other one made, but no one talked about how much the people in the project learned, or how well they did the work...I believe the projects are a good way to integrate the things we learn in the classroom and the field, but it seems they've just become money makers.

We're here to become agents of change in the humid tropics. The enterprise projects should be an opportunity for us to get practice working in groups. If we're going to be leaders, we need to act like leaders and not school kids. Nevertheless, the projects just seem like a course to get together with friends and try to make money. I have seen people treated badly in their group and no one says or does anything. However, when it's a money problem, the professor in charge is right there to solve the problem. I think the enterprise project course should be reorganized to guarantee that the student learns how to work with different people by doing it.

The concern about the extent to which environmental concerns are taken into account in the activities of the projects is an important one. It demonstrates a critical attitude on the part of some students that, if channeled in a constructive direction, could be an positive influence on the university. Secondly, it is evidence of an environmental
awareness and ethos, the encouragement of which is one on the expressed missions of the university. Finally, it suggests that as the enterprise project experience evolves, more emphasis might be placed on advisors (whether they be faculty, staff or others) working more closely with students in a mutual search for means to reduce negative impacts on the environment.

The suggestion that too much emphasis is placed on the net return from enterprise projects was made by four fourth year students. This critique was not voiced by other students interviewed, yet the stature of the individuals who expressed the concern -- all have been active student leaders -- seems to lend credence to the criticism. For the students, the problem of stressing financial returns from the projects is that other concerns, for example the quality of the learning experience, environmental issues and human relations concerns, then become secondary. To the extent that this may be true, it seems to be a legitimate point of discussion. The concern with the aims of the enterprise project experience can be extended to the larger aims and mission of the university. To what extent is the development of an entrepreneurial mentality compatible with social and environmental awareness? What criteria are used in mediating between the competing and often conflicting objectives of development in the humid tropics? Is the primary focus maximization of production, environmental
protection, improvements in living standards? These issues will be addressed in the next chapter.

If anything characterized students comments about the internship experience it was the development of confidence. Almost without fail, students talked about returning to EARTH after the internship feeling more relaxed and self-confident:

I had always been a little unsure about my abilities. The internship showed me how much I can do. It's funny, but I found all kinds of things I'd learned at EARTH that turned out to be practical, like adjusting valves, playing soccer and cards and designing an experimental plot. It wasn't until I played soccer and cards with the guys I was working with on my internship that I really fit in.

I found I could deal with a group of very machista (sexist) men and do it well. At the beginning, I was very uncomfortable and didn't think it was going to work out. I guess my knowledge and willingness to jump right in and work without acting like an arrogant educated person helped them see me for what I am. It all worked out great and I know I can do just about anything now.

For the majority of students interviewed who had participated in an internship, the experience appeared to be a defining moment in their personal development. For many it was the first time being "out there" alone in the world without the security of family, friends or institutional support. According to comments made by students, as well as faculty and others, many of them returned noticeably changed. In addition to gaining self-confidence and maturity, a number of students mentioned that the internship helped them clarify career and
personal goals and adopt more realistic expectations with respect to future employment.

The investigator had the opportunity to visit three internship sites in Costa Rica, observe interns, and informally interview interns and their supervisors. The degree of responsibility and obvious confidence placed in these students was impressive. One of the young men was working with a multinational fruit company in one of the company's principal banana divisions. He had recently completed a series of meetings with the division's field workers, over 300 men, explaining new work procedures affecting the way they are paid. Considering the volatility of labor issues in the banana industry, it is a significant gesture of confidence to entrust such a potentially delicate task to a three and a half month intern. His supervisor indicated that he had selected ________ for this task based on what he judged to be his excellent communication skills.

The other interns visited were working with a tropical flower production and exporting business and a tropical crops research institute financed by banana exporters.

The second chapter of this study discussed principles which characterize a promising approach to higher education in agriculture to meet the challenges of the future. The assertion was made that experiential learning strategies represent an effective means for integrating these principles
into the learning environment. In discussing their perceptions and experiences at EARTH, students overwhelmingly embraced experiential learning, repeatedly stressing that the integration of propositional learning with the acquisition of practical skills and the opportunities for personal and professional development was what distinguished EARTH from other institutions and was the reason they studied there.

In addition to the emphasis on experiential learning, many of the students interviewed exhibited a commitment to the amelioration of social ills and the prevention of environmental destruction. There is a common perception among the pioneros that increasing numbers of students who entered in later classes do not share this commitment. They ascribe this change to a greater proportion of economically privileged students being admitted, as well as changes in EARTH itself. Many perceive a decreased emphasis on social and environmental concerns in the curriculum, and a greater focus on the development of technical and academic competence. This issue will be returned in the final Chapter.

Finally, if any one single theme were to be identified that emerged from students discussing how they feel about EARTH and how they view the learning process, it is an appreciation of the importance of learning to be -- of learning to work with others, learning to communicate effectively with different kinds of people, learning to be
critical, learning how to make sense out of the complex and confusing world surrounding them.

The question, What should a student take with them (in terms of knowledge, skills, and attitudes) upon graduating from EARTH? elicited a great variety of responses. Interestingly, very few students mentioned the acquisition of scientific, technical, or other sorts of propositional knowledge, (although when asked about it, all the students indicated it was very important to leave EARTH with a "solid base" of knowledge). A few students, while still the minority, emphasized the importance of graduates leaving EARTH with well-developed skills in computers, agricultural production, communication technologies and other "practical" areas. What a clear majority of students mentioned first, and most energetically, was the importance of changes in attitudes, and the notion of becoming something different from what they were when they entered. They talked about how an EARTH graduate should:

Be humble.

Not be afraid to get his/her hands dirty.

Leave with a strong commitment to the development and environmental protection of the humid tropics.

Question conventional ways of doing things.

Feel powerful, remember they can do more than they ever thought.

Know how to ask for help.
Not be afraid to speak up, no matter what the circumstances.

Learn to look at problems in new ways, not be stuck in one way of seeing situations. Try to look at problems from different perspectives.

Know that things are changing all the time and what you learn today might be useless tomorrow. But learning how to learn new things will always be with you and you just have to maintain a positive attitude about learning.

These responses were voiced repeatedly. While it is easy to attribute (and thus discount) these kinds of remarks to "typical" student idealism, in the authors opinion that would miss the point. It would be more profitable for faculty and administrators to investigate ways of reinforcing and encouraging such sentiments.

Interviews with Faculty

The interviews conducted with members of the faculty were highly unstructured. Perhaps because there is a strong tendency within the faculty to concentrate their activities in a relatively restricted orbit, their view of the institution is in many ways more constricted than a students. Consequently in the interviews, the conversation inevitably led back to the individual's particular "turf". The investigator decided quite early on to follow the faculty where they wanted to go in the interviews in the hope of understanding as much as possible what each individual considers important within the overall
framework of a conversation about EARTH and its approach to learning.

Twenty members of the faculty were interviewed, 19 males and 1 female. In addition, two members of the administration were included. The nationalities of the 22 were as follows:

- Costa Rica: 8
- El Salvador: 3
- Guatemala: 2
- Argentina: 1
- Brazil: 1
- Cameroon: 1
- Honduras: 1
- Mexico: 1
- Nepal: 1
- Philippines: 1
- Peru: 1
- USA: 1

A faculty member from a U.S. midwestern land grant institution spending his sabbatical at EARTH was also interviewed.

In very general terms, and with one, perhaps two exceptions, the attitude of those interviewed toward EARTH could be characterized as highly positive. While almost everyone mentioned changes and adjustments they might like to see, the author's overall impression upon completing the interviews (again, with a couple of exceptions) was of a highly motivated and, perhaps most importantly, a challenged faculty.

If any single overriding theme were to be identified in the remarks of faculty, it would be the sense that EARTH is
different from other institutions where they had previously either taught or studied. The difference mentioned most often is the opportunities at EARTH for integrating theoretical with practical activities. Faculty, like students, were almost unanimous in their support for efforts to integrate different modes of learning in the curriculum through experiential approaches. Another aspect which faculty identified as distinguishing EARTH from other institutions of higher education in agriculture was the close relationship between faculty and students. Finally, a number of faculty members mentioned EARTH's emphasis on learning and the expectation that faculty and students will expend extra effort to ensure student success as a distinguishing characteristic of the institution.

Students at EARTH are favored by a system that not only integrates and balances theory and practice, but also does each one better than do most other institutions. The theoretical side of things is handled better at EARTH precisely because efforts are made to make it real, to make it 'touchable'. While theoretical education is perhaps more profound in other programs, it is also far more abstract.

The balance between theory and practice does not matter, what is important are the objectives. What it is you are trying to do - that is what decides what you should be doing. Some things you can teach/learn without practice, some things you can teach/learn without 'theory'. What makes EARTH unique is that the objectives call for students to learn content and also learn the application of that content.

One comes to EARTH thinking about content, and learns to think about process and integration. We are used to thinking how to communicate our
particular content to the student, but that is not what is needed. We have learned to turn that upside down, we now start with problems and go to theory, rather than theory to problems...When I taught at advanced algebra, but couldn't solve simple problems involving conversions of measurements - they had learned content but could never apply or use it.

EARTH is filling a gap - a graduate who is capable of integrating natural resource conservation with enough theory and practice to develop sustainable agriculture systems...Students learn a great many skills that other agrónomos (agriculturalists) never develop. Their activities in the field raise questions in their minds about discovering the whys...Education is not just about transferring information. Its also about the development of habits, and that can only happen through practice.

When I studied for my undergraduate degree we had lectures and some labs but practically never went to the field, unless it was to look at something. At EARTH, very few things are talked about in classes without some connection being made with the field. It doesn't have to be in agronomy or animals. When students learn about communication, they can apply what they are talking about right away when they work with local farmers, on their enterprise projects and other places.

I was really surprised when I came to EARTH by how confident the students are about their abilities. They seem to have a perspective on theory and the application of theory. I have observed that some of them don't seem to know a lot of formulas and lack knowledge of some theories, but they obviously do understand the connection between theories and what they mean in the real world...I will never forget how scared I was when I got my first job after college - I thought everyone would discover right away that I couldn't do very much. I don't think any EARTH students are going to feel that way. From what I see, they are (with reason) pretty confident both in what they know and know how to do.

Learning is an active process. It requires trying things out, thinking about them in new ways, and explaining them to others. What is so different about EARTH is that all of us, students and faculty,
can do that here. I don't think it's so important by itself that a student can drive a tractor or swing a machete, but in working in the field, on projects, in work experience and in courses, it's interesting how much students reflect on what they're reading and talking about in the classroom, and seem to actually learn it.

The relationship between students and faculty here is like the relationship I used to have with graduate students. It is a sort of mentoring relationship that is quite close and personally very gratifying. I get to know the students as individuals, not as faces or numbers, but as personalities.

Sometimes I think the students expect too much of us. If they see someone in their office at 11 p.m. they expect us to talk with them as if that is the most important part of our job. Other times I think maybe it is the most important part of our job.

Out of class contact with students is one of the things that makes EARTH different. Counseling lonely students, organizing special activities like the fair, talking in the cafeteria, are all ways you can affect students. You can really talk about ethics and other important things much more easily there than you can in a classroom. That is an important part of our job.

I think we're struggling to find a position between being supportive of students, making them successful, and expecting and demanding excellence. I think sometimes we maybe treat them too easily, we're afraid of being too harsh in grading because they have to leave the school if they fail a course. But as long as they're trying to learn and want to work, I don't mind having extra classes at night to make sure everyone understands what we're doing. I think it's good that our objective is to have everyone succeed, I never liked the idea that some have to fail - why?

Faculty perceptions regarding the value of experiential learning strategies largely mirrored those of students. With respect to the enterprise projects and the third year...
internship, faculty comments were very positive. The work experience program, however, seems to generate somewhat less enthusiasm. While most of those interviewed indicated agreement with the aims and methods of work experience, a sizable minority questioned the amount of time devoted to the course and its overall value. Many of those who questioned the work experience course were little involved with the course. Questions were raised regarded the value of university students swinging machetes and digging drainage ditches. Some professors said that because students worked so hard in the field, they were then too tired to devote time to academic pursuits. Others questioned the menial nature of the experience and suggested that the intellectual content of the course be increased.

In addition to the opportunities for integrating cognitive, psychomotor and affective learning, the close faculty/student interaction and the emphasis on success at EARTH as distinguishing characteristics of the institution, another theme which emerged from faculty responses is an abiding interest in the integration of disciplines. Reflecting a concern common in agricultural higher education, EARTH faculty have struggled with the notion of breaking down what many perceive as artificial barriers between disciplines. While some respondents identified this integration (or efforts towards it) as a feature distinguishing EARTH from other
institutions, quite a few others expressed frustration and disappointment with the extent of such integration. Faculty cited many examples of integration across courses -- for example having a professor of animal science develop the problems to be posed in a quantitative skills course, utilizing the written reports from a tropical crops experiment as the basis for improving written communication skills, and focusing on applied agriculture problems for investigation in a beginning chemistry course. Yet for each example of successful integration there seems to be a comparable tale of frustration. A number of faculty complained that, with the passage of time, they have perceived a lessening of enthusiasm for integration, both among colleagues and administrators, while others indicated that integration is simply too time consuming. Integration requires too much logistical maneuvering and faculty indicated they are simply too busy to invest the time required for the coordination required with other faculty.

While most of the students interviewed shared a belief that the value and uniqueness of EARTH derives from the opportunities for personal growth and affective learning and development, this view was less prevalent among the faculty. Some members of the faculty were clearly in agreement with this outlook. Others, perhaps reflecting their specialized training and disciplinary focus, and while strongly endorsing
the integration of theory with its applications, referred to
the acquisition of technical knowledge and expertise as the
raison d’etre for the institution. A sizable group appeared
to have a somewhat more balanced view, emphasizing both
cognitive and affective development.

The investigator was left with the impression that
beliefs with respect to the aims of EARTH depend in part on
how long one has been working at EARTH. Among those
interviewed, it appeared that those who heavily emphasize the
development of technical expertise tend to be those who joined
the faculty relatively recently.

The investigator left Costa Rica with the impression that
a number of professors, primarily among those who began
teaching during the first academic year, had significant
reservations regarding the future direction of EARTH. Their
concerns largely involved a perception that the curriculum at
EARTH was increasingly content oriented, with the information
assimilation model of learning gaining prominence at the
expense of more experiential vision. In addition, concerns
were expressed that, in the process of institutional growth, a
common mission and close faculty integration were being
sacrificed.

One professor asserted that, in his opinion, the
change in the law allowing EARTH to grant a
licenciatura degree was probably a mistake, and
certainly premature. He indicated that the change
contributes to pressure for a greater and greater
emphasis on research, and contributes to the
tendency for students to think in terms of seeking higher academic degrees.

Two members of the faculty indicated that they perceived a steady erosion of support for the work experience program among faculty. They attributed this to the addition of new faculty who hadn't "bought in" to EARTH's mission or methods.

A number of faculty expressed reservations about what they perceived to be an increasing emphasis on memorization of content in courses rather than problem solving or critical thinking. They said they sensed that some faculty were not comfortable with experiential and participative approaches.

Many of the professors who had joined the faculty during the first or second years indicated that they missed the sense of closeness among faculty that had existed when there were fewer professors and bi-weekly faculty meetings included everyone. While they seemed to support the faculty structure which had evolved -- with the faculty being divided according to instructional level -- they also indicated that they felt the instructional program and the overall development of EARTH was suffering as a result.

A certain degree of uncertainty surfaced in many of the interviews with respect to mission and philosophy. Some of the faculty indicated they were not entirely sure what the "exit profile" for an EARTH graduate was. Was EARTH trying to produce a "foreman" for field level production activities, a rural development worker, an extensionist, or a private farmer? Is it even appropriate to try and specify what graduates might do after graduation? One of the original faculty members observed that EARTH will be a success to the extent to which EARTH graduates make their careers in rural development, while it will be judged a failure if a high
proportion pursue additional degrees and ever greater degrees of specialization. Along the same lines, another professor argued that if EARTH begins to graduate large numbers of students whose ambition is to pursue advanced degrees, USAID would have been better off giving the money used in the creation of EARTH to the University of Costa Rica. Others indicated that regardless of one's desires, it is only natural for a certain percentage of graduates to seek advanced degrees, and that those same students might end up having a far greater impact in terms of contributing to the region's sustainable development, than those who go from EARTH to rural areas and seek employment in production, agricultural extension or similar activities. A number of faculty stressed that regardless of what anyone desires, students will do what they perceive is in their best interests, a matter determined in large measure by things external to EARTH.

These responses regarding the aims of EARTH were largely elicited by asking the same question that was asked of students: What do you think a student should leave EARTH with (in terms of knowledge, skills and attitudes)? Some members of the faculty were asked to also reflect on how they perceive the strengths and weaknesses of EARTH graduates and, to the extent possible, to compare them to graduates of other institutions. In very general terms responses were what one might expect -- graduates, while perhaps not possessing quite
the range of theoretical information as do graduates of a more conventional program, are generally more comfortable in the field, better able to analyze and solve problems, and more self-confident.

A visiting professor from the U.S. indicated that the small group of students with whom he had been working seemed to be considerably ahead of the average student from his home institution in terms of initiative, independence, and responsibility.

A professor familiar with the Pan American Agriculture school in Honduras, Zamorano, indicated that he thought EARTH students were perhaps more aware and sensitive to social and environmental concerns, and are more experienced entrepreneurs, but are not as competent field level technicians.

One of the newer faculty members observed that many EARTH graduates will be "innovative entrepreneurs", and that is what is perhaps most significant about the university's contribution.

Five members of the faculty expressed concerns regarding the lack of humanities and social sciences in the curriculum. One professor in particular was quite dismayed. He bemoaned the lack of humanities, sociology, anthropology, especially now that EARTH was granting a licenciatura degree. In his opinion, EARTH students would not be prepared to pursue a further degree in a conventional university, as the licenciatura implies a base in philosophy. He indicated that student interest in activities such as a philosophy club and a literary society, while important, didn't serve to ameliorate this glaring omission in the curriculum, as only students with a special proclivity for these activities were attracted to such groups.

A particularly disheartening comment, repeated by three members of the faculty, was that they had seen few signs of self-directed learning among students. They talked of trying to integrate exercises in their classes in an attempt to stimulate students to use the resources of the library, but that they were meeting with little success.
The faculty members interviewed seem to agree that EARTH graduates could be characterized as self-confident problem solvers, comfortable in the field and experienced in drawing connections between theory and practice. At the same time, many of them consider an EARTH graduate to be somewhat deficient in theoretical knowledge and, in comparison with graduates from many other schools, lacking a base in the social sciences and humanities.

Six members of the faculty expressed concern regarding the role of research at EARTH, without being asked any questions related to the issue. Two questioned how EARTH can be expected to make a contribution to the development of the humid tropics when relatively little is known about raising food and fibre in the humid tropics. They indicated that, despite the fact that EARTH was beginning to increase its involvement in joint research projects with other institutions and that individual faculty members and students were involved in research activities on their time, a much greater institutional commitment to research was required. Others expressed doubts about their ability to engage in research. They indicated that, in light of the teaching load, they did not understand how they could be expected to conduct research. Finally, two faculty members interviewed expressed grave reservations about what they perceived to be a barely discernable trend towards a research emphasis in the
institution. They both felt that EARTH should be firm in its commitment to being a premier teaching institution and should not dilute that mission by trying to become a center for research. It might be mentioned that in casual conversation with other faculty and administrators, the author perceived a general agreement that EARTH should strive to become involved in applied agricultural research, both independently and in collaboration with other entities, and that such research should be integrated into the primary mission of the school, which should continue to be teaching.
The present study was an exploration of the philosophical orientation, history and development of higher education in agriculture. The case of one institution, The Escuela de Agricultura de la Región Tropical Húmeda, was examined. The essential purpose of the study was to contribute to an ongoing dialogue regarding higher education in agriculture.

Summary

The following section summarizes and interprets chapters 2, 3 and 5. It is organized according to the research objectives as presented in the introduction to the study.

The first objective was to describe important approaches to educational philosophy, with a particular focus on higher education in agriculture.

Elements of selected theories of education were presented, including the liberal (or academic), behaviorist, humanist, progressive and social reconstructionist-radical approaches. The impact of each of these theories on contemporary approaches to agricultural higher education was then described. The liberal approach, to the extent that it is concerned with the development of wisdom and a moral, spiritual and aesthetic sense, was characterized as valuable
to the education of agriculturalists for the twenty-first century.

It was noted that the behaviorist approach has had an enormous impact on modern educational philosophy and practice. Behaviorists' extreme empiricism fits closely with the positivist stance of most scientists, making it particularly suited to conventional approaches to agricultural higher education.

The humanists' focus on the learner and on personal discovery and meaning are not concerns usually associated with higher education in sciences and technology. Indeed this approach is generally associated with the liberal arts and "experimental" or "alternative" education. These are concerns which are clearly relevant to the education of agriculturalists and rural development professionals.

Progressive educational philosophy advocates the scientific method as the model for learning. Dewey in particular emphasized the importance of students learning to think scientifically as the means of enabling them to make sound judgements regarding the whole range of subjects presented in school. It might appear that the emphasis of progressive philosophy on the scientific method would be well suited to an educational program focused on agriculture. On examination, the influence of progressive education on agricultural higher education has been minimal.
Social reconstructionism and other radical approaches to education have had minimal impact on the philosophy or practice of higher education in agriculture. Traditionally, colleges of agriculture have treated social concerns, and indeed most issues not directly relating to production, as externalities and, therefore, largely irrelevant to the business of agriculture.

Increasingly, individuals involved in agricultural higher education, as well as a diverse group of observers from outside, have concluded that traditional approaches are not adequate. If the challenges of feeding the planet, preserving the natural environment, and building and protecting viable rural communities are to be met, agricultural education must move beyond an exclusive focus on production and give equal consideration to questions of social equity, environmental conservation and rural development. This implies that in formulating a philosophy to guide the education of agricultural professionals, it is important to integrate elements of the liberal, humanist, progressive and radical approaches. In particular, it seems appropriate to adapt the concern for ethical and moral development which has characterized the liberal approach, the humanist's emphasis on the needs of the learner, the focus on experience and the notion of the scientific method as serving for a metaphor for learning from the progressives, and the reconstructionists
insistence that learning occurs in a social context and that education has a responsibility to transform society.

The second objective of the study was to propose elements of a philosophical approach to agricultural higher education appropriate for meeting the challenges of the 21st century. Part of this objective was addressed in the discussion of approaches to educational philosophy. It was suggested that, whereas agricultural higher education has traditionally been viewed as the training of agricultural professionals capable of increasing production and maximizing profit, there is a need for a new paradigm emphasizing the social and environmental context in which agricultural takes place. At the same time, the traditional concept of education as the assimilation of propositional knowledge has largely ignored students' moral, ethical, and spiritual development, as well as other affective concerns.

Taking the social and environmental context of agriculture into account means more than simply adding social science or ecology courses to the curriculum. It means thinking about agricultural higher education in a new way, and implies that a key principle of a new philosophical approach is people centered development. Technological and scientific change must be judged based on its impact on the social and natural environment, rather than simply its impact on production.
Preparing students for complexity and change is another key element in a new philosophy guiding higher education. Agriculture is a human activity which occurs amidst a confusing array of social, cultural, political, economic, and environmental factors. The explosion of information and rapid development of new technologies translates into rapid obsolescence of much of what learners study today. A fundamental principal of higher education in agriculture should be to facilitate a process by which learners adapt to their environment, a major part of which is helping students learn how to learn. This includes Dewey's notion of encouraging students to employ scientific reasoning, as well as systems analysis and other approaches which provide students a more holistic perspective.

A third principle of a new approach to agricultural higher education is the inclusion of methods of inquiry which enable students to confront complex issues requiring the reconciliation of technical and scientific concerns with social and environmental constraints and possibilities. Systems analysis and related holistic approaches are examples.

Finally, experiential learning strategies were proposed as the best means for providing learners opportunities to integrate experiential, propositional and practical knowledge. Equally importantly, experiential learning strategies are
ideally suited for developing an awareness of the social and political context of agriculture and rural development.

The third objective of the study involved describing the development of higher education in agriculture and characterizing contemporary approaches.

Current practice and philosophy in U.S. agricultural higher education was characterized as owing much to the traditions of the German research university and the American land grant institutions. The emphasis on research, the dominance of science, and the notion of educational opportunities for the "laboring class" were identified as important elements of these traditions. The land grant model in particular has been widely imitated around the world, including Latin America.

While there are many signs of discontent with contemporary approaches to agricultural higher education, by and large they remain remarkably similar to the approach of the 1940s and 50s. While there was a period of innovation in the late 1960s and 70s, fiscal crises, falling enrollments, increasing pressure to publish for peers, and an increasingly conservative national mood, all conspired to slow down, and even reverse the pace of reform.

The fourth objective of the study was to describe the development, philosophy and educational practice of EARTH.
In doing so, the institutional commitment to the development of the humid tropics, the emphasis on learning by doing, and the efforts at curricular innovation were related.

The evolution of the curriculum was presented. Three courses that exemplify the learning by doing focus were described, as were attempts at implementing a systems approach in the curriculum. A clear statement of mission, emphasizing education for the development of the humid tropics, emerged from an analysis of EARTH documents. These documents reveal considerably less about the philosophical basis for EARTH's educational practice. It is possible to discern in EARTH documents an emphasis on people centered development, experiential learning, a democratic and participatory institutional climate and the notion of social responsibility, yet these issues have merited relatively little explicit attention. In contrast to the approach advocated in this study, there is little emphasis on complexity and change in EARTH literature, and the reductionist paradigm seems to remains the favored inquiry mode.

The dominant theme to emerge from interviews with students was their overwhelming embrace of experiential learning. The opportunity to integrate propositional learning with the acquisition of practical skills was repeatedly identified as EARTH's greatest strength. The interviews also revealed a widespread appreciation for the importance of
attitudinal change. Students were very concerned about becoming effective communicators and leaders, about learning how to work in teams, and about becoming agricultural professionals who know how to relate to small farmers, as well as bankers and politicians.

Students expressed nearly unanimous support for the work experience, enterprise project and internship courses. They repeatedly stressed that these courses embody EARTH's approach to learning, and related the importance of each course in their personal development. A great many students indicated it would be beneficial to increase off-campus activities associated with these courses, both as a means of increasing students' understanding of agriculture and rural development, as well as to more fully integrate the school with the surrounding communities.

Interviews with the pioneros proved to be particularly enlightening. Having been at EARTH since the 1990 inauguration, and having shared the hardships of developing a new institution, these students possessed a unique and valuable perspective. Some of them indicated they sensed two important changes in EARTH. The first was a change in the curriculum, with emphasis increasingly being placed on content and focused on technical issues. The second was their perception of a decreased commitment to social and environmental concerns on the part of newer faculty and
students admitted in 1991, '92 and '93. Based on interviews with students from these latter classes, as well as with relatively recently hired faculty, the investigator shared their perception regarding the trend toward a greater emphasis on content in the curriculum, yet did not conclude the interviews sharing their perception with respect to student and faculty attitudes. It cannot be ignored that their perceptions regarding student attitudes were fairly widespread and they shared a great deal more contact with subsequent classes of students and new faculty than did the researcher (who, at the time of the interviews, had been absent from EARTH for 15 months).

Faculty, like students, shared a perception of EARTH as a unique institution, with an innovative approach to teaching and learning. The opportunity for experience-based learning was repeatedly mentioned as the defining element in EARTH's approach. Faculty seemed to value experiential learning largely as a means for integrating cognitive and psychomotor learning. Many also indicated that hands-on experience provides motivation for learning. Students, on the other hand, talked far more about the opportunities for personal development and attitudinal change associated with experiential learning.

Faculty were very supportive of both the internship and the enterprise projects. The work experience course, on the
other hand, was more controversial. Questions were raised about the intensity of the course, in terms of both the time and energy demands on faculty and students, as well as the value of students performing routine field work.

Far more than students, faculty emphasized the importance of technical competence and the possession of propositional knowledge in agricultural sciences. To a certain extent, the degree of emphasis placed on technical competence by faculty, reflected when they began working for the institution. With some exceptions, those hired during the first two years of EARTH's existence tended to place more stress on a student's concern for the social and environmental dimensions of agricultural and rural development, while those hired later appeared to be more concerned with students' mastery of technical and scientific aspects.

Like students, faculty talked a great deal about the importance of graduates feeling comfortable in the field. A surprising number of faculty related their complete lack of confidence in their practical skills when they graduated from college. For many faculty, the student's degree of self confidence seemed to be largely a function of their practical skills. Many faculty stressed the importance of the ability to analyze and solve problems.

In general, the faculty perceived EARTH graduates as possessing different kinds of skills from graduates of more
conventional university programs in agriculture. The EARTH graduate tends to be more motivated, independent and self confident. At the same time, many faculty members suggested that EARTH graduates might lack exposure to the humanities and social sciences, and perhaps not possess the same degree of propositional knowledge as would the graduate from a conventional program.

The fifth and final objective of the study called for the formulation of a series of recommendations with respect to EARTH's philosophy and educational practice. These are presented in the following section.

Recommendations

The following section presents a series of recommendations with respect to EARTH, its philosophy, and educational practice. They reflect issues and concerns that emerged in the course of the interviews at EARTH, as well as those of the researcher, based on his association with the College. They are presented in the spirit and hope of contributing to the continued improvement of EARTH, as well as to a more general and on-going dialogue regarding higher education in agriculture.

Recommendation number #1: There is a need to articulate a comprehensive definition of the purpose and aims of EARTH.
The articulation of a comprehensive definition of purpose and aims should be considered the fundamental recommendation of this study. It is fundamental in the sense that all subsequent concerns and recommendations could legitimately be viewed as elements of such a definition. For the sake of clarity, additional recommendations that could be considered elements of this comprehensive definition have been treated separately.

In higher education, the call for definition, formulation of mission statements, strategic plans and related exercises is a familiar refrain. Reduced enrollments, budget cuts and quantum changes in the nature of agriculture and rural society have forced many institutions to re-examine their institutional missions and philosophies. Often the writing of mission and philosophy statements is the first step in this process.

In the case of EARTH, this is not a new or novel suggestion. One of the first tasks undertaken in the development of EARTH was the writing of a mission statement, a statement later adopted by the newly established Board of Directors. The elaboration of a statement of purpose was again proposed by Richard Bawden, John Rigby and Roberta Warren in a 1991 evaluation of EARTH carried out for USAID/Costa Rica (Bawden, 1991). A new mission statement, the details of which are discussed in Chapter V, was developed in late 1993. Based
on the comments made by faculty and others in October of 1993, it is the author's observation that there is considerable confusion and differences in understanding regarding the purpose and aims of EARTH.

There is fairly widespread agreement that the primary purpose of EARTH is to contribute to the sustainable development of the humid tropics through education, yet no such unanimity is evident regarding the meaning of the terms sustainable and development. Clearly, the manner in which these concepts are defined greatly impacts the kind of learning experiences one designs. If the primary focus of development is increased agricultural productivity and profitability, one might reasonably expect an almost exclusive emphasis on the technical and scientific aspects of production in the curriculum. If, on the other hand, agriculture is viewed as a human activity concerned with issues of social equity, one might design a curriculum that includes an emphasis on the social sciences along with the agriculture sciences. In the event that a primary objective of development efforts is the design of agricultural production systems which do not degrade the environment, the curriculum would probably focus on ecology and agriculture/environment interactions.

It may reasonably be argued that EARTH's development paradigm should encompass all of these approaches. It is the author's opinion that EARTH should in fact promote a multi-
faceted definition of development. It must be recognized that tradition exerts a strong pull toward conceiving of development in terms of the application of science and technology for increased production. It is important for a definition of development to stress the emphasis on people, equity, and sustainability as counterweights to the traditional view.

The process involved in articulating a vision of development, in the author's opinion, is almost as important as the details of the resultant vision. Such a debate requires faculty and staff to reflect on their individual views and values, serves to unify the institution, and fosters a sense of ownership of the vision which emerges from the debate.

An important part of the dialogue regarding EARTH's purpose and aims relates to the relative emphasis placed on the acquisition of propositional knowledge, practical skills, and attitudinal or affective learning, including critical thinking abilities. Traditional approaches to higher education in agriculture have relied heavily on information transfer, largely ignoring affective development. Students, faculty, and administrators all come to EARTH formed in this tradition. It is critical that strategies currently in use that have proven effective in promoting affective development be preserved and that additional innovations be encouraged.
The tendency to relegate concerns regarding student attitudinal and emotional development to the student life program is common in higher education, and EARTH is no exception. Despite an institutional goal of graduating a professional committed to the development of the humid tropics who is strongly identified with environmental protection and social responsibility, discussions of the curriculum, outcomes, and course objectives too often focus exclusively on content. Interestingly, in many cases, students appear to appreciate the importance of affective development more than do members of the faculty. The work experience and enterprise projects courses are a clear example. Faculty, in discussing these courses tend to focus on content, while students focus largely on how work experience and the projects altered their attitudes towards work and their ability to work in groups and get along with co-workers.

Strategies which facilitate affective development should be integrated into courses, projects and the student life program. Students should be encouraged to participate in the development and on-going evaluation of such strategies.

As mentioned above, the objective of initiating a dialogue with respect to the nature of learning is not necessarily to achieve consensus or agreement on a single approach to teaching or educational methodology. Rather, the
aim is to encourage debate and reflection, and hopefully expand everyone's repertoire of approaches.

A related and equally important concern in defining EARTH's purpose and aims is the initiation of a dialogue regarding the design of learning experiences. Should the focus remain on "learning by doing" as the dominant model for learning? It seems that some faculty (and students) view learning by doing as simply integrating a minimum number of "practical" exercises in an otherwise conventional information assimilation format. Others conceive of learning by doing as encouraging active student participation in all aspects of the learning process, whether it's in the classroom, laboratory, or field. A dialogue about learning would again require faculty to reflect on their individual approaches, and would enrich everyone's understanding of the learning process.

The following proposed mission statement has been offered in the hope of stimulating and renewing the conversation with respect to the mission and philosophy of EARTH.

EARTH is an international university dedicated to the sustainable development of the humid tropics through a process of participative inquiry. EARTH is a place where students, faculty, staff, farmers and their families, and others from throughout the humid tropics of the Americas come together to create systems of agriculture and living which lead to improvements in the quality of life for the inhabitants and the conservation of the environment.

Agriculture and rural development in the humid tropics are human activities occurring in a fragile and biologically diverse region. The human and ecological dimensions of development efforts are the primary considerations in the decision making process at EARTH. In all of our activities, we are committed to actions that are socially desirable,
ecologically compatible with resource conservation, culturally feasible, ethically defensible, and economically sound.

The primary focus of EARTH is on the facilitation of learning. EARTH is committed to experiential learning. We view experiential learning as a participative process in which the student is an active partner. We view learning as a process of making sense out of our experiences and what we see around us. Ultimately, our learning should lead us to attempt to improve our world. Experiential learning includes learning knowledge already created, as well as learning how to do a great variety of things. Most importantly, experiential learning means learning how to be -- learning to work and communicate with others, learning to be critical, learning to take responsibility for one's own learning, and learning social responsibility. All learning experiences at EARTH attempt to integrate the gaining of propositional knowledge with the application of knowledge and an understanding of the uses of such knowledge.

Two things characterize the world of agriculture and rural development -- complexity and change. To effectively manage complexity and change, modes of inquiry must be employed that enable people to grasp the big picture, as well as understand the parts comprising the whole. EARTH thus seeks to promote the use of modes of inquiry and organization of learning experiences which provide learners an overview of the situation, as well as more conventional approaches appropriate for examining the components of a system.

To be successful in its mission, EARTH must continually strive for increased communication and integration with the larger community. It is not only our responsibility to be actively involved in our society, but our learning system depends on the learner being immersed in the larger context of agriculture and rural development. We seek greater ties with the international academic and development community, the business community, the communities of the humid tropics, and especially the communities which surround the University. EARTH seeks to be a good and reliable neighbor and will expend every effort to promote the sustainable development of our region.

Recommendation #2: Critically examine EARTH's curriculum in light of the definition of purpose and aims.

There is a common belief that EARTH's curriculum is too intense both in terms of hours per week committed to classes, laboratories and field work, as well as the total number of
credits, and indeed the length of semesters. Experience has shown that is far easier to identify a need and add a new course than it is to lighten the load and eliminate or combine courses. Efforts are currently underway to revise the curriculum and find a means of reducing the load on students and faculty.

In examining and possibly revising the curriculum, it is critical to first achieve some degree of consensus regarding the purpose and aims of the university. Lacking such a consensus, adjustments will, at best, result from negotiations between different disciplinary interest groups or, at worst, represent simple expediency or capriciousness.

Recommendation #3: As agents of change in the humid tropics, students must be adept at coping with a complex and ever-changing environment. Students need to be exposed to approaches and participate in activities which will prepare them to manage complexity and change.

In the process of bringing students and faculty with very different backgrounds and abilities together into a single learning system, the emphasis on curricular integration and the importance of providing students a holistic perspective has been reduced. The curriculum has become more discipline specific and, in the opinion of some students and faculty, more fragmented. A fourth year student commented that, while such changes made for a more comprehensible and "comfortable"
curriculum, she thought students were no longer getting the "big picture" to the extent they had been.

In the author's opinion, there are two ways to enhance students' (and faculty) ability to deal with the complex and dynamic nature of agriculture and rural development. The first is to provide abundant opportunities for integrating the academic and student life programs with the life of the larger community. The success of the third year internship provides ample evidence of the value of this approach. Well organized field trips to farms and communities, the integration of "real world" problems into courses, and student involvement in the life of the surrounding communities through the student life program, are other ways of accomplishing this goal.

The second means of enhancing students' ability to manage complexity involves the use of systems approaches in the academic program. Systems theory advocates approaching difficult and complex situations, whether it be the sustainable production of bananas or improving the quality of life of land reform beneficiaries, by attempting first to gain an understanding and appreciation of the entire system. The use of soft systems analysis, farming systems approaches, and other holistic methods, provide students an appreciation for the complexity of addressing real world problems. Students are already quite familiar with reductionist approaches, involving a focus on isolated parts of the larger system. Whether it be
identifying the best chemical to control nematodes attacking bananas (and perhaps overlooking long term effects on soil fertility), or introducing a cash crop to small farmers (and overlooking the effects on family nutrition), the reductionist approach is appropriate for addressing individual and easily identified problems. It is often inadequate, however, when dealing with complex situations.

Recommendation #4: Based on student comments, the work experience course is a key feature of EARTH's curriculum. Without altering the emphasis on actual production field experiences, an effort should be made to enhance opportunities for student reflection and involvement in critical discussions of their activities.

Students were practically unanimous in praising the value of the work experience course. It is a course which provides students the opportunity to integrate practical skills with the theoretical foundations of agriculture. Students indicated that the course is also crucial in the development of positive attitudes towards work, and provides opportunities for learning to work more effectively in groups.

A common criticism of the course, particularly during the first two years of study, regards the lack of opportunities for discussing what takes place in the field. Students indicated they frequently have questions that go unanswered, suggestions for improving procedures and practices that go unstated, and other comments which they don't express because they lack an adequate forum for initiating such discussions.
In the opinion of the author, the one hour weekly "in class" period that theoretically is a part of work experience, should be considered a required part of the course. If that proves insufficient, or if students would like to participate in a different type of meeting or discussion group, every effort should be made to accommodate them.

**Recommendation #5: Students should be encouraged to participate in a permanent dialogue and critical examination of EARTH and its activities, including individual courses, the overall curriculum, the student life program, and commercial farming operations.**

A promising way to introduce students to the difficulty of confronting problematic situations is through participation in a critical examination of EARTH's varied activities. Students have a great deal to gain through participation in such deliberations. Examples of discussion in which students might participate include determining course objectives, the role of content versus process in the curriculum, the determination of norms governing student conduct, and the extent of chemical use in the production of spices on the commercial farm. Not only can students contribute to such discussions, but even more importantly, their involvement will result in a sense of greater ownership in the course, the curriculum and the institution.

Participation in meaningful deliberations regarding institutional affairs is an effective means of encouraging
students to take responsibility for their actions and learn more about decision making. Students are exposed to methods for resolving conflicts and are faced with the difficulties inherent in adjudicating conflicting claims.

**Recommendation #6:** As EARTH labors to define its institutional purpose and aims, it is critical that new faculty fully understand its details and the implications for educational practice.

A number of people have expressed disappointment with the lack of depth in the orientation process for new faculty. A few of the newer faculty indicated that after teaching for several months they were still not clear about many aspects of EARTH's educational approach. Similarly, faculty members who had begun teaching during the first and second years expressed frustration that some of the newer teachers did not appear to understand the principles upon which EARTH's practice is ostensibly based.

Clearly, the process of integrating new staff into an existing institution is a complex one, especially in the case of an institution like EARTH that is attempting to approach education in new and innovative ways. The success of EARTH's efforts will largely depend on the degree to which faculty identify with and feel ownership of the university's approach and philosophy.

**Recommendation #7:** Initiate a dialogue regarding the nature of research conducted at EARTH, faculty
research responsibilities, and the integration of the teaching and research programs.

The original design for EARTH focused on the creation of a teaching institution. Little mention was made of research and investigation. At the same time, the institution was charged with the responsibility to contribute to the sustainable development of the humid tropics, a task made particularly challenging in light of the lack of successful experience and accumulated knowledge regarding humid tropical agriculture and development. It has become increasingly difficult to reconcile these twin roles, and there have been ongoing efforts to clarify the nature of EARTH's research program. It was clear in the interviews that a consensus was lacking regarding the role of research, the manner in which teaching and research are linked, and faculty opportunities and responsibilities for research.

Recommendation #8: EARTH's success and impact on the future of the humid tropics will depend in large measure on the quality of relationships within the institution, as well as relationships created between the university and the larger community. Concerted efforts should be made to continually improve the quality of such relationships.

An aspect of life at EARTH brought up repeatedly by students and faculty is the nature of the relationships between faculty and students. Many students expressed that the accessibility and openness of faculty had been critical to their personal development and success at EARTH. During the
first years of the institution, a period characterized by a reduced student population and an atmosphere of novelty and enthusiasm, it was perhaps inevitable that students and faculty develop close and positive relationships. As student numbers approach 400 and campus life becomes more regulated and normalized, however, the researcher perceived barriers growing between the faculty and students. One clear indication of this was that first and second year students did not refer to their relationships with faculty to the same extent as fourth year students. Another was comments and inferences made by some faculty members indicating that student faculty relationships at EARTH are too close, and that relationships should be more formal and "respectful".

Relationships between administrators and faculty was another aspect of institutional life frequently mentioned during the interviews. A number of faculty expressed concern and frustration with the lack of contact with administrators. Some suggested that cliques were forming among the faculty, and that certain faculty seemed to be in favor with administrators. While it is clearly beyond the scope of this study to evaluate EARTH's administrative organization, the encouragement of open, honest and frequent communication between faculty and administrators should clearly be a priority.
Of equal importance are EARTH's relationships with the larger community. EARTH's success on practically every front will depend on the nature of the relationships developed with surrounding communities, communities in other regions of the humid tropics, secondary schools that produce the graduates who seek admission to EARTH, parents, the international academic community, the business community, donors, and other groups too numerous to mention.

Recommendation #9: The degree of integration between courses and disciplines is an aspect of EARTH that has set it apart from other institutions. It is also an aspect of the program that generates great interest from visitors accustomed to more "conventional" programs. As EARTH evolves, priority should be given to enhancing such integration.

The avoidance of departments and other forms of discipline-based organizational structures was seen as one means of encouraging a holistic view of agriculture and rural development. Team teaching, the integration of activities among distinct courses, and daily interaction of faculty representing different disciplines, were strategies adopted to promote a more holistic curriculum.

Despite continued efforts to encourage faculty integration, the author perceived increased divisions between faculty members, between disciplines, and between instructional levels. There appears to be a greater tendency for faculty to discuss the course they teach as "their course", and treat other courses as "his" or "her" course.
Faculty seemed to be less aware of what was going on in other courses, and to perceive of other courses as beyond their influence or concern. The organization of faculty meetings by instructional level also seems to have resulted in a noticeable degree of fragmentation.

While part of this can clearly be attributed to an increase in the number of students and faculty, other factors can be identified as well. These include extreme demands on faculty time leaving few opportunities for becoming involved in other courses and discussing matters of mutual concern, the increased emphasis on discipline specific courses in the curriculum, and the legacy of having studied and, in many cases, taught in academic environments organized around disciplines.

There seems to be a great deal of interest on the part of faculty in increasing the level of integration. The encouragement of greater integration within the academic program should remain a priority of the entire faculty and administration. Possible measures which might be taken include bringing successful experiences to the attention of the faculty, enhancing opportunities for true team teaching (as opposed to rely teaching), and experimenting with alternative organization structures.
Conclusion

Formidable challenges confront agriculture and the future of rural society. Higher education has an important role to play in preparing young people who possess the knowledge, skills, attitudes and abilities to meet these challenges. Designing effective learning strategies and appropriate educational approaches requires the articulation of philosophical principles upon which educational practice is based.

Agricultural higher education has, until the present, been primarily concerned with increasing production and maximizing profitability. Consequently, the curriculum has focused largely on technical and scientific subject matter. As environmental and social concerns become increasingly important, other fields and modes of inquiry gain significance. The shift from production-oriented to people-centered development becomes imperative.

Experiential learning strategies offer great promise for integrating distinct kinds of learning and for confronting students with the complexity and diversity of agriculture and rural development. Through active participation in their learning, and involvement beyond the confines of the classroom and laboratory, students develop an awareness and appreciation for the larger social and political context.
EARTH was created to contribute to the sustainable development of the humid tropics. Remarkable success has been achieved in implementing an innovative approach to learning and building a dedicated team. There is a need for those involved in EARTH to initiate a critical conversation regarding the aims and purpose of the institution. An important part of this dialogue involves articulating a vision of sustainable development as well as the profile of the graduate of the institution.

At the same time, while EARTH has only been in existence for a few short years, the enthusiasm exhibited by students and faculty for its approach to agricultural higher education is impressive. Those involved in other institutions might do well to explore the "EARTH experience", particularly with respect to the integration of theory and practice, in the process of reflecting on how their own programs are meeting the needs of their graduates and society.


Agriculture, Department of Agricultural and Extension Education.


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APPENDIX A

INTERVIEW QUESTIONS

I. Faculty

1. How do you feel about the balance between theory and practice in EARTH's curriculum - are they well balanced? Are they integrated?

2. What are your perceptions regarding the work experience, enterprise project and internship courses?

3. Educators talk about the three domains of learning: cognitive, affective and psychomotor, as well as levels of learning within each of these areas - where do you feel the main emphasis is placed in EARTH's curriculum with respect to these three kinds of learning? Give some examples.

4. If you could make one change in EARTH's curriculum, what would it be?
5. Think a little about what you have observed with respect to the development of attitudes and changes in behavior among EARTH students. To what do you attribute these changes? Can you think of any specific examples?

6. Is the educational process and philosophy at EARTH different from what you had experienced before coming here? In what way?

7. Is there anything you have observed or experienced since coming to EARTH that has changed your attitudes or understanding with respect to learning and education?

8. What would you like to see a student get out of their time at EARTH?

9. With respect to the humid tropics, what do you think are the most important things for a student to learn?

10. How would you define learning?
II. Administrators

All of the above questions, plus:

1. In evaluating the performance of faculty, what do you consider the single most important thing to consider?

III. Students

1. What experiences at EARTH do you feel have, or will prepare you to be a successful professional in agriculture?

2. What do you hope to get out of your time at EARTH?

3. What do you feel is the balance between theory and practice in the curriculum at EARTH (theory in this case might be defined as "book learning" or work related to assimilating concepts, principles and theories; practice as either hands on work and/or problem solving experiences)?
4. How about the integration between theory and practice - do you feel connections are made between the theory you learn and field activities, small group activities, enterprise projects, etc.?

5. What is your opinion of the work experience, enterprise projects and the internship courses?

6. Is the learning process/philosophy at EARTH different from what you had experienced before coming to EARTH? In what way?

7. If you could make one change in EARTH's curriculum, what would it be?

8. What sort of things you have done at EARTH (includes everything - classroom, field, dormitory living, vacations, etc.) have been the most important to you and why?

9. Have your attitudes about agriculture, the environment, social issues, or other
significant issues changed since coming to EARTH?

10. How do you see yourself acting (both now and in the future) to improve the situation of agriculture in the humid tropics?

11. How do you perceive your future role as a professional in agriculture?

12. How would you define learning?
## APPENDIX B
### EARTH CURRICULUM

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Dear EARTH Student, Faculty or Administrator:

Thank you for your willingness to assist me!

As you know I am conducting a series of interviews with students, faculty and administrators at EARTH. I am hoping to learn how the school is doing in integrating theory and practice in the academic program. This is a qualitative research project in which I will try to "tell the EARTH story" using the words of students, faculty and administrators. The interview should last between 30-60 minutes.

Before we begin the interview, it is important that you know that your participation is entirely voluntary and that you are under no obligation to be interviewed. I will be recording the interview, unless you request that it not be recorded. The tapes of the interview will stay in my possession and will be listened to only by me. After concluding the analysis phase of the study, all of the tapes will be erased. If, during the interview, you would like to have the recorder turned off, please let me know and I will gladly oblige.

What you say in our interview will be kept entirely confidential. While it is possible that some of the things you say will be included in a report of this research, nothing you say will be attributed to you.

Again, thanks for your cooperation.

Sincerely,

Daniel Sherrard
APPENDIX D
HUMAN SUBJECTS REVIEW COMMITTEE APPROVAL

Last Name of Principal Investigator: SHERRARD

Checklist for Attachments and Time Schedule

The following are attached (please check):

12. □ Letter or written statement to subjects indicating clearly:
   a) purpose of the research
   b) the use of any identifier codes (names, #s), how they will be used, and when they will be
      removed (see Item 17)
   c) an estimate of time needed for participation in the research and the place
   d) if applicable, location of the research activity
   e) how you will ensure confidentiality
   f) in a longitudinal study, note when and how you will contact subjects later
   g) participation is voluntary; nonparticipation will not affect evaluations of the subject

13. □ Consent form (if applicable)

14. □ Letter of approval for research from cooperating organizations or institutions (if applicable)

15. □ Data-gathering instruments Interviewer is data gathering instrument

16. Anticipated dates for contact with subjects:

   First Contact                     Last Contact
   January - February 1994          Same
   Month / Day / Year               Month / Day / Year

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual

   tapes will be erased:
   N.A.
   Month / Day / Year

18. Signature of Departmental Executive Officer Date Department or Administrative Unit

   Patricia M. Keith 12-1-93 Agricultural Education Studies

19. Decision of the University Human Subjects Review Committee:

   □ Project Approved  □ Project Not Approved  □ No Action Required

   Patricia M. Keith 1-12-94 Signature of Committee Chairperson

Name of Committee Chairperson Date