A DESCRIPTION OF THE USE OF A VALUE CLARIFICATION APPROACH IN THE TEACHING OF EARTH SCIENCE CLASSES

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ABSTRACT

A DESCRIPTION OF THE USE OF A VALUE CLARIFICATION APPROACH IN THE TEACHING OF EARTH SCIENCE CLASSES

By

Virginia M. Chamberlain

Whether one looks to John Dewey's comment that all education has a moral purpose or at the more recent comment of Charles Silberman who, in his book Crisis In The Classroom, said that "The job of the educator is to teach in such a way as to convert ideas about morality into moral ideas," the issue of the role values should play in instruction is one of abiding concern. This concern, coupled with another educational concern which has had renewed attention--the need for equal emphasis upon both cognitive and affective instructional objectives--poses central issues for the review and synthesis of approaches designed to foster the clarification of values and student choices or valuing about those educational experiences which they face in schools.

Although any subject in the curriculum should be equally concerned about the role values play, this concern is uniquely appropriate to modern science education.

Modern technology, an outgrowth of scientific erudition, has come under attack in recent years. Lack of clear understanding about the effects of technology and a corresponding lack of application of "moral" issues--beliefs, attitudes, values--has often resulted in the tendency to act upon or utilize scientific knowledge because it was possible to do so--regardless of whether the action was desirable.

In this descriptive study, a value clarification approach--based primarily on the work of Louis Raths, Merrill Harmin, and Sidney B. Simon, as reported in the book, Values and Teaching--was used for a three month period in the author's instruction of four earth science classes in a medium-sized rural school. Two major concerns were of interest:

1. Does a value clarification approach lead to increased valuing of science as a meaningful part of daily life, and
2. Does a value clarification approach lead to increased student respect for, and use of, divergent questioning patterns?

A variety of strategies are discussed in the review of the literature; the appropriate concerns raised by various learning theories are also considered. In the methods actually employed by the researcher, various strategies, as reported, is for the integration of cognitive and

affective objectives rather than emphasis upon one area at the expense of the other.

Evaluation of the strategies used was based upon observations and upon opinionnaire data collected by means of instruments designed by the researcher. No attempt was made to provide "normative" evaluation which would permit generalizations to other situations. From the evaluation, the following findings emerged:

1. Girls increased in their perception of relationships between the study of science and the problems of their daily lives. Boys did not change in this respect; the perception of positive relationships were at the same level for both boys and girls by the end of the experiment.

2. Boys showed an increase in action activities related to science, e.g., voluntary science demonstrations in class and voluntary participation in ecological issues arising within the local community.

3. Girls showed increases in cognitive data collecting activities, e.g., reading of articles, the bringing to class of newspaper clippings, and letter-writing aimed at either the collection of materials or at ecological issues upon which they wished to express a point of view.

In conclusion, analysis of this experimental and initiatory use of a value clarification approach led to some concern on the part of the researcher as to whether the effects of any teaching strategy or method are

measurable in terms of changed student behaviors as a criteria of success, i.e., is it the method which leads to changes or is it the changed behaviors and perceptions on the part of the teacher which arise through use of a method. Regardless of the answer to this moot question, the value-clarification approach appears to be deserving of additional attention by educators interested in exploring ways of effectively providing for both affective and cognitive goals.

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To everything there is a season,
and a time to every purpose
- Ecclesiastes 3:1

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CHAPTER I

THE PROBLEM

Introduction

In spite of all the fashionable rhetoric about this era of revolutions, we are running down a new road; there can be no return by the old route. Whether our journey is marked by violent confrontation or accomplished in quiet dignity, changes in human affairs are taking place at an ever more rapid pace. Paul DeHart Hurd[1] has labelled the scientific and technological revolutions as cultural mutations. Hurd further states that now is the time for the age of science to come forth and help bridge the gulf between yesterday's world, today's world and the world of the future.

Neil Postman and Charles Weingartner[2] echo the above concern and stress the incredible task of preparing

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[1]Paul DeHart Hurd, "Scientific Enlightenment for the Age of Science," The Science Teacher, Vol. 37, No. 1 (Jan., 1970), p. 13.

[2]Neil Postman and Charles Weingartner, Teaching As a Subversive Activity (New York, Delacorte Press, 1970), p. 208.

youth for their world--the world of the future. How should children be educated for an environment in which the primary condition is that of change? How many traditional concepts are needed to provide a bridge from yesterday to today and to the future? Postman and Weingartner see it this way:

> Survival in a rapidly changing environment depends almost entirely upon being able to identify which of the old concepts are relevant to the demands imposed by the new threats to survival, and which are not. Then a new educational task becomes critical: getting the group to unlearn (to "forget") the irrelavant concepts as a prior condition to learning. What we are saying is that "selective forgetting" is necessary to survival.

Is our first task, then, to look to the environment--to the technologically produced changes which have impacted upon it--to determine the body of knowledge necessary to bridge these gaps? Is it the task of the scientist to weed the irrelevant old concepts from the abyss of accumulated knowledge? Is our education at the same crisis-survival level as that of our environment?

Charles Silberman has said that education:[4]

> . . . is inescapably a moral as well as intellectual enterprise. "The moral purpose," as John Dewey emphasized in his neglected little classic, Moral Principles in Education, is "universal and dominant in all instruction--whatsoever the topic.

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[3] Ibid., p. 208. Italics added for emphasis.

[4] Charles Silberman, Crisis in the Classroom, (New York, Random House, 1970), pp. 8-9.

Silberman is not inferring that education should be moralistic.

> Talking about morality, honesty, or kindness in no way insures that people will act morally, honestly, or kindly. The job of the educator is to teach in such a way as to convert ideas about morality into moral ideas. What educator's must realize, moreover, is that how they teach and how they act may be more important than what they teach. The way we do things, that is to say, shapes values more directly and more effectively than the way we talk about them.[5]

However, Silberman is candid in pointing to the need for a purposeful education. The time-line of our lives does not allow for rediscovery of all knowledge. Therefore, it is evident that education must not depend upon a casual, haphazard process of learning.

Charles Silberman strikes at the heart of the educational problem and at the heart of the educator with this indictment of the public school:[6]

> It is not possible to spend any prolonged period visiting public school classrooms without being appalled by the mutilation visible everywhere--mutilation of spontaneity, of joy in learning, or pleasure in creating, of sense of self.

To many educators there are two separate entities in the teaching function, there is a practicing dichotomy between subject matter (or the "cognitive" domain) and

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[5] Ibid., p. 9.

[6] Ibid., p. 10.

thoughts, feelings (or the "affective" domain). William Boyer[7] suggests that the school, because of the fragmentation and isolation of knowledge into separate compartments coupled with the traditional pressure to transmit this knowledge, has perpetuated ignorance of the needs of the child. It has also perpetuated the "existing order." The attitude that any specific body of knowledge, per se, is necessary for educating the young is now giving way to a question as to how educational patterns have a vital connection to human life today?

The traditional method of lecturing--giving the student what the teacher knows--has been educating the student for a world of the past, not the present. And certainly, such techniques have not educated for the technological and science-oriented society of the future.

Science teachers are aware of how modern science has made myths of our traditional educational goals and approaches in science and also has rendered much of our textbook subject matter obsolete. If science educators are aware of this credibility gap between school science curriculum and society, why is the chasm continuing to widen? Hurd[8] states that, because science is integrated into all

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[7]William H. Boyer, "Education for Survival," Phi Delta Kappan, Vol. LII, No. 5 (January, 1971), p. 258.

[8]Hurd, op. cit., p. 13.

phases of our culture, its significance as a part of general education becomes more and more important. The problem according to Hurd is that:

> . . . a majority of adults are unaware of or are misinformed about the meaning of science and its influences on the material, social, and intellectual life of our time. As a result, they have little insight into the meaning of problems which plague mankind today--environmental pollution, poverty, disease, overpopulation, and the management of leisure.

The scientist and the science teacher have concentrated on the study of the natural world and have neglected interpreting or relating "pure" science to the issues created by modern technology, and especially to its management for the good of man.

To confront this dilemma, science educators and curriculum designers must consider the connections between science, technology, society and the individual. How can the science curriculum directly relate science to the real affairs of man and to human conditions? Certainly the science curriculum must be remolded--the frame of reference must be societal and personal. F. H. T. Rhodes[9] reminds us that we are aboard a relatively small spaceship--Earth--which we share with three and a half billion other members of the human race. Demographers predict that, by the year 2000, seven billion people will be confronted with the

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[9]F. H. T. Rhodes, "The Intellectual Value and Educational Advantage of Earth Science Studies," Journal of Geological Education, Vol. XVIII, No. 5 (Nov., 1970), p. 187.

exhaustion of known and predictable supplies of minerals and fuels: "Nothing could be more relevant to the last third of the twentieth century than the challenge of survival in a crowded world."[10]

If our major educational problem is how to prepare young people to become happy, self-actualized individuals--causal agents--in this historical change, our approach to education must, indeed, be revolutionary.

Robert Gagne,[11] in a recent article in the Phi Delta Kappan, discusses the newer conceptions of learning as being much more than connections and repetition. Learning must be highly analytical about "events that take place in learning, both outside the learner and also inside." Each learner approaches the learning task with his own frame of reference, collection of perceptions, skills, and needs; therefore, the task of instruction means more than merely communicating something to be stored. Instruction must stimulate the capacities the learner already possesses and offer requisite experiences for both the task at hand and for tasks of the future.

We are now at the dawn of at least two basic attitudes of conceptual change: (1) the rejection of subject

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[10] Ibid., p. 188.

[11] Robert Gagne, "Some Views of Learning and Instruction," Phi Delta Kappan, Vol. LI, 9 (May, 1970), pp. 469-472.

matter as the single most important aspect of the teaching function and (2) the inclusion of value clarification techniques as planned instructional activities by which to help both students and teachers discover and clarify values for their lives today as well as for a future point in time.

The traditional approaches to educating for values (moralizing, persuading, imposing, inspiring, hoping, passing the buck to the school) have not worked too effectively. One major reason has been the continual change in the American family. Often the home is a place of aimless gathering and confusion (working mothers, broken homes, geographical mobility) rather than a haven for either value clarification or the indoctrination of values. The traditional inculcation or indoctrination of values is limiting (but preferable to no value education at all). To persuade a child to accept the "right" value is neglecting to help the child develop a process for continuous valuing. In John Gardner's words:[12]

> All too often we are giving our young people cut flowers when we should be teaching them to grow their own plants. We are stuffing their heads with the products of earlier innovations rather than teaching them to innovate.

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[12]John W. Gardner, Self Renewal: The Individual and the Innovative Society (New York, Harper and Row, Publishers, 1964), p. 21.

According to Raths, Harmin, and Simon,[13] in Values and Teaching, schools should include a procedure for integrating the value clarification program within the total curriculum. In this book, procedures are presented which can be used with present programs by simply applying critical thinking techniques to matters that are mainly in the affective domain.

The whole subject of values is complex. According to Fay L. Corey,[14] "a value is an attitude, a standard, or a belief which the individual has selected and reconstructed from the many concepts that beset him in his environment and the feelings that struggle within him." These are the things people consider desirable. If the focus of education is to be on the values and attitudes of students, then educators must ask themselves what kind of attitudes they wish students to consider desirable. How will we assess what is happening in the interpersonal interactions which occur? What kind of classroom environment is the optimum "climate" and how do we measure it?

Traditionally teachers and school authorities have established the classroom pattern, set the rules, and

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[13] Louis Raths, Merrill Harmin, and Sidney Simon, Values and Teaching (Columbus, Ohio, Charles E. Merrill, 1966), p. 47.

[14] Fay L. Corey, Values of Future Teachers: A study of Attitudes Toward Contemporary Issues (New York, Bureau of Publications, Teachers College, Columbia University, 1955), p. 5.

called the plays. Herbert Kohl[15] reminds us of the tidal-wave of possible implications resulting from a changed set of classroom priorities:

> To have a free classroom is to present an environment where many people can discover themselves, and there is no simple set of rules to prescribe how this can be created. There will always be the fear that one is wrong in letting people choose their own lives instead of legislating their roles in society.

Although Kohl's open classroom is revolutionary compared to applying the principles of valuing to a traditional program, we can still expect some tremors in the traditional foundation.

Raths, Harmin, and Simon[16] refer to the value theory, as outlined in their book, as a teaching theory, which can be tested and evaluated in any classroom. Harmin, Kirschenbaum and Simon have suggested that the science classroom offers an ideal opportunity for focusing on values. As they have stated:[17]

> The factual sufficed in an earlier, less complex and confusing world, but today, with nuclear holocaust just outside the window and the polluted atmosphere already seeping in, we simply cannot afford to train

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[15]Herbert R. Kohl, The Open Classroom (New York, Random House, Inc., 1969), p. 115.

[16]Rath, Harmin, Simon, op. cit., p. 8

[17]Merrill Harmin, Howard Kirschenbaum, and Sidney B. Simon, "Teaching Science with a Focus on Values," The Science Teacher, Vol. 37, No. 1 (Jan., 1970), p. 17.

> a generation of students who know the how and the why of scientific phenomena, but do not have a process for inquiring into the value issues raised by the topics they study.

When we recall that science teachers have long been concerned with the process of inquiry, or searching for concepts and arriving at generalizations, it would seem feasible to consider use of valuing processes to raise the factual aspects of science to a deeper and broader understanding for the individual. Science teachers are also aware that the teaching, testing, and talking about these facts and concepts will not assure that higher level learning will be realized. If the subject matter of science is looked at on three levels--facts, concepts, and values--a planned approach to the much neglected values area might become a part of the science curriculum.

Statement of the Problem

The purposes of this study are (1) to describe the use of a high school science teaching method centered upon value clarification strategies, (2) to report on the initial use of this method in high school earth science classes, and (3) to report on apparent changes in behavior after use of the method.

Significance of the Study

The emphasis of this study on a humanistic approach to science teaching does not intend to neglect the basic subject matter, concepts, laws, theories, and methods of science, i.e., can the necessary or expected subject matter be covered so that both cognitive and affective needs can be met? The aim, then, is to move to a level of developing insights for more personal appreciation and valuing of the facts and concepts of science encountered by each individual student in the classroom. This study attempts to evaluate the effect of the application of the value clarification method in earth science classes.

Young people have long been aware, in spite of many new types of science curricula, that schools provide science for science--for a yesteryear and not for the present conditions of this earth. We need an upgrading of the discipline and in many cases great strides have been made with the discipline-centered curricula. Little or nothing, however, has been formulated for the integration of science teaching and its application to the lives of students. Many of the newer science curricula have looked to the inquiry approach to bridge this gap--much more is needed. If we view education as a change in behavior, then young people must be given the opportunity to think

and question on their own; to consider, in a direct way, what they believe and value. To arrive at this vital level within the classroom requires new approaches, unorthodox when compared to more traditional methods. The literature reveals research conducted at all levels of education using various strategies of the value clarification method. The values concept takes a focal point in many studies of human behavior, and value clarification approaches do alter behavior patterns of students.

Harmin, Kirschenbaum, and Simon,[18] have proposed this means of moving school science into the "real world" of students: "Values issues must become so much a part of science teaching that almost no topic in any science class will be taught without some opportunity to consider the values implications for that content." These authors suggest looking at subject matter as three levels: (1) fact level or level one, (2) concept level or level two, (3) values level or level three. They caution that values as teachers sometimes presume, are not automatic by-products of the teaching of facts and concepts. "There needs to be a real connection with the students' lives, attitudes, and feelings for the questions to be raised to the third level, the values level."[19]

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[18] Ibid., pp. 16-20.

[19] Ibid., p. 18.

The strategies to accomplish the valuing process are based on the book, Values and Teaching.[20] Its thesis is that we should not only define what values are, but look hard at the process by which people acquire them. Because values are a part of living, they often operate in complex circumstances and involve more than simple good and bad or right and wrong answers. Traditional approaches to values (persuading and convincing, imposing regulations, cultural and religious dogma, setting examples, appeals to conscience, and limiting choices) have not been as successful as we have hoped, primarily because they have the air of indoctrination. In Values and Teaching, explicit procedures for integrating values with other classroom materials and with the total curriculum are presented. The procedure could be objective, but eventually the values approach leads to doing something about the topic studied. As the authors have stated: "There are an infinite number of topics in science that lends themselves to action projects." Hurd[21] also speaks of the great need to widen the science teaching picture to include the broad perspective of the humanities. He states that the science classroom must "challenge man to revise his social outlook and value assumptions as new knowledge and technology extend the range of what he can do."

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[20] Raths, Harmin, and Simon, op. cit., pp. 51-162.

[21] Hurd, op. cit., p. 15.

Focus of the Study

After extensive review of the literature describing the use of the value clarification method and the careful consideration of the learning process in the interrelationships of the affective, cognitive, and psychomotor domains, only two major concerns were selected for investigation. As a primary descriptive study, these concerns have not been listed as formal hypotheses--no statistical operations are being used. The two concerns which are to be reported upon, and evaluated, are:

1. Does use of a value clarification approach cause apparent increases in student perceptions of personal responsibility and involvement in the processes of science, particularly as related to classroom actions and local environmental issues?

2. Does use of a value clarification approach encourage a classroom climate more conducive to freedom of thought and acceptance of divergent thinking?

Limitations of the Study

This study is restricted in scope. Major limitations include:

1. Use of a method by one teacher (results may be related to the idiosyncratic behaviors of the teacher rather than the method).

2. Use within only one subject area (the applicability of the method to other areas cannot be assumed).

3. Use within only one secondary school environment (the particular "climate" of the school being used may be a factor although this can be neither assumed nor ignored).

4. Reliance upon descriptive techniques for reporting of activities and observations. (Simple opinionnaire data collected by self-constructed instruments are also presented).

Assumptions of the Study

The basic assumption of this study is that the teaching of science must involve an integrated approach which gives equal emphasis to three levels of teacher action and teacher-student interaction. These three levels are: facts, concepts, and values. A further assumption is that the emphasis of past or present teaching methods has been primarily on the transmission of facts while recent approaches have strengthened the inquiry approach necessary for improving conceptual generalizations and skills. Far less has been proposed for improving--or even using--approaches designed to help students identify and clarify values. In preparing a descriptive study of the use of a value clarification method in earth science classes, the assumption was that students would become more positive in their perceptions of the role of science and its meaning in their everyday lives.

Definition of Terms

Writers in the area of values and science have used a variety of definitions for the key words used in this study. However, the following interpretations will be used throughout the paper:

Facts (Level I) are defined as isolated incidents of information or verbal learning. Science facts are means, not ends.

Concepts (Level II) are defined as the application of facts or generalizations (use of abstract thought) selected in learning experiences. A statement of relationship or generalization between two or more concepts is a principle. The laboratory experiment is a demonstration in the application of concepts and principles.

Values (Level III) are defined as the demonstration of concepts, e.g., science laws, elevated to a personal connection with students' lives, attitudes, and feelings. Values are a conceptualized desirable standard that influences a person in choosing among alternative factors faced in life. A. D. Woodruff[22] states the definition simply: "a value is any object, condition, or activity which the individual feels has an effect on his well-being."

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[22] A. D. Woodruff, "The Roles of Value in Human Behavior," Journal of Social Psychology, Vol. XXXVI (1952), p. 98.

Value clarification process is defined as the use of strategies and techniques planned to help the individual make value choices.

Value clarification method is defined as a teaching theory using the value clarification process in an open classroom (democratic) climate.

Clarifying responses are defined as statements oral or written planned for the purpose of stimulating examination of existing values and value choices.

Open-classroom is defined as an environment where democratic procedures are practiced and where students are free to discover themselves and things that interest them.

Traditional classroom is defined as an environment where the teacher plans and directs the learning experiences and where emphasis is placed almost solely on the learning of subject matter.

Classroom climate in the formal, or psychological sense, is measured by comparing the needs of the individual with the requirements or restrictions imposed upon him--the "press"--of a situation. As used in this study the climate of the classroom is used much as Andrew Halpin described "climate," i.e., as the subjectively "felt personality" of a situation.

Traditional approaches are defined as the communication of facts and concepts by repetition as in lecturing

or by the inquiry approach to learning subject matter.

Science is defined as a truthful activity. It is the formal ordering of a succession of facts into a network of scientific laws. It also refers to understanding the function of concepts, laws and theories--the delicate sequences and balances of the earth. J. Bronowski[24] distinguishes the humanness of science: "science is not a mechanism but a human progress, and not a set of findings but the search for them."

Technology is defined as a mechanical science. J. Bronowski[25] refers to technology as the body of technical science without the spirit of science. Paul Goodman[26] refers to technology as a branch of moral philosophy, not of science. Scientific technology is a confusing term related to the theoretical sciences and its treatment for commercial and political purposes.

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[24]J. Bronowski, Science and Human Values (New York, Harper & Row Publishers, 1965), p. 63.

[25]Ibid., p. 70.

[26]Paul Goodman, New Reformation: Notes of a Neolithic Conservative (New York, Random House Publishers, 1970), pp. 12-13.

Organization and Reporting of the Study

Four earth science classes in a medium-sized rural high school with an enrollment of approximately 700 students were used as the experimental classes reported upon in this study. These classes were composed entirely of ninth-grade students; the earth science course is a required course.

The first half of the academic year was conducted in the same manner as had been previously used by the teacher in other years. By beginning with the same format and then, at a later point, introducing units and methods concerned with value clarification, it is possible to make comparisons. Such comparisons can be made regarding observable changes in the behaviors of the student exposed to the value clarification method; comparisons can also be made by reference to the actions which had occurred in earlier classes taught under traditional methods.

To assist in the description, evaluation, and reporting of the effects of the use of a value clarification approach, the following steps were taken:

1. A diary was kept of the researcher's feelings and reactions as the experimental teaching period progressed.

2. Other teachers, in other subject areas, who worked with the same students, were asked to observe any changes which might occur.

3. Occasions on which students became involved in identifiable "affective" behaviors, e.g., voluntary materials provided for classroom use, involvement in outside-of-class ecological issues, etc., were noted for purposes of comparison.

4. Two teacher-constructed instruments were used. Both of these instruments were given before the use of the value clarification methods; both were reapplied at the conclusion of the three-month experimental period.

5. Students kept a daily record of classroom activities. These records--kept on a class basis--were used for the recording of classroom activities, student reactions, and student feelings.

Reporting of the Study. This study is divided into five chapters. In this chapter, Chapter I, the basic problem has been introduced and outlined. Terms have been identified and the scope of this descriptive study has been defined.

In Chapter II, a review of the literature on values, value clarification, and learning theory (as applicable to the value clarification approach) has been given.

Methods and approaches which can be used for the introduction of a value clarification approach in science classes have been identified in Chapter III. Chapter III also describes, in detail, the specific classroom procedures and materials used by the author of this study in

working with the four earth science classes reported upon.

Chapter IV contains a descriptive analysis of the observations and opinionnaire data used by the author as a means of evaluating and reporting upon the effectiveness of the use of value clarification strategies in the science classroom. Chapter V provides a brief conclusion to the research reported upon here and also gives some limited consideration to the types of problems and issues which should be considered in future efforts to evaluate such issues as the effectiveness of the value clarification approach or the development of satisfactory classroom climate.

CHAPTER II

REVIEW OF THE LITERATURE ON VALUES AND TEACHING WITH A FOCUS ON A VALUE CLARIFICATION APPROACH

Introduction

The deep unorganized examination taking place in our nation today seems to be world wide. The perfections of the moon landings have intensified and clarified the images of imperfections on the earth--particularly those of the brotherhood of man. The picture of the amazingly beautiful, tiny agate earth surrounded by the vastness of space has projected clearly not only its uniqueness in the universe, but its limitations as a spaceship. Michael Collins[1] observed the earth from his moonship and wrote the following words:

> Suddenly I knew what a tiny, fragile thing Earth is. Such a little gem, such an incredible balance of the universe's rarest ingredients, one that can be ruined all the more easily just because it is so small. And I determined in that moment that I would do all I could to let people know what a wonderful home we have--before it is too late. There is only one Earth. It is a tiny, precious stone. Let us treasure it; there is not another one.

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[1]Michael Collins, "The Garden of Earth," Guideposts, Vol. 26, No. 1, (March, 1971), p. 18.

Collins' view of the world was not fragmented or polarized; he saw the whole world and sensed its basic needs. Philip Handler[2] has also outlined a thesis of basic universal need:

> I cannot help but believe that youthful protest is not really addressed to its supposed targets--Vietnam, the draft, the environment, even the ghetto. There is, rather, a deep drive for an ultimate justice and morality.

How can understanding and purpose rise from today's turbulent society? What is the line between purposeful, permissible dissent and that which is destructive and unacceptable? Answers to the posed questions seem inherent to, and are conditioned by, the values and social standards of today. It is clear that American life--or universal life--cannot retreat to the traditional attitudes and values of the past. Society with its social standards and values are in flux--in process. In Alvin Toffler's words:[3]

> Indeed the future is arriving so swiftly that for all practical purposes, we are superimposing a new, alien culture with new values, esthetics, politics, sexual roles, on top of the old. And we are doing it so fast that we are creating cultural shock in our society--future shock.

The basic question then, becomes one of how to guide youth toward the process of dealing with a rapidly changing future, with a new culture and with new values.

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[2]Philip Handler, "The World We Want," The Science Teacher, Vol. 37, No. 5 (May, 1970), p. 18.

[3]Alvin Toffler, "What is Happening to Our Lives and Values Future Shock--The Clue to Understanding, Detroit Free Press (Aug. 9, 1970), p. 3.

Traditionally the school has backed away from value education responsibilities, assuming that was the task of the church. Probably the lack of understanding of the Supreme Court decisions on prayer and Bible reading in the school has caused both teachers and administrators to fear any reference to values or "moral" behaviors. The result is that teachers have been concerned or comfortable only with the teaching of facts and concepts. Simon and Harmin[4] challenge traditional teachers to wrestle with the age old problem of the real purpose of education by answering these questions: Do the facts and concept deal in any way with the current concerns of our society? How much of the standard subject matter is to be set aside to make room for subject matter which speak to the times and to the student's values? These authors stress the need to go beyond facts and beyond Bruner's well presented concept level, and above all, to integrate these two levels into a higher third level--a values level--which penetrates the student's life.

There is no question about the importance of subject matter. Students must be informed if they are to make value choices. However, there should be deep and abiding questions lurking in the conscience of every

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[4]Sidney B. Simon and Merrill Harmin, "Subject Matter With a Focus on Values," Educational Leadership, Vol. 26, No. 1 (October, 1968), pp. 34-39.

educator: Has this information any personal, higher level meaning to students? Robert Blume[5] has this to say:

> Education must include more than the acquisition of a few more facts and a faster reading rate. It must be the instrument through which people release the tremendous creative potential that was born into all of us. Whatever methods and materials are needed to do the job--that is education. But this isn't enough. We must also help our young to develop compassion, concern for others, faith in themselves, the ability to cooperate with others, the ability to maintain good health, and above all, the ability to remain open to other people and new experiences. This is humanistic education.

Blume not only indicates that the teacher must bring knowledge as well as human values into the teaching function, but the teacher must become "humane."

Perhaps one of the main difficulties facing traditional teachers today is the assumption that all humans, particularly teachers, are humane. As Alburey Castell[6] points out:

> When someone asks, "What am I, anyway?" an excellent answer is, "You are a rational animal." To make this point clear I would involve the notion of responsible doubts, questions, and denials, by analogy with responsible beliefs and knowledge--claims."

Castell is saying that teachers, more than any other tribe, have lost sight of the thesis that he reasons and can be

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[5]Robert Blume, "Humanizing Teacher Education," Phi Delta Kappan, Vol. LII, No. 7 (March, 1971), p. 411.

[6]Alburey Castell, "What it means to become Human: The Rational Animal," in To Nurture Humaneness; edited by Mary-Margaret Scobey and Grace Graham, (Washington D.C.: Association Supervision and Curriculum Development, N.E.A., 1970), p. 19.

reasoned with--that he is a rational animal. This seems to be a strong statement against people in the business of "getting to know." For further emphasis on loss of humaneness, Castell presents this scene:

> If your thesis is that man is an ignorant and irrational animal, you will get a concessive hearing, provided it does not take you too long to make your point. But to claim that man is undeniably a rational animal is, for many, no more plausible than to claim he is a sinner as much in need of forgiveness as in need of knowledge.

Castell's thesis is that we are already rational animals, but to capture again, some of our humaneness and to learn more fully what it is to be humane is our goal--our calling. He says:

> My point is that it will not do for a person to say, "I am a rational animal; therefore, I have no stake in logic or ethics or aesthetics or semantics."

What seems to be apparent is that humanistic education or a humanistic teacher is not described by specific traits, but by a comprehensiveness of fulfillment, a "fully functioning," a "whole." Herbert Thelen[7] calls the "humane" person the truly "educated" person. The educated person seeks purposive inquiry. The self realizing quality of inquiry, however, is not enough for the "whole" child; the attitudinal context, or the spirit that animates

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[7]Herbert Thelen, Comments on "What It Means To Become Human," in To Nuture Humaneness. Edited by Mary-Margaret Scobey and Grace Graham, (Washington D.C.: Association for Supervision and Curriculum Development, N.E.A., 1970), p. 30.

inquiry, must be considered. Can we create new educational patterns that will involve the whole child and his environment?

Educational literature over the past two decades has given us some guidelines to more purposeful and exciting schools. Several new teacher education programs are underway based on principles resulting from the research conducted by Arthur Combs and associates, Carl Rogers, and others. If we assume teachers teach in the manner in which they were taught, eventually new teachers will not be programmed by the old patterns and old assumptions--the dehumanizing cycle will be broken. Students taught by humanists will become humanists, listeners, people of understanding of values, and feelings. Perhaps educational technology will help teachers rise to this higher calling by freeing them from the drudgery of dispensing facts and information, so that more time can be spent on the clarification of values--or the meaning of it all.

Although the curriculum reform movement presented much progress in what to teach, particularly in science, the relationship of the new curricula to the human situation is still found lacking. These lines from On Staying Awake: Talks With Teachers[8] describe the problem:

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[8]Ole Sand, "How Much Does Gray Matter?" On Staying Awake: Talks With Teachers (Preliminary Series, published by National Education Association Center for the Study of Instruction, 1970), pp. 46-47.

> When the teacher dominates the learning process; when parents and the community set unimaginative expectations; when cultural value systems emphasize end over means, material possessions, and economic ascendancy; and when those value conflicts go unresolved, there will be no humane environment.

If these barriers could be changed, i.e., if we could learn to value the learner as a central decision maker in the schools; to value divergent behaviors of learners; to provide multiple options for learning opportunities; to promote true two-way communication between school and community; to behave toward colleagues and students with trust and honesty; and, above all, to help students resolve their value conflicts, then, the humane environment or the democratic, open classroom climate is possible. Singer Aretha Franklin suggests the requirement of one additional factor. She poses the crucial question:[9]

> Has it got soul? Man, that's the question of the hour. If it has soul, then it's tough, beautiful, out of sight. It passes the test of withitness. . . But what is soul? It's like electricity. "We don't really know what it is," says Ray Charles, "but it's a force that can light a room." The force radiates from a sense of knowing where you've been and what it means. Soul is a way of life--but it is always the hard way. Its essence is ingrained in those who suffer and endure to laugh about it later.

This is the magnificent challenge: When the heart and soul of education is back in the classroom, the climate will be open; although diversities will abound, the "route to the stars" will be more clearly mapped for each individual student.

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[9] Ibid., p. 47.

The Traditional View of Values and the Teaching Function

To understand more clearly the harvest of confusion we are now facing in regards to our responsibilities toward the teaching-learning of values--moral, spiritual, and religious--in our schools a review of this country's foundation values (now often referred to as middle-class) seems to be a sensible approach. According to Edwin A. Roberts,[10] middle-class values are not associated with income level, but are derived from the Protestant ethic. "The foundations of this country were framed by the Protestant Englishmen who believed in the inherent rightness and efficiency of self-discipline, hard work, thrift, and the sanctity of contracts."[11] Accordingly, the public school curriculum became emmeshed within this moralistic value system geared to what is now referred to as middle-class standards.

Arthur Foshay[12] explains the gradual decay of our moral code: "The old nineteenth century standards of hard work and probity, taught through stories and maxims, were

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[10]Edwin A. Roberts, "Middle-class Values," Today's Education, Vol. 59, No. 1 (Jan., 1970), p. 20.

[11]Ibid., p. 20.

[12]Arthur Foshay, "The Moral Code of Children and Teacher Education," in Approaches to Education for Character: Strategies for Change in Higher Education edited by Clarence H. Faust and Jessica Feingold (New York: Columbia University Press, 1969), p. 88.

replaced with nothing, nothing at all." Foshay lists five reasons for the decline in the teaching of values:

1. Confusion of "moral" with "religious" belief
2. The culture changed in reaction against Puritanism and religious fundamentalism
3. Sharp social class distinction between the religious and the intellectuals
4. Emergence into popular consciousness of the social and behavioral sciences
5. Emergence of cultural pluralism

"The simple, rural virtues of McGuffey, et al. survived all of this for a surprising long time, but disappear they did--at least from the books."[13] H. B. Pepinsky[14] presents further evidence of the loss of the traditional moral code in an unpublished study done in 1955-1956 at the Ohio State University Campus School. He found that the children studied had two entirely different vocabularies: the one associated with prohibitions was subtle, direct, and rich; the one associated with being a "good citizen at University School"--i.e., the things to do, not the things to avoid--was ambiguous, general and sparse. Pepinsky suggests that much of the behavior we took to be evidence of social values and aversions was actually just avoidance. It is interesting to note the elements of the social code at this

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[13] Ibid., p. 89

[14] Ibid., p. 90.

school (children age 6-12 years) given in order of decreasing intensity. The intensity was established from the severity of punishment associated with violation of the code. Teachers did not punish the children physically. They only "talked to them;" they asked reproachful questions or denied them privileges. Here are the values and aversions: property, honesty, vulgar or obscene language, irreverent language, cleanliness, obedience, violent or physical cruelty, respect for offical authority, courteous speech to adults, generosity of possessions, forbearance and completion of undertakings.[15] However, note that the word gossip, character assassination, respect for one another, and assumption of sex roles is missing from the list.

Joseph S. Junell[16] presents his views on how to go about redeeming the teaching of values--particularly, basic moral values:

> Does the teacher have less right to tell it how he thinks it ought to be told than does the dramatist whose impact on moral attitudes is perhaps next to that of the home? Does he have the same right to inculcate youth with the notions of trust, fidelity and compassion when he knows fully half of the world he lives in is still brutalized by violent struggles for identity and survival.

Junell seems to be saying that some basic values must be accepted on faith as an absolute or not at all. To modify

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[15] Ibid., pp. 90-91

[16] Joseph S. Junell, "Do Teachers Have the Right To Indoctrinate?," Phi Delta Kappan, Vol. LI, No. 14 (Dec., 1969), p. 184.

or give alternatives is out of the question, the principle is unconditioned. Junell points out that he has no argument with the employment of alternatives as a means of teaching learned opinions and stresses that indoctrination under these conditions would be intolerable. He goes on to describe Lee J. Cronbach's beliefe that "the teacher. . . has an obligation to intensify his influence by whatever procedures will have the greatest effect." George S. Counts[17] seems to concur with Junell in assessing the fate of Homo sapiens as being dependent on the culture which inherits him. "Here is the supreme imposition." Counts draws the following conclusion: "The big question therefore is not whether we should impose anything on the child in the process of education, but what we should impose."[18] Arthur Laison[19] cites the same opinion by stressing the importance of the re-interpretation of old values which go back to the teachings of Jesus. He stresses the importance of children acquiring the basic values of kindness, loyalty, fair play, honesty, pride of craftmanship, intelligence, tolerance of ambiguity, and enjoyment in cultural diversity.

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[17] George S. Counts, "Should the Teacher Always Be Neutral?" Phi Delta Kappan, Vol. LI, No. 14 (Dec., 1969), p. 187.

[18] Ibid., p. 187.

[19] Arthur Laison, "Values for a Changing America," in Values for a Changing America. Edited by Helen Huus (Philadelphia University Press, 1966), p. 35.

His argument is that a child from a poor neighborhood finds the school represents a different society from what he finds outside; but, this is where he learns the values that he later reflects on and deals with, intellectually, to guide his life. Laison says that educators should not modify their middle class values, but should learn to appreciate cultural diversity; they should teach a value system which will help these children find a more secure place in America. He points out that we do not make provision for enough intellectual examination, reflection, and interpretation of values in our schools. In the slum areas the values are negative ones which the school seems to be doing very little about.[20]

Robert Mason[21] speaks to the connotation of the "religious" as to why teachers are not concerned about nurturing children's feelings about right things which hopefully leads to a distaste for the wrong things. He states forthrightly that moral (doing right) and spiritual (wanting to do right) ought to be, and in reality, is education. Mason is simply referring to values as guides to behavior. He places the internalization of moral values at the heart

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[20] Ibid., p. 39.

[21] Robert E. Mason, "Teaching Moral and Spiritual Values in the Public Schools: The Philosophical Issues," in Values for a Changing America edited by Helen Huus (Philadelphia: University Press, 1966), pp. 45-53.

of education for the secularist as well as for the religionist, but, for the secularist, moral education is a process of socialization while for the religionist it is a process depending upon spiritual reinforcement in the light of religion. Mason says: "Moral education remains a central responsibility of the secular school even after the realm of the spiritual has been merged with aesthetic, and religious worship has been forbidden.[22]

Charles A. Glatt[23] classifies values as either intrinsic (built in) or instrumental (developed out of). He discusses these insights:

> When thought to be intrinsic, values sometimes lead to internal conflict for a person, especially if he detects conflict between the behaviors they prescribe and the ordinary behaviors that he enjoys or that others around him seem to engage in. On the other hand, when values develop from human transactions and become flexible tools by which man guides his activities, they can cause very disturbing problems for the person in whose world rigid standards are necessary.

Glatt suggests that by the time a child enters first grade he has learned half of all he will ever learn:

> If he has internalized respect for the rights of other persons and for property rights, for "telling the truth" and for not stealing, for neatness, for thrift, for punctuality, for sobriety, for fulfillment of responsibility, he most likely will fit our image of the good solid American citizen throughout his life. If he has not, regardless of other factors, he probably will wear a label like "disadvantaged," "deprived," or "problem child," and in many ways always will have trouble adapting to society's expectations.[24]

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[22] Ibid., p. 58.

[23] Charles A. Glatt, "Values in Conflict," Pennsylvania School Journal, Vol. 118, No. 3 (Feb., 1970), p. 179.

[24] Ibid., p. 179.

Seymour Halleck[25] suggests that the generation gap is in reality a crisis related to the manner in which values are generated and maintained in a rapidly changing world. His two basic assumptions are: (1) as old values are attacked, new ones are not being created to replace them, (2) new technology and new mass media has created almost unlimited alternatives, and freedom to choose among them has become incapacitating and paralyzing. Halleck warns that the real danger is that values of any kind may be losing their power, and that young people may find themselves existing in a value-less world. He suggests that certain basic guideline values become institutionalized, because those entrusted with the teaching of values seem totally unprepared to move from dogmatic to rational presentation of value systems. Halleck views these basic guidelines relevant to all men as:

-Value of compassion, affection, love, sense of community
-Openness to experience, self-understanding
-Find optimum amount of freedom
-Comprehension of his mortality, belief in a supreme being. In any case, an ideology he can value.
-Innate need to interact with his environment and sense a feeling of mastery over it
-A reverence for progress and order
-Assume responsibility for one's own behavior. This provides dignity for the individual and stability for the group
-Honesty, the willingness to avoid deceiving oneself or others.

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[25]Seymour L. Halleck, "The Generation Gap: A Problem of Values," Think, Vol. XXXIV, (September-October, 1968), pp. 3-7.

-The need to find a way of inculcating the value of non-violence in our people. We have no other choice, if we wish to survive.
-Reverence for elderly members of society. The creating of a world which offers the possibility of aging with grace, honor and meaningfulness, otherwise there will be no future for our youth.

Stanley Coopersmith and Jan Silverman[26] speak on the child's background as determining his success at school. These authors relate that in the study of 1,748 normal middle-class boys and their families, they found that parental attitude was the key factor in the development of self-esteem. They challenge the educator to examine his own values and then ask whether he likes himself as an educator and whether he likes and respects children. Several earlier research studies have found a relationship existing between the child and the effect of his immediate family upon the attitudes and values he will develop. William F. Itkin[27] tested 400 male and female college students and their parents and found that when students had favorable parental attitudes they approved of their parents supervision regardless of whether their parents had dominant or submissive attitudes toward control. Those students who had negative parental attitudes regarded their parents

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[26]Stanley Coopersmith and Jan Silverman, "How to Enhance Pupil Self-Esteem," Today's Education, Vol. 58, No. 4 (April, 1969), p. 28.

[27]William F. Itkin, "Relationships Between Attitudes Toward Parents and Parents' Attitudes Toward Children," Journal of Genetic Psychology, Vol. LXXXVI (June, 1955), pp. 339-52.

dominant regardless of their parents' attitude toward control. The studies done by Arnold M. Rose[28] also suggested that the intimacy of family life is related to the child's attitudes and values. William H. Truesdell[29] presents a similar thesis when he states that too many teachers are poor models for those they teach. He asks the puzzling question as to why teachers, who train youngsters to state opinions, are reluctant at baring themselves to the analysis of those they teach. His two questions and answers give further insight:

1. Can they ever be convinced that firm commitments are worth anything if their teachers project a vague ambivalence?
2. When a teacher faces a class and voluntarily consigns himself to that growing mass whose members really don't give a damn one way or the other, he is condemning and denying the very essence of education.

O. R. Bontrager[30] stresses the same idea in Approaches to Values in Education. He takes a dim view of the panic and despair shown by many educators when they view the gap between the values we verbally profess and our actions. He reminds educators that children copy the action of adult models they see on the stage of life before them. Great

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[28]Arnold M. Rose, "Reference Groups of Rural High School Youth," Child Development, Vol. XXVII (September, 1956), pp. 251-63.

[29]William H. Truesdell, "Teachers Should Commit Themselves," Today's Education, Vol. 58, No. 1 (Jan., 1969) p. 37.

[30]O. R. Bontrager, "On Evaluation and Values," Approaches to Values in Education, Belok et al. (Dubuque, Iowa: Wm. C. Brown Co., Publishers, 1966), p. 16.

models such as Jesus, Aristotle, Mohammed and Marx were used to support his view.

In summary of the traditional views on values and education, W. R. Wees[31] cites two main causes for the failure of education to stress humane values:

1. Education's self-scrutiny of values is less than a century old and psychology has paid systematic attention to values only within the past hundred years.
2. "The dominant method of instruction--exposition is not suited to the development of deeply held and rationally applied values. As long as education is designed for the acquisition of knowledge, the development of values will remain accidental and fragmentary."

A Review of Science Methods and Values in Teaching

"No man steps into the same river twice." Or so Heraclitus said.[32] Even to the ancient Greek change was the major feature of civilization. Today all is change. Because education must prepare each individual to cope with the present change and changes of the unpredictable future, we must face the obsolescence in education in rapidly changing fields, particularly science. To meet

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[31]William G. Carr, "Synopsis of the Conference," Values and the Curriculum, edited by William G. Carr (A Report of the Fourth International Curriculum Conference: National Education Association, 1970), p. 7.

[32]Bentley Glass, "Educational Obsolescence," Science, Vol. 190, No. 3962 (December 4, 1970), p. 1041.

this challenge we must dispense with the idea of schooling and concentrate on educating. The scope of this task is a life-long, never-ending "adult education" approach to keeping up with the changes in, and accumulation of, knowledge. There are differences of opinion among scientists and educators as to how best to either educate for change or use the vast store of cumulative knowledge.

Paul F. Brandwein[33] speaks of the textbook, of a given domain, as being the basic tool for instructed learning. He states that "the act of learning in school is not an acquisition of experience but an act of acquisition of meaning out of designed experience; that is, out of instructed learning." Brandwein refers to the text as a "part of a design to teach the young the art of acquisition of knowledge, at present subsumed under such terms as discovery, inquiry, and the like." He calls the "master teacher" and the scientist "ever-learners." This teacher depends on the text as the basic tool in inquiry or discovery. As he states:[34]

> All of us depend on the knowledge gathered by those who have gone before us--our teachers and researchers. And these teachers have garnered the knowledge of their forebears--teachers and scientists. Like other organisms we are interdependent with our environment--and part of this environment is that described by others in books.

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[33]Paul F. Brandwein, "Man's Cumulative Record--and His Methods of Intelligence," The Science Teacher, Vol. 38, No. 3 (March, 1971), p. 27.

[34]Ibid., p. 28.

Dr. Robert L. Ebel[35] also states that the command of knowledge is the primary objective of education. The two means available for the school to help an individual toward personal adjustment, according to Ebel, are social betterment and behavioral effectiveness. Teachers should support the command of knowledge by:

1. Fostering the cognitive development of their pupils.
2. Using the processes of conditioning to establish automatic, subrational responses.
3. Recognizing that different ultimate goals call for different content to be learned, not for different methods of learning.

Ebel makes it clear he is not referring to "information" as "knowledge." The growth of knowledge is not a simple cumulative process of the storage of facts in the head, but rather, a structure and its present form always limits its possibilities of growth. He further emphasizes:

> The structure of knowledge I am talking about consists of all the relevant knowledge and nothing else. Every factual detail and every generalization that can be related to other factual details and generalizations becomes part of the structure.

Ebel refers to the textbook as an example of such a meaningful and useful structure of knowledge. The inference is that almost every individual can find, in almost every subject matter field, some information that is useless to him. However, if it is truly useless, it will never become a part of his structure of knowledge and soon will be

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[35]Robert L. Ebel, "Command of Knowledge Should be the Primary Objective of Education," Today's Education, Vol. 60, No. 3 (March, 1971), p. 36.

forgotten. The case for knowledge, as presented, cannot stand alone when faced with such questions as: can knowledge alone guarantee wisdom or happiness or goodness? What should be the emphasis on knowledge in the process of learning?

Since it is clearly impossible for each individual to achieve command of all knowledge, the question remains as to what knowledge is necessary for successful work and happy lives. Another hard question refers to the how and why of the selection of knowledge in the learning process. Nebulous statements are being tossed about by educators with reference to teaching students "the ability to learn" rather than knowledge per se, and to teaching students, somehow, the ability to cope with a rapidly changing environment.

McGeorge Bundy[36] has focused on four basic principles of the process of learning:

1. There is no learning except as someone learns. There can be learning without teaching and there can be teaching without learning.
2. All learning takes place in the present tense. . . The student's motives for learning must be forces that operate in the present.

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[36]McGeorge Bundy, "What is Learning: Who Does It?" Teachers College Record, Vol. 72, No. 2 (Columbia University, Dec., 1970), pp. 201-205.

3. Part of the process of learning is learning how to keep on learning.
4. All learning is learning something. There is no learning where nothing is learned.

Bundy clarifies the fourth principle by emphasizing that all learning is not verbal. Succinctly stated: "To learn is not the same as to learn to explain, although each process can be reinforced by the other."[37]

The four simple principles stated by Bundy appear to expose many of the hotly debated educational questions as being unreal or falsely posed. Some of the tiresome abstract arguments concerning the merits of books, machines, methods or the teacher seems to miss the important point: learning is what happens to the learner. Obviously, this poses the difficulty of fitting the program both to the learner and to something he wants to learn. However, these are just technical problems, that lend to the possibility of many different means of learning, as long as the "learner is the center of learning, and that all learning is learning something."[38] The difficulty is in measuring a process that is so inescapably individual.

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[37] Ibid., p. 205.

[38] Ibid., p. 205.

Changing Concepts of Science Methods and Values in Teaching

The science educator's concern, like that of other educators, has started to shift from an emphasis upon the mastery of common educational tasks to each child's learning to master his own individual educational tasks. The current studies in developmental psychology of learning also indicate there is a right time for acquiring certain cognitive learnings. Research contributed by Bruner, Bloom, and Piaget have clearly indicated that certain kinds of learning are necessary prerequisites to other types of learnings. The learning process seems to be a sequential process that is functional by providing the appropriate environment and the experience in proper sequence. Different classes of learning behavior should be arranged in hierarchical order from the simple to the complex.

> In classifying educational objectives, Bloom and Krathwohl separated them into three domains: The cognitive, the affective, and the psychomotor. The cognitive domain deals with knowledge and understanding. The affective domain deals with values, attitudes, and interests. The psychomotor domain deals with relatively simple motor skills, like typing and walking, as well as the more complex skills of talking and writing.[39]

These findings pose several significant questions for schools of the 70's:[40]

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[39]Albert F. Eiss and Mary Blatt Harbeck, Behavioral Objectives in the Affective Domain, National Science Teachers Association, N.E.A. (Washington, D.C., 1969), p. 3.

[40]William L. Pharis, Lloyd E. Robison, and John C. Walden, Decision Making and Schools for the 70's, National Education Association (Washington, D.C., 1970), pp. 39-40.

1. Which learnings that are the legitimate concern of the schools must be developed sequentially?
2. What are the best methods for determining when an individual is ready to proceed from one level of development to another?
3. To what degree can an individual perceive his own developmental needs in intellectual growth?
4. How can the balance between an individual's self-direction in learning and the school's view of the need for uniformity of direction for learning best be achieved?

One consistent message coming from behavioral psychologists, cognitive psychologists, and learning theorists is that nothing else causes an individual to seek success in the present as much as past success. "Educators should concern themselves not with a general concept of motivation, but rather with the specific means of determining which particular motivators cause a particular child to respond to a specific situation."[41]

There is a rapidly emerging debate over the wisdom of emphasizing cognitive development at the expense of development in the affective areas, with the focus of the argument centered around the possible creation of value-confused

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[41] Ibid., p. 44

students. Mary B. Harbeck[42] states that educational objectives can and should be formulated in the affective domain, as well as in the higher levels of the cognitive domain.

> Teachers do not often consciously teach or test for objectives in the affective domain. More or less on faith, we assume that people will develop a value complex as they continue to learn.

Harbeck emphasizes that quality education demands that we no longer make these assumptions and that we attempt to measure our effectiveness in the affective domain. David Krathwohl[43] has classified educational objectives dealing with attitudes and values in five major categories:

1. Receiving or attending--awareness, willingness to receive, and controlled or selected attention
2. Responding--acquiescence in responding, willingness to respond, and satisfaction in response
3. Valuing--acceptance of or preference for a value or commitment
4. Organization or conceptualization of a value, or organization of a value system
5. Characterization of a value or value complex, including generalized set

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42 Mary B. Harbeck, "Instructional Objectives in the Affective Domain," Educational Technology (Jan., 1970), p. 49.

43 John P. DeCecco, The Psychology of Learning and Instruction (Englewood Cliffs, New Jersey, Prentice-Hall, Inc. 1968), p. 33.

Harbeck points out that learning cannot take place without the first two. The third level, valuing, is often found in a learning situation; however, levels four and five are frequently ignored by teachers. According to Harbeck, we are reaping the harvest of our neglect: "having spent several decades teaching students to think for themselves, we are now watching youngsters attempt to live by the value judgments they are making for themselves."[44] Where reformers in science education of the 60's placed almost all their emphasis on subject matter, i.e., Chemical Education Materials Study, the Chemical Bond Approach and the Biological Sciences Curriculum Study, some of the newer agencies place emphasis on what is called "policy sciences." Morris R. Lerner[45] reports the field as being mostly problem-solving, decision-making, and forecasting techniques developed by the "think-tank" research institutions. Lerner states that the National Assessment of Education is another force in the science teaching environment. "They call for new emphasis in the teaching of physical sciences."[46]

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[44] Harbeck, op. cit., p. 50.

[45] Morris R. Lerner, "The Ecology of Science Teaching," The Science Teacher, Vol. 38, No. 3 (March, 1971), p. 15.

[46] Ibid., p. 16.

In the area of science two questions are apparent: Who will set the level of adequacy: the science teaching profession or an outside agency? Are changes necessary in science education?

The literature points overwhelmingly to the need for revolutionaly change. It seems quite evident that if the science teaching community does not make the necessary changes, they will be imposed upon us by other agencies. The news media indicate science is already suffering from a bad image. Many of our young believe that science is no longer relevant. It seems fair to assume that part of this poor image results from the failure of science educators to explain science adequately to youngsters. There is a clear mandate to the science teaching community to not only make science and technology understandable, but to clarify its effects on the quality of life and living. While the faith in science is waning, the need for science to help establish environmental priorities for survival is urgent. Glenn T. Seaborg[47] is confident that we can win many of our young people back, especially by showing them how effective we can be in working toward the solution of our environmental ills. According to Seaborg, science must return to the broad and general philosophy from which it originated. As the growing number of precise disciplines became more

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[47]Glenn T. Seaborg, "Those Good New Days," Saturday Review (March 6, 1971), pp. 52-53.

productive the narrower the focus became; however, "science traded off wisdom for knowledge and, to some extent, knowledge for information."[48] He is not suggesting less effort in the individual disciplines, but, rather, more effort in the correlation and transmission of knowledge in an effective way to society. "We have a tremendous task before us in humanizing the focus and feeling of science, while at the same time organizing and rationalizing the forces of humanity."[49] Lerner[50] presents the same idea with these questions and answers:

> Perhaps we must develop courses with social, economic, philosophical or artistic facets. But where should these aspects of science be developed? Should it be in social studies class or a science class? I firmly believe that it will be better and easier to develop the necessary background in the science teacher.

Much of the literature presents the major weakness in the present teacher education programs as a lack of experience in dealing with the human element in the classroom. It is not surprising, then, that the science teacher has failed to integrate the facts and concepts with the real issues and problems to which they apply. The important question seems to be: Can we reform or repair the old conventional system to meet the challenge of today? Few educators believe this is possible without radical reconstruction.

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[48] Ibid., p. 53.

[49] Ibid., p. 53.

[50] Lerner, op. cit., p. 17.

Possibly Carl Roger's[51] plea for change has been the most passionate and revolutionary. His basic thesis is that the learning situation does not require a teacher--i.e., one who imparts knowledge. Learning requires, instead, a facilitation of change and learning. This changingness, "a reliance on process rather than upon static knowledge, is the only thing that makes any sense as a goal for education in the modern world.

In light of the above goal for education, Rogers lists the following ten "Implicit Assumptions" relative to present graduate education as based on how they appear upon analysis:[52]

1. The student cannot be trusted to pursue his own scientific and professional learning.

2. Ability to pass examinations is the best criterion for student selection and for judging professional promise.

3. Evaluation is education; education is evaluation.

4. Presentation equals learning: What is presented in the lecture is what the student learns.

5. Knowledge is the accumulation of brick upon brick of content and information.

6. The truths of psychology are known.

7. Method is science.

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[51]Carl R. Rogers, Freedom to Learn (Columbus, Ohio: Charles E. Merrill Publishing Co., 1969), p. 104.

[52]Ibid., pp. 169-202.

8. Creative scientists develop from passive learners.

9. "Weeding out" a majority of the students is a satisfactory method of producing scientists and clinicians.

10. Students are best regarded as manipulable, not as persons.

The above assumptions gathered by Rogers from observations and graduate students lead him to seriously question the pattern of scientific and professional education in our colleges. He says, "when we examine what we do, rather than what we profess in this area, the picture which emerges is, in my estimation, a sorry one."[53]

Rogers proposes the "Plan of Self-Directed Change" as a view of what education might become. This plan implies new techniques along with a new goal for education. He believes that in the coming world it is more important to be able to face the new than it is to know and repeat the old. This requires that the educator be open and flexible, and also involved in the processes of change. How is this accomplished? Roger directs our attention to the human element:

> ". . .unless we give strong positive attention to the human interpersonal side of our educational dilemma, our civilization is on its way down the drain. Better courses, better curricula, better coverage, better teaching machines, will never resolve our dilemma in a basic way."[54]

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[53] Ibid., p. 170

[54] Ibid., p. 125.

The most important tool in this plan is the intensive group which is also known by such names as "T"-group, laboratory training, sensitivity training, basic encounter group and workshop. Rogers refers to it as the "workshop" group, which consists of ten to fifteen people and a facilitator or leader.[55] The group is mostly unstructured, which provides a climate for freedom of personal expression, exploration of feelings and the all important interactions among the group members. The route to realness is easier in this atmosphere which encourages each member to "drop his defenses and facades and relate directly and openly to other members of the group--the 'basic encounter.'"[56] The basic aim is to bring about improvement in the learning and abilities of participants particularly in leadership and inter-personal communication, which will consequently bring about change in the organizational climate and structure in which members work. Industry has found this approach helpful in many aspects of learning and leadership.

Rogers presents the following steps as a plan for educational systems at all levels:[57] (It is assumed that

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[55] Ibid., p. 304.

[56] Ibid., p. 304.

[57] Ibid., pp. 308-322.

the basic criterion is met--that one or more persons in power in the school have the desire and willingness to become involved in an intensive group experience.)

1. An intensive group experience for administrators and school board members. (For one week)

2. Intensive group experience for teachers (small or large groups--taken off campus for at least a week).

3. Encounter groups for class units (outside facilitator working with the class for five full days).

4. Intensive groups for parents.

5. "Vertical" groups (For individuals involved in some previous encounter groups, e.g., two school board members, two administrators, two teachers, two parents and two students).

The time schedule for carrying out the above plan is that the various group experiences should be held within a fairly short period of time, so as not to lose the impact of the program. A suggestion for the first year would be to hold nine workshops with, perhaps, ten encounter groups in each workshop. The plan should be designed for continuing change and training. Rogers lists the following possible risks and objections:

1. The possibility of damage to individuals (openness of group experiences revealing hidden feelings).

2. Possibility of too rapid a change (to a process-centered organization from static stability).

3. Possibility of rejection by the community.

4. The possibility of criticism.

5. Financial aspects.

6. Assessment of change (assessment teams, a member from each group, observe and interview prior to the program and then compare with assessments taken at intervals after the program has begun. (Members of the community might be on the team).

According to Rogers, rigorous research opportunities are available in studying one or more encounter groups. Such a research proposal has been developed and is ready with the above plan.

Aspects of Roger's plan has been incorporated in the Earth Science Teacher Preparation Project. This project is an outgrowth of the teacher preparation activities of the Earth Science Curriculum Project. The primary focus of ESTPP is on pre-service training of teachers of earth science and environmental science. "Teachers should learn in the same kind of environment they expect to create."[58] William D. Romey[59] writes of the role of the teacher in experimental learning in environmental science as that

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[58]William D. Romey, "ESTPP. . . New Concepts in Teacher Education," Environmental Science, No. 1 (Sept. 1, 1970), p. 3.

of facilitator of learning rather than dispenser of information. In his words:

> Much educational research suggests that learning of science can only be significant when based on experiences that have direct meaning to the learner.

As Romey has written, if we accept experimental learning as the mode in which secondary school students should learn science, the teacher should be educated in such a manner that he will possess the fundamental competencies to operate his own course. "He must have greater love for his students than for the subject matter."[60]

Robert E. Samples[61] hails the curriculum makers of this decade as looking at "the other half of the human being." He described the science curricula of the past and that of the Woods Hole Conference of 1958 as being concerned with two aspects of content: (1) basic inherent rational structure and (2) how the human intellect accumulates knowledge. Jerome Bruner and others were the great "process" spokesmen of the times. (It should be noted that Bruner, in his March 9, 1971, keynote address at the 26th Convention of ASCD, expressed his current reservations about the emphasis on process which has characterized the past decade.) Psychologists were also adding recipes for the working of the rational sides of the intellect. It was

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[60] Ibid., p. 5.

[61] Robert E. Samples, "Get Out. . . and Learn," Environmental Science, No. 1 (Sept. 1, 1970), p. 4.

the Sputnik rationality that was being heard. As Samples describes:

> Onward to the books, the equipment, the lab manuals, the teacher's guides that now nostalgically populate our classrooms.[62]

Now after ten years invested in what one knows, there is a new tune which is focused on how the human being feels. Now many psychologists, along with social critics, have attacked the joyless, coercive, institution called the school. Their thesis is crystal clear. They defend the students' right to "feel" about learning as well as to "know" the content. Some of the current voices singing the new tune are Carl Rogers, Leonard Engle, Postman and Weingartner, John Holt, Richard Jones, Louis Raths, Merrill Harmin, and Sidney Simon. Their arguments can be summed up in the claim that what happens at school should be compatible with the social and personal conditions called life. Edward Yeomans[63] presents a similar message from Terry Borton's book, Reach, Touch and Teach. While schools for generations have been concerned with the logical and the rational, only recently are more educators allowing more access to the intuitive and emotional in the educational process. Certainly both the emotional-intuitive inputs and the rational-logical inputs are equally

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[62] Ibid., p. 5.

[63] Edward Yeomans, "Reach Touch and Teach" by Terry Borton, Teachers College Record, Vol. 72, No. 3 (February, 1971), p. 465.

important in our lives. In Borton's words:[64]

> The goal of the teacher should be to help each student constantly increase his understanding of his feelings, and expand that self-awareness by utilizing the vast intellectual resources available to man. Such an education will mean that students learn increasingly sophisticated processes for coping with his concerns about his inner self, and the outer world. By stressing the relation between processes and concerns, it should be possible to make school as relevant, involving, and joyful as the learning each of us experienced when we were infants first discovering ourselves and our surroundings.

The literature clearly indicates there are two camps writing the magic formula on how to make students feel better. One group argues that activities should be pre-determined and students should be guided into intellectual activities so as to insure that the cognitive intellectual levels are met. These theorists believe that the sense of self-worth is nourished by the student's ratio of success in accomplishing or conforming to the intellectual criteria set up by the teacher as standards for success. Gail Lueck[65] refers to this argument when describing the inquiry approach to laboratory investigations common in contemporary science teaching. Inquiry takes either the directed route or the open-ended route; most inquiry-oriented teachers employ a directed inquiry approach.

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[64] Ibid., p. 465.

[65] Gail G. Lueck, "Inquiry: Directed or Open-Ended?" Journal of Geological Education, Vol. XVIII, No. 1 (Jan., 1970), p. 40.

According to Lueck, directed inquiry presumes that, prior to introducing an investigation, the teacher knows:

1. The specific problem to be investigated by the students.
2. The methods students will use to solve the problem.
3. The quantitative data and qualitative observations students will collect and make during the course of the investigation.

Also, use of specific methods is usually assured by placing certain materials and equipment in the laboratory or by giving the students duplicated laboratory instructions. The students are exposed to the "desired concepts in the order the teacher and curriculum writers have determined to be most useful and logical."[66] Samples[67] points to another facet of this camp's activities--the measurement syndrome. He writes:

> We are now crushed by a wave of behavioral research, and the dominance, of content has waved in the name of progress. Currently the students are being tossed and tumbled about in the result of that research, the work of behavioral scientists who are infatuated with definable, measurable objectives.

In summary, the behaviorist camp views education as <u>extrinsically purposive</u>.

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[66] <u>Ibid</u>., p. 40.

[67] Robert E. Samples, "Toward the Intrinsic: A Plea For the Next Step in Curriculum," <u>The American Biology Teacher</u>, Vol. 32, No. 3 (March, 1970), p. 143.

The other camp, referred to by Sample as the suspicious camp, feel that education should be intrinsically purposive. They argue that mere conformity to external criteria is not a valid indicator of personal success. The qualities inside the child are far more important than those outside the child. They feel that children should explore and discover assignments, as they see it. The teacher's role, then, becomes that of facilitator, focused on making each student reach in the direction in which he points. Samples relates these thoughts to the Environmental Studies as:[68]

> . . . "change" provides conceptual as opposed to content constraints, the students have far greater degrees of freedom than otherwise. . . .
> Ambiguity has a higher potential for relevance than does specificity. In the face of ambiguity concerning a conceptual topic (like "change"), a student has a far higher potential for serving his own (intrinsic) needs than he does if the teacher announces, "Go outside and get evidence of erosion." Erosion is content, whereas change is conceptual. Conceptual involvement is far less constraining than content.

Gail Lueck expresses the fruitfulness of divergent thinking using the earth sciences as a framework and source of problem areas. According to Lueck:[69]

> If the teacher is viewed as the primary source of knowledge and teaching is equated with learning, the directed approach will be used; if learning is seen as a student process resulting from his responsible, free interaction with things and ideas, the approach will be open-ended.

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[68] Samples, op. cit., p. 6.

[69] Lueck, op. cit., p. 40.

As Lueck points out, the main value of the open-ended approach and also the primary difference between it and the directed approach is the "need it develops in the student for self-reliance and self-motivation in the learning process."[70]

These researchers have found that divergent thinking is the most rewarding quality, particularly, in the early stages of problem solving. They do not aim to discredit the convergent thinking that inevitably emerges in the final steps of problem solving. However, this camp comes forth with a loud and clear concern regarding the pressure toward convergent thinking, traditionally established in science curricula, as a result of the content and process biases.

Teaching Science With A Value Clarification Approach

> No longer can we theorize about democracy and the brotherhood of man. We either bring these concepts into reality in our classrooms or we face the alternatives of the smoldering fires of feelings or the actual flames of conflict.[71]

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[70] Ibid., p. 41.

[71] Helen Godsey Murray, "Teaching Staff puts Value into Action; Provides Anatomy for Integrated School," The Delta Kappa Gamma Bulletin, Vol. XXXVII-2, (Winter, 1971), p. 32.

Margaret L. Smith's[72] two basic questions as to the purpose of education today brings into focus the beginning of our search for values and teaching. These questions are: "Which direction should we go? Where do we want to go?" "Without a sense of indebtedness to what is around them in space and prior to them in time, people lose a sense of direction and the meaning of the values which our society has decided to live by." As Smith points out, "no man is just educated; he is educated for something, for some purpose." Listing some qualities of American life of the 60's as change, fear, and confusion over values, Smith moves to suggestions for meeting these needs, particularly value confusion:[73]

1. Parents and the school need to direct their greatest attention and efforts toward identifying these values and moving them from the twilight into the limelight.

2. Knowledge is only one determiner of human behavior. Acquisition of basic facts is important, but only in relation to the development of skill in using these facts--in decision-making, in social relationships, and in all aspects of daily living.

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[72]Margaret L. Smith, "Which Direction Should We Go? Where Do We Want to Go?" The Delta Kappa Gamma Bulletin, Vol. XXXVII-2 (Winter, 1971), p. 43.

[73]Ibid., pp. 44-45.

3. Needs, perceptions, attitudes, experiences, beliefs and values also are determiners of our behavior.

4. That one basic, underlying purpose of education for every individual is to help him to be a proud responsible citizen of this United States of America.

We are reaping the fruits of neglecting to equip students with the knowledge, attitudes, skills and values necessary to maintain and promote a democratic government. Perhaps in the zeal for the facts, teachers have consciously or unconsciously debunked our heroes and made issues of their human frailties. Accordingly, while minimizing the importance of the heroes and their deeds, the significance of the depth of feelings and basic values that promoted the deed was never communicated. To bridge this gap, far more is needed than revival efforts in the American history or science classroom. American ideals and our heroes cannot survive isolated in the classroom, even with renewed effort to re-evaluate them. In this area, the home and school must share the responsibility.

Values and the Valuing Process

What are values? What is the valuing process? Values have been defined in Chapter I of this study as "an attitude, a standard, or a belief which the individual has selected and reconstructed from the many concepts that beset him in his environment and the feelings that struggle

within him." Values may result from either indoctrination or introjection or free choice. The valuing process has been defined in Chapter I of this study as the use of strategies and techniques planned to help the individual make value choices. The criteria for value choice must satisfy the seven steps of the valuing process.[74]

According to J. Bronowski:[75]

> The problem of values arises only when men try to fit together their need to be social animals with their need to be free men. There is no problem, and there are no values, until men want to do both.
>
> The concepts of value are profound and difficult exactly because they do two things at once: they join men into societies, and yet they preserve for them a freedom which makes them single men. A philosophy which does not acknowledge both needs cannot evolve values, and indeed cannot allow them.

Clyde Kluckholm[76] also brings in both personal values and social values by defining a value as a "conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable, which influences the selection from available modes, means, and ends of action."

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[74]See Chapter I: Also see the definition of "valuing process" and "criteria for value choice" as presented by Louis Raths, Merrill Harmin, and Sidney B. Simon, Values and Teaching, (Columbus, Ohio: Charles E. Merrill Publishing Company, 1966), p. 46.

[75]Bronowski, op. cit., p. 55. Italics added for emphasis.

[76]Clyde Kluckholm, "Values and Value-Orientations in the Theory of Action" Toward A General Theory of Action, ed. Talcott Parsons and Edward A. Shils (Cambridge, Massachusetts: Harvard University Press, 1962), p. 395.

Rokeach[77] defines a value as:

> . . . a type of belief, centrally located within one's total belief system, about how one ought or ought not to behave, or about some end-state of existence worth or not worth attaining. Values are thus abstract ideals, positive or negative, not tied to any specific attitude object or situation, representing a person's beliefs about ideals modes of conduct and ideal terminal goals. A person's values, like all beliefs may be consciously conceived or unconsciously held, and must be inferred from what a person says or does.

"The concept of values," he explains "seems to be a more dynamic concept since it has a strong motivational component as well as cognitive, affective, and behavioral components." According to Rokeach, individuals possess fewer values than attitudes, therefore, the value concept provides a more reliable analytical tool.

Mead[78] noted in her studies of primitive peoples that ritual was used to inculcate beliefs and values that often run contrary to fact.

Rogers[79] has interpreted the term value in three ways:

1. "Operative values"--This is a tendency of any living beings to show preference, in their actions, for one kind of object or objective rather than another. It need not involve any cognitive or conceptual thinking.

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[77]Milton Rokeach, Beliefs, Attitudes, and Values (Calif., Jossey-Bass, Inc. 1969), p. 124.

[78]Margaret Mead, "Adolescence in Primitive and Modern Society," The New Generation, ed. V. F. Calverton and S. D. Schmalhousen (New York: Macauley, 1930), pp. 169-88.

[79]Rogers, op. cit., p. 241.

2. "Conceived values"--This is the preference of the individual for symbolized object, e.g., a preference for "honesty is the best policy" is such a conceived value.

3. "Objective value"--This is used when people wish to speak to what is objectively preferable or in fact conceived of as desirable.

Rogers speaks almost conclusively to definitions number one and two. He states that the infant human being has at the beginning, a clear approach to values. That is, he prefers some things and experiences and rejects others. The change in this innate, clear-cut value system takes place as the child introjects the value judgments of others, taking them as his own.

Rogers also refers to the infants approach to values as a flexible, changing, valuing process, not a fixed system. This weighing of experience is organismic, operative--not conceived values. However, he believes that the process can deal with complex value problems. Rogers is saying that the infant approach to the valuing process is located clearly within himself--he knows what he likes and dislikes. The infant is not influenced by the latest "experts" in the field, his parents' preference, or by advertising. Rogers asks: "What happens to this highly efficient, soundly based valuing process?"

Erikson[80] believes that when the infant begins to explore the environment within his home, initiative develops and his values may conflict with those of his parents. Consequently, the center of the valuing process starts to shift from within the child to the external influence of "significant others." It is by this process that the child, in his attempt to view himself as a worthy, loved individual, adapts the values of "significant others" and begins to distrust his own innate valuing process. Peter Caws[81] refers to the value process when discussing science and the theory of values. His words are:

> Science is a kind of knowledge, and as such it must. . . always be retrospective. But values are different from knowledge; they do not come to us from the world, but they go from us to the world; they refer not to what is or was the case, but to what will or may be the case. They are, therefore, always prospective or future referential.

Current research efforts in the area of values and teaching, particularly on values as process, can be classified as dealing with either values, valuing or the theory of value. The value theory, in most occasions, is implicit within the definition of a value. Therefore, value theory emphasizes the varying definitions and categorization of a value. The various disciplines of psychology, social

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[80]Erik Erikson, Childhood and Society (New York: W. W. Horton and Company, 1950), pp. 222-226.

[81]Peter Caws, Science and the Theory of Value (New York, Random House, Inc., 1967), p. 54.

science, anthropology, social psychology and philosophy have suggested the operation of values in both individual and group behavior. The valuing processes are concerned with enabling students to make choices which, according to Dewey,[82] place the emphasis upon the variable of the problem situation as the key to value learning. Raths, Harmin, and Simon[83] suggest the similarity between the value theory and certain approaches to critical thinking. Many psychologists interested in education today maintain Dewey's position that values arise in the individual only when problem situations require a behavioral choice. According to this position, values or the valuing processes assume that the behavior of students in our classroom environments reflect confusion and conflict of values. Much of the recent literature on the confusion and conflict in values emphasize how children are caught between differing messages received through the school, the home, the peer group and the overwhelming multi-media.[84] As value

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[82]John Dewey, Interest and Effort in Education (Boston: Houghton-Mifflin Company, 1913), pp. 21-42., and John Dewey, Experience and Education (New York: The Macmillan Company, 1938), p. 5.

[83]Raths, Harmin, and Simon, op. cit., p. 9.

[84]Charles Glatt, op. cit; Billy J. Paschal, "How Children Learn Values," School and Society, Vol. XCVI (Feb. 3, 1968), pp. 77-78; Caleb Gattegno, What We Owe Children: The Subordination of Teaching to Learning (New York: Outerbridge and Dienstfrey, 1970); Paul Goodman, New Reformation: Notes of a Neolithic Conservative, op. cit.; and Judy Neuman, Detroit Free Press, "Nixon Talks About Values: Families At Loose Ends" (Tues., March 16, 1971).

confusion increases, there seems to be a proportionally negative influence on behavior and achievement.[85]

Certainly the research indicates the urgent need for new directions in the classroom. Teaching strategies for the clarification of values must be a part of the classroom process. Changes are needed in classroom climate so that more freedom and humanness are experienced by both students and teachers as they search together for values in the learning-teaching environment.

Values and Teaching in the Open Environment

Kimball Wiles[86] stated nearly two decades ago that our best technique for teaching of values is through the operation of the classroom. "We learn what we live." The open, democratic climate must constitute the basic framework for value clarification to function.

Rogers[87] has described the components of the classroom, in which value-clarification is the goal, as being

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[85]Eleanor Burke Leacock, Teaching and Learning in City Schools a Comparative Study (New York, Basic Books, 1969); Developing Programs for the Educationally Disadvantaged, edited by Harry Passow, (New York, College-Press, 1968); Bernice Waddles, "Teaching in the Inner-City Schools," NEA Journal, Vol. 57, No. 3 (March, 1968), p. 39; Stanley Coopersmith and Jan Silverman, op. cit.; and Sidney Trubowitz, "How to Teach in a Ghetto School," Today's Education, Vo. 57, No. 7 (October, 1968), p. 28.

[86]Kimball Wiles, Teaching for Better Schools, (New York, Prentice-Hall, Inc., 1953), p. 146.

[87]Rogers, op. cit., p. 103.

conducive to the "facilitation of change and learning." Teaching, he continues, is a "relatively unimportant and vastly overvalued activity." The facilitation of learning does not rely upon teaching skills, methods or materials, but "rests upon certain attitudinal qualities which exist in the personal relationship between the facilitator and the learner." The research of others, according to Rogers, has estimated as many as 1,000 interpersonal interactions may exist per day between the teacher and her students.

Caleb Gattegno[88] refers to the subordination of teaching to learning as building on the strengths or functionings of children. Gattegno continues:

> Now, as soon as we shift from acquiring facts through memory to acquiring them through functionings, we unify our experience in the duration of one life--for we always build on and integrate with what already exists and do not simply pile one fragment of information upon another--and we recognize that inner meaning is more important than outside authority.

There are other writers[89] holding the same view toward teaching as that of Rogers and Gattegno; several have been previously cited in this study. Of those mentioned, perhaps Kohl[90] is most adamant in his call for a new way of teaching. His open classroom is difficult to explain. It must be experienced. It is not a haphazard

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[88] Gattegno, op. cit.

[89] In addition to those mentioned here and elsewhere in this study, writers such as Holt, Jones, Leonard, and Gordon should be consulted. Citations for these works are listed in the Bibliography.

[90] Kohl, op. cit., p. 15.

or "permissive" environment. It is a human environment. Kohl says that:

> In an open classroom the teacher must be as much himself as the pupils are themselves. This means that if the teacher is angry he ought to express his anger, and if he is annoyed at someone's behavior he ought to express that, too. In an authoritarian classroom annoying behavior is legislated out of existence. In a "permissive" classroom the teacher pretends it isn't annoying. He also permits students to behave only in certain ways, thereby retaining the authority over their behavior he pretends to be giving up. In an open situation the teacher tries to express what he feels and to deal with each situation as a communal problem.

The typical view of the "open" classroom is equated with "messing around," "goof-off" and a diminution of subject matter and real investigative activity. Certainly there is more than one view of the open classroom. Also, an open learning environment has possibilities for both successes and failures.

Virgil Franks and Verna Todd[91] relate their observations of an open earth science classroom rated by them as unsuccessful: "a typical day in the class saw the dull, cheerless faces of students aimlessly rather than purposefully, doing the following activities, some of obvious and some of questionable merit:

Four boys conversing for the period around a chemistry setup they had assembled from a picture and didn't know the purpose of or the chemical they had put into it.

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[91]Virgil Franks and Verna Todd, "An Open Classroom: One View," ES/ESTPP Newsletter, No. 3, p. 3.

Four or five students chatting all period, as they had done for weeks, while waiting for the fish they wanted to investigate to arrive at a pet shop. . .

Franks and Todd sum with this picture of total permissiveness: "One of the pictures of the class that remains in my mind is Thompson toward the end of the year in front of the room attempting to speak to the students about the class--as they read magazines, tossed a ball back and forth, and conversed."

Another view of the same classroom is related by William Romey:[92]

> What I learned on the first visit and have since realized more fully in a number of open classrooms is that the problems I have "seen" are largely my problems as an observer rather than real problems for the students. When I see students doing things other than what my still narrow expectations demand, I am uncomfortable. But I'm becoming more comfortable every day with what students choose to do. After years of being coerced and of coercing, I still find it difficult to be a truly free person and to accept a student's right to freedom.

The literature cited above and elsewhere in this paper refers repeatedly to the subject matter orientation of teachers as being the primary obstacle to both openness and the value clarification approach to teaching. Jersild[93]

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[92]William D. Romey, "An Open Classroom: Another View," ES/ESTPP Newsletter, No. 3, p. 3.

[93]Arthur T. Jersild, When Teachers Face Themselves (New York, Horace Mann-Lincoln Institute of School Experimentation, Teachers College, Columbia University, 1955), p. 61.

has expressed the basic idea: "There is no value in the volume of what one knows or the quantity of what one does unless one is achieving some kind of self-fulfillment in the process of learning or doing." Or, as Jersild continues:[94]

> If we as educators are to face the problem of meaninglessness, we must make an effort to conduct education in depth. . . to move toward something that is personally significant beyond the facade of facts, subject matter, logic, and reason behind human motives and a person's real struggles are often concealed. This does not mean the rejection of subject matter. . . far from it. . . but it does mean helping the learner to relate himself to what he is learning and to fit what he learns into the fabric of his life in a meaningful way. Such an endeavor means an effort to overcome the prevailing tendency in education to encourage the learner to understand everything except himself.

Arthur Combs[95] emphasizes the point:

> What makes people human are matters of feelings, beliefs, values, attitudes, understandings. Without these things a man is nothing. These are the qualities which make people human. They are also the qualities which, in our zeal to be objective, we have carefully eliminated from much of what goes on in our public schools.

Considering the merits and limitations of the subject matter or knowledge dilemna, as previously cited in this study, the haunting question returns as to <u>how</u> or <u>how much</u> can educators serve the affective domain, while still maintaining the necessary cognitive learnings. Harbeck and

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[94] <u>Ibid</u>., p. 80.

[95] Arthur W. Combs, "An Educational Imperative: The Human Dimension," in <u>To Nurture Humaneness</u>, edited by Mary-Margaret Scobey and Grace Graham (Washington C.C.: ASCD, NEA, 1970), p. 174.

Eiss[96] clearly outline the problem as this:

> At the present state of our knowledge about the affective domain, it may not be possible to suggest behaviors that invariably will serve as indicators of the achievement of a given affective objective, or to provide numerical values between overt behaviors and desired goals. Of course, this is true to a lesser extent with the cognitive domain. It is only in the psychomotor that the "credibility gap" is fairly closed between behaviors and objectives.

This study has cited several suggested reasons why teachers are more comfortable when dealing with the cognitive domain. Another important major factor is that it is easier to evaluate the outcomes of cognitive goals than it is to measure the attainment of affective goals. Harbeck[97] has listed the following problems related to the attainment and evaluation of the outcomes of affective goals in education:

1. Probably not possible to give a rigid list of desirable behaviors in the affective domain.

2. Objectives in the affective domain may have to be more open, with flexibility to specify acceptable behaviors in response to a given situation.

3. Evaluation items will be less precise. "However, any attempt to assess students' willingness and ability to make value judgments and defend them will be some improvement over the present dearth of any attempt at measurement in this area."

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[96]Harbeck and Eiss, op. cit., p. 4.

[97]Harbeck, op. cit., pp. 51-52.

4. The credibility gap between the desired objective and the student behavior that will be accepted as evidence that the objective has been achieved. "In the affective domain, it may be unwise to announce objectives to students in advance of instruction. This is in contrast to good practice in the cognitive domain, where a student's difficulty in learning often stems from his inability to find out what the learning objective is." Checklists and attitude scales may be administered by an agent outside the classroom as a possible means of assessment tasks.

5. "If learning to make judgments and build value systems is an important part of science, then this should be reflected somehow in the evaluation system. However, it seems impossible to give a student a grade for interest or values."

6. "An effort must be made to build some quality into learning experiences, so that there will be values in learning in addition to the terminal cognitive objectives." Harbeck closes by asserting: "The affective domain is central to every part of the learning and evaluation process. . . value systems provide the motivation for continued learning and for most of an individual's overt behavior."[98]

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[98] Ibid., p. 52.

Value Clarification and Science Teaching

Considering Harbeck's belief that the cognitive has an affective origin, the question returns as to how to deal explicitly with the fundamental aspects of values in the curriculum. Is any subject value-free? The literature cited in this study has made it clear that those values implicit in the present curriculum are either unknown, dysfunctional, irrelevant, or strongly questioned. Modern technology is forcing us to restructure our views and certainly to reestablish our basic priorities in the classroom. The question is no longer whether we should reexamine our priorities and values; we must examine the new possible routes and proceed. Faced with the challenge of newer approaches, William G. Davis[99] quoted the following Victorian verse to indicate the similarity to our time:

> Strength without hands to smile,
> Love that endures for a breath,
> Night the shadow of life,
> and life, the shadow of death.

In some ways, perhaps, the young are more sensitive to these lines and to the confused value issues of our times. Students have lived their entire lives in a television-dominated society with its horrendous volume of information and entertainment being tossed haphazardly upon them. Certainly resolving some of these disparities are normal to

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[99]William G. Davis, "Values and the Curriculum," Values and the Curriculum (Auxiliary Series, published by N.E.A., a report of the Fourth International Curriculum Conference, 1970), p. 96.

life--flexibility is central to human experience. However, today's students see the world and hear it speak and what they hear and see are not the old values. They are accusing the school and teachers of hypocrisy. Can we help them to examine, and clarify the complexity of the issues and decisions of our time? Ralph Ellison's[100] words describe one clear voice from the wilderness:

> If you can show me how I can cling to that which is real to me, while teaching me a way into a larger society, then I will drop my defenses and my hostility, but I will sing your praises and I will help you to make the desert bear fruit.

Harmin, Kirschenbaum and Simon[101] have presented a description of the value theory and strategies for value clarification approaches which might be used by science teachers for the practice of the teaching function as a value clarification process. As indicated earlier in this study, the value theory is designed to foster critical thinking which in turn, elevates the facts and concepts of science to the higher values level. The distinction from the other approaches to critical thinking such as the scientific method, is the affective domain.

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[100] Developing Program for the Educationally Disadvantaged, edited by Harry Passow (New York: College Press, 1968), p. 72.

[101] Harmin, Kirschenbaum, and Simon, op. cit.

All three levels, Level I--Facts, Level II--Concepts, and Level III--Values become equally important in the science teaching-learning situation. Raths, Harmin, and Simon[102] state the relationship between the cognitive domain of human activity and the affective domain as where "the value clarifying methodology invades both areas and might be seen as one way of synthesizing certain aspects of both. A value is a result of activation of both the affective and cognitive domains, then, and seems to be one of the few connecting links that has been carefully delineated."

Harmin, Kirschenbaum and Simon[103] offer the following examples to indicate how topics in earth science are elevated through the three levels view:

The Earth's Crust

Level I (Facts)

1. What are the three major groups of rocks?
2. Name three ways water can change the earth's surface.
3. What precious gems are found among the minerals in the earth?
4. How are volcanoes formed? etc.

Level II (Concepts)

1. Show how two recent dramatic changes of the earth's surface were similar to changes which took place a million or more years ago.

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[102]Raths, Harmin, and Simon, op. cit., p. 225.

[103]Harmin, Kirschenbaum, and Simon, op. cit.

2. Compare and contrast two theories of how mountains were formed. Which do you accept? Give your reasons.
3. Discuss the similarities and differences between precious and semi-precious stones, from a scientific point of view.
4. Where on the earth's surfaces are volcanoes most likely to occur today?

Level III (Values)

1. Are you someone who is likely to become a rock hound some day?
2. Are the mountains a place where you really like to spend your vacation?
3. Should oil companies receive a depletion allowance?
4. In some states, strip miners find it cheaper to pay a fine than to do the reforestation the law requires. What is your reaction to this? What other information do you feel you need to know about this?
5. Which, if any, of these worry you at all or more than others?
   a. Converting the Florida Everglades into housing for senior citizens.
   b. Bulldozing a mountain so a fourlane road can go by.
   c. The cities spreading out over the earth's surface, leaving less and less open space.
6. When you get married, do you think you will give an expensive ring to your wife, or if you are a girl, do you think you will want one? Can you think of any alternative ways a husband might show affection for his bride?

These authors point out repeatedly <u>subject matter is important</u>, but that the teacher's role is that of <u>elevating subject matter</u> to the third level, "that is making the information taught relevant to the student's lives."

Thus, the teacher's role becomes elevated. The teacher must help create a classroom climate which is conducive to the search and clarification of values.

Raths, Harmin, and Simon[104] see seven criteria for definition of a value. These seven criteria are based upon the process of choosing, prizing, and acting. The criteria are:

1. Encourage children to make choices, and allow them to choose freely.

2. Help them discover and examine available alternatives when faced with choices.

3. Help them weigh alternatives thoughtfully reflecting on the consequences of each.

4. Encourage them to consider what it is that they prize and cherish.

5. Give them opportunities to make public affirmations of their choices.

6. Encourage them to act in accordance with their choices.

7. Help them to examine repeated behaviors or patterns in their lives.

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[104]Louis E. Raths, Merrill Harmin, and Sidney B. Simon, "Helping Children to Clarify Values," NEA Journal Vol. 56, No. 7 (October, 1967), p. 13.

Teaching Strategies

Because the value clarification process rests on the seven valuing criteria, the use of clarifying questions becomes an important basic tool in this teaching method. The clarifying response avoids any judgmental aspects and is planned to cause the student to examine his own values. Accordingly, the teacher must not ask questions to probe; the clarification method is not meant to be therapeutic. Some examples of clarifying responses taken from Values and Teaching[105] are:

1. Is this something that you prize?
2. Are you glad about that?
3. How did you feel when that happened?
4. Did you consider any alternatives?
5. Have you felt this way for a long time?
6. Was that something that you yourself selected or chose?
7. Did you have to choose that; was it a free choice?
8. Do you do anything about that idea?
9. Can you give me some examples of that idea?
10. What do you mean by____: can you define that word?
11. Where would that idea lead; what would be its consequences?
12. Would you really do that or are you just talking?
13. Are you saying that. . . (repeat the statement?)
14. Did you say that. . . (repeat in some distorted way?)
15. Have you thought much about that idea (or behavior?)
16. What are some good things about that notion?
17. What do we have to assume for things to work out that way?
18. Is what you express consistent with. . . (note something else the person said or did that may point to an inconsistency?)

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[105]Raths, Harmin, and Simon, op. cit., pp. 56-63.

19. What other possibilities are there?
20. Is that a personal preference or do you think about your idea?
21. How can I help you do something about your idea?
22. Is there a purpose back of this activity?
23. Is that very important to you?
24. Do you do this often?
25. Would you tell others about your idea?

The clarifying response does not follow a precise pre-planned experience for molding student's thinking. It is not used as an interview or as a means of obtaining data, but as an opportunity for the student to clarify his ideas and life, if he wishes to do so.

The clarifying response is a useful technique to use as written comments on student papers. The questions may be modified to become appropriate to the specific situation. In short, the clarifying response "avoids moralizing, criticizing, giving values, or evaluating."

The second most important value clarification strategy is the value sheet. The usual value sheet contains a written, provocative, sometimes even threatening, value-laden statement, which is followed by "you" questions. Discussion on value sheets becomes effective only after students have individually considered the clarifying questions. The value sheets can be used with subject matter as a means of elevating the subject to the value level or as single value lessons. The value sheet may be constructed by the teacher or by the students. Small group work provides an excellent opportunity for either the construction of value

sheets or to focus on their use in the classroom. The authors of Values in Teaching give the following example of good questions:[106]

> Do you have a reason for your choice? If so, please mention it. What alternatives did you consider before you arrived at your choice? List the consequences that you desired from your choice and also the consequences from alternative choices that you rejected. Also ask questions about actual behavior, about what a person does or intends to do about his choice.

These authors emphasize that the purpose of the value theory, and the strategy of the value sheet, is to help students think through the important areas of their lives and in the process gain more respect for their own decision-making abilities.

Another useful approach in science teaching is the strategy called rank order, which in many ways is similar to the incomplete value sheet. The aim is the search for priorities by helping students place their value choices into perspective with possible alternatives. There are no "right" or "wrong" answers involved in the exercise. After completing the rankings several different students may be called on to explain the order of their ranking. Another variation of this approach is called the "16 Item

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[106] Ibid., p. 110.

Forced Choice," listed with other strategies compiled by Sheila Jarsonbeck.[107]

A fourth strategy is the thought sheet or weekly value card, which is designed to help students to discover and articulate values. Students may use an index card for recording the thoughts important to them during the week. The ideas recorded by the students may or may not be relative to topics currently being studied in the classroom. This approach, like that of the value sheet, offers a sharing of peer thinking. (If a student does not wish to share his thoughts, he may write, "please do not read to class" on his card.) From time to time, the value cards should be returned to students with the teacher's comments or questions checked, so that the student is aware of the pattern of his thinking.

The diary is a valuable clarification technique which is similar to the value card in the way it can be used by students. A time diary may also be kept as a record of activities (Level I, II, and III) that have taken place in the classroom. This record becomes a summary of the recorder's views of the events that have taken place. Repeat and comparison exercises, then, might be useful.

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[107]Sheila Jarsonbeck, Who Are You? Are You In Touch With Your Feelings? Do You Really Know What You Value in Life? compiled by Sheila Jarsonbeck from a Workshop in Values at Canandaigua, New York, conducted by Sidney Simon and Howie Kirschenbaum (Summer, 1970), p. 3.

Another useful approach for clarifying, particularly controversial, issues in the classroom is the role-play. In the beginning, this strategy is more effectively structured by the teacher with the involvement of the more outgoing students. Gradually the structure can be more student-centered with the involvement of the less out-spoken students. These simulated situations regarding real issues often help students to clarify their thinking and bring forth and develop their own pattern of choosing and prizing.

Raths, Harmin, and Simon list twenty-one clarifying strategies in Values and Teaching. Since the publication of this book others have been compiled by Simon.[108] Chapter III of this study presents examples of using various strategies in the earth science classroom. A desirable outcome of the valuing approach is the action it promotes. Therefore, particular exercises to help students see alternatives for action are included in this study. (Example noted in Chapter III). Although, only a few strategies were briefly described, the science classrooms offer a fertile ground for unlimited use of the value clarification method. This experiment in teaching, like all experimental teaching, will only be as successful as the teacher's faith in, and use of, the method.

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[108]The author of this study attended the Values Clarification Workshop, June 15-19, 1970, in Warminster, Pennsylvania conducted by Dr. Sidney B. Simon. Forty value clarification strategies were presented in this workshop.

Value Clarification and Classroom Climate

Raths, Harmin, and Simon[109] list as the first important guideline to value clarification the psychologically safe classroom climate. They are not referring to complete permissiveness; however, the completely autocratic climate is ruled out.

> More important than permissiveness is respect and concern. Students must feel that, even though rules exist and there is teacher direction, the teacher respects values of the student and is concerned that the student works at those values in his own way.

This teaching theory, according to the authors, is based on a testable hypothesis and they suggest three basic steps for assessing what happens in initial attempts at applying the value clarifying process:

1. Take an initial inventory (measurement of classroom and value-related behavior).
2. Use the value-clarifying method.
3. Take a second inventory (measurement of classroom climate and value-related behavior).

Accordingly, three or four months is suggested as a workable length of time between the first and second measurement. The assumption is that not only will the post-test show a positive effect on classroom climate, but the clarifying experience will have a positive effect on value related

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[109] Raths, Harmin, and Simon, op. cit., pp. 168-169.

behaviors toward the specific subject matter. Teachers using this theory are given these words of encouragement:[110]

> Squeezing value approaches into the crowded schedule may be the large investment that has even larger dividends. . . Few teachers, and we hope this is reassuring, fall flat on their faces when using this theory. About the worst that can happen is that there will be no change. (But be cautious in attributing no change to the theory or one's use of it; it may be nothing more than insufficient dosage.)

The design does not provide positive, conclusive evidence of the degree of affective behavioral changes that have occurred, however, it does help the teacher to discover what value-related effects are occurring from the attempt to apply the value clarification method. By examining the initial inventory, teachers can determine the input necessary for meeting their objectives. As Harbeck[111] has suggested, if measurement of behavior in the affective domain is to be done so we can assess the effectiveness of instruction, it would probably be necessary to produce a list of behavioral descriptions and action words. According to the first reports from the National Assessment,[112] the science exercises that were performed correctly by both 17-year olds and adults were those that were applicable to everyday life

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[110] Raths, Harmin, and Simon, op. cit., pp. 168-169.

[111] Harbeck, op. cit., p. 50.

[112] Ralph W. Tyler, "First Reports from the National Assessment," Educational Leadership, Vol. 28, No. 6 (March, 1971), p. 578.

or "can be learned from out-of-school experiences." The report continues:

> The development of democratic, humanitarian attitudes is commonly viewed as one of the major goals of education in American citizenship. These goals are not universally attained as in the acquisition of knowledge and skills. The curriculum in this area should be carefully reviewed to see whether students are actually involved in activities that give them a chance to sense the way other people feel and see the effects of their own attitudes on others.

The best presently, available instruments, for measuring attitudes are checklists and attitude scales, which for best results should be administered by an independent agent outside the classroom. These instruments are limited to the assessment of students' willingness and ability to make value judgments and perhaps defend them. Other checklists are available as means of measuring a degree of interest and attitudes. Observation of the students reactions and activities is probably as valid as checklists for this purpose.

There seems to be little doubt regarding the relationship between positive student growth and the classroom in which the student is unthreatened, free enough to consider divergent thinking a necessary approach to learning. Raths, Harmin, and Simon[113] caution teachers regarding rapid movement toward a more open climate.

> Indeed, we have seen teachers develop an unsafe classroom climate by rapidly removing controls and direction in the mistaken belief that permissiveness was necessary for value development.

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[113] Raths, Harmin, and Simon, op. cit., p. 169.

As they continue: "The required climate is related more to respect and acceptance of students than to freedom for students."

Suggestions for the preparation of the instruments used in this study were drawn from the above recommendations and those of Albert F. Eiss and Mary Blatt Harbeck (as cited in this study). The Classroom Inventory which was used in the pre-test and post-test contained questions for checking attitudes toward science, personal attitudes and values, and classroom climate as determined by the author of this study to be essential to the assessment of the stated hypotheses. The second instrument, The Classroom Reaction Form was designed to assess, by student opinion, student perceptions of classroom climate. Comparison of pre-test and post-test data permits evaluation as to the effectiveness of the strategies used in the classroom. These results for the author's classes, are given in Chapter IV.

Summary

In summarizing Chapter II, it is essential to return to the concept of two basic threads to curriculum development: those which center upon cognitive knowledge and those which argue that feelings, i.e., the affective domain, are as important as facts. The value clarification process is clearly a method of instruction which seeks to actualize the latter view.

In the remainder of this study, the author's personal convictions as to the need for equal emphasis upon "facts and feelings" are expressed.

This chapter has been used to fully explore value theory, learning theory, and strategies of value clarification styles of instruction. In Chapter III, detailed attention is given to the strategies employed by the author in a three month period of experimentation.

CHAPTER III

METHODS AND APPROACHES USED IN TEACHING SCIENCE WITH A VALUE CLARIFICATION APPROACH

Introduction

I believe the Golden Age is now. Never before has there been a more exciting challenge placed before science teachers than the present task of guiding students through the hierarchy of choices inherent in our technological world. Perhaps the task is too great for the classroom to accomplish alone; but, if we believe the school has any purpose, we must determine what we as teachers wish to do and what performance criteria we are going to set for ourselves and our students. Too long we have taught our students about the conflicts of life and living, while only haphazardly have we taught them the process for making the choices, judgments, and personal commitments necessary to a meaningful life.

We must develop ways to proceed with practical intelligence toward methods, assessment of needs, and the evaluation of outcomes. After we have worked out methods, conducted for desired outcomes, and evaluated the impact of methods on needs, we may be able to concern ourselves with

affective and individualized goals as well as with cognitive and normative procedures. Science teaching must seek ways of achieving such an increased emphasis upon affective education.

Subject matter and the transmission of knowledge remain necessary and important as means to the processes of science and valuing. Earth science classes--such as those reported upon in this study--present a fertile area for grappling with the problems within science and our culture; e.g., the study of the earth's ecological systems provides room for such a dual focus. This same total environmental approach should become integrated into all of the fragmental disciplines of the curriculum. Perhaps environmental education or environmental ecology could be established in the curriculum as a broad field. Life (science and society) is a unit which is interrelated, interdependent, and changing, but certainly not a series of isolated compartments. Perhaps the defects of our present curriculum rest upon two foci: fragmentation, as mentioned above, and secondly, that so many teachers still view our democratic value system as fixed, intuitive, and beyond the need for reconstruction and reexamination. On the other hand, the following conditions are more nearly true today.

1. Our society is changing rapidly at the level of fundamental values.

2. The school is neglecting the affective domain at that time in the student's social-moral development when choice making among the alternatives of today's society is the most important need in his life.

3. Most of the decisions regarding the use of the remaining resources of our natural environment--the earth--will depend upon the basic attitudes and values of the students we are presently educating.

The experimental teaching outlined in this study began with a few preliminary exercises used by the author with four earth science classes. These classes were ninth-grade students in a rural high school with a 9-12 enrollment of 700 students; earth science is a required class for all students. Students in these classes were told at the start of the school year that some of the approaches and activities used during the year might very possibly be different from those they had experienced before. During the first week of school the following long-range activities were introduced:

1. The Student Diary--a running record for the year. This was a daily record of the activities of the classroom as perceived by the student recording for that week. Each week the recording responsibility shifted to a different student. As an example, on September 9, the following words were written in the sixth hour earth science class record book:

Kirk Baese. . . . . "Today we took a different look at the Earth. And we found it is not really round, it is in the shape of a geoid. Our assignment for tomorrow is to figure a gravity problem. We are viewing the movie "Scanning the Universe". I think the class was interested to know the earth has four "humps". And we were interested in the movie.

2. Establishment of a science library in the classroom. The library consisted of current magazines, periodicals, paperbacks in science, and professional magazines. Volunteer librarians were used in each classroom and a valiant attempt was made to share the resources and maintain the library services provided within the classroom setting.

3. Small groups were used for decision-making and problem solving experiences. The students decided as to which group they wished to join, keeping within the parameters of six groups with the class membership divided as equally as possible among the six groups. Changes in group membership were seen as an individual problem; changes were permitted, when desired, as long as the groups remained fairly balanced in membership.

4. Each class, operating as a large group, selected one of three basic approaches for the study of each unit. These choices applied only to individual or group project work: (1) teacher-selection of topics for study with accompanying work plan; (2) student-teacher selection of topics for study with collaboration on the planning; (3) student selection of

their own topics for study and accompanying responsibility for building the plan of study to be used.

Regardless of whether small group or individual study was selected there was an option later in the term for those wishing to do individual study rather than small group work. Small groups were selected by all classes for studies in Unit I, "Earth in the Universe."

The plans selected ranged about equally in each class. One small group decision-making problem was given to each small group as a group exercise in addition to their selected topics. This exercise is shown as Example I in the Appendix.

Besides the small group presentations, other regular classroom activities were carried out, e.g.:

1. Assigned reading from the textbook (Modern Earth Science by William L. Ramsey and Raymond Burckly, Holt, Rinehart and Winston, 1965).

2. Laboratory exercises (Exercises and Investigations for Modern Earth Science by Henri Floch.

3. Readings in Current Science, which all students subscribed to during the first week of school.

4. Teacher lectures.

5. Tests on Level I (Content) Lessons.

In the initial three months, all activities were aimed at creating opportunities for increased student involvement in classroom planning.

Introduction of the Value Clarification Approach

The week before the value clarification method was formally launched, students were asked to select, as class groups, one of three approaches to the study of a unit. These three approaches--called Plan I, Plan II, Plan III--are described in the chart on the following pages.

Students made their choices by popular vote. On Plans II and III, some students worked in pair-learning or small group situations as well as on individual projects. Of the four class groups, one each selected Plan I and Plan II; Plan III was selected by two classes.

One requirement, regardless of the plan chosen, was the completion of laboratory and value-related assignments. This was, however, the only common element.

Organization of Value-Related Content

To understand more clearly the value clarification approach, as interpreted and applied to the four earth science classes described for the three month experimental period, the chart, beginning on page 98, has been prepared to describe the chronological order of activities and techniques used.

The activities shown in the chart should be more fully explained. Each of the following paragraphs explains in detail, the use or purpose of the item, strategy, or activity identified in the chart.

Table 1. Approaches For The Study of Each Unit.

	Plan I	Plan II	Plan III
Required Activities	1. Uniform assignments (all students do the same work): a. Laboratory assignments. b. Quizzes. c. Unit tests.	1. Laboratory assignments. 2. Reporting on topic selected for research. Optional methods for reporting: a. Class presentation. b. Conference with teacher. c. Written report. d. Written test. 3. Log of activities and evidence collected or used.	1. Laboratory assignments. 2. Reporting on topic for research. Optional methods for reporting: a. Class presentation. b. Conference with teacher. c. Written report. d. Written report. 3. Log of activities and evidence collected or used.

Table 2. Approaches For The Study of Each Unit.

	Plan I	Plan II	Plan III
Description:	1. Teacher-Centered	1. Teacher-Student Centered	1. Student-Centered
Guidelines:	1. Uniform for all students according to unit and teacher and text requirements.	1. Teacher lists a variety of learning activities. 2. Student selects, from the listed topics, one topic for investigation. 3. Student prepares five research questions related to the selected topic. 4. The teacher, after receiving the student selected topic and questions, prepares five additional questions.	1. Student selects a topic, related to the unit, for investigation. 2. Student prepares and presents a list of ten research questions, about his selected topic, for investigation.

Table 3. Approaches For The Study of Each Unit.

	Plan I	Plan II	Plan III
Evaluation and Grading	1. Scores on tests and other assignments determined grade according to school grading scale.	1. All activities were evaluated by both student and teacher through the use of individual conferences. Grades received were negotiated. Evaluation activities included periodic suggestions for revision and improvement prior to conferences for evaluation.	1. All activities were evaluated by both student and teacher through the use of individual conferences. Grades received were negotiated. Evaluation activities included periodic suggestions for revision and improvement prior to conferences for evaluation.

Table 4. Chronological Order of Activities and Clarification Techniques Used.

Activity Valuing Strategy	Level I (Facts)	Level II (Concepts) Principles and Generalizations	Level III (Values) Applying critical thinking to facts, concepts and feelings).
1. Classroom Inventory.			
2. Autobiography			
3. Student Objectives			
4. Teacher Objectives			
5. Value Clarification process	Name the seven steps in the valuing process.	Show how subject matter is important to the valuing process.	Valuing is worthless without understanding the subject. Understanding is worthless without values.
6. Valuing Through Literature. "I found an Important Fossil and Lost It."	Name the geologic time the fossil lived.	Where are fossils of this type found? Why?	Is the value of this fossil to science more important than private ownership?

Table 4. Continued

Activity Valuing Strategy	Level I (Facts)	Level II (Concepts) Principles and Generalizations	Level III (Values) Applying critical thinking to facts, concepts and feelings.
7. Valuing Through Literature. "World Climate Changed?"	Name ways in which large bodies of water effect world climate.	Show how ice content in the Arctic controls world climate.	Does any nation have the right to change world climate?
8. Role-Play "Strip-Mining Scars Appalachia."	Name the major problems involved in strip-mining.	Discuss the similarities between strip-mining today and the gold-rush of the past.	How do you feel about strip miners being allowed to pay a fee rather than to restore the natural environment?
9. The Action Side of Valuing. "Mining in Minnesota Boundary Waters Canoe Area."	What critical minerals are abundant in the Boundary Waters Canoe Area?	Compare the need for essential minerals to preserving virgin forests.	Write a letter stating your decision between preserving virgin forests or mining for critically short minerals.

Table 4. Continued.

Activity Valuing Strategy	Level I (Facts)	Level II (Concepts) Principles and Generalizations	Level III (Values) Applying critical thinking to facts, concepts and feelings).
10. Environmental crisis. Film-strips. Man's Natural Environment: Crises Through Abuse Environment: Changing Man's Values		What valuing thoughts did we gather from these two days of looking at our environment?	Did you make any plans for change toward your earth or the knowledge needed to understand it?
11. Zig-Zag "Declaration of Dependence."	Name some ways man is dependent on each other. Name some ways man is dependent on the earth.	Why is the subject of dependence important in earth science?	Can you make a connection between this exercise and that on "World Climate Changed?" Who is dependent on you?
12. Value Sheet "More Than Minerals?"	From minerals to man: where is man on the Continuum? Consider the evolutionary scale of the earth (minerals life, man).	Does this value sheet have any relationship to strip-mining in Appalachia?	Can you list some things you have done which show what you think human beings are worth?

Table 4. Continued.

Activity Valuing Strategy	Level I (Facts)	Level II (Concepts) Principles and Generalizations	Level III (Values) Applying critical thinking to facts, concepts and feelings).
13. Student Prepared Value Sheets			
14. 16-Forced Choice Items (Rank Ordering) "Youth Bill of Rights"	List sixteen choices from "careless" to "very strong opinion."	Attempt to consider the alternatives and the consequences of your choices	How do you think you would have ranked these items last year?
15. Student prepared 16-Forced choice items.			
16. Value continuum "Truthfulness"	If your friend buys a new hat that you think is ridiculous and she asks you if you like it, how would you answer her? Where on the continuum would you place your answer?	When does truth cease to be truth?	How do you feel about the statement: "Honesty is the best policy?"
17. I see (Perception) Picture: "Sky Garden"			

Table 4. Continued.

Activity Valuing Strategy	Level I (Facts)	Level II (Concepts) Principles and Generalizations	Level III (Values) Applying critical thinking to facts, concepts and feelings).
18. Sensory Perception. "Blind-fold touching game"			
19. <u>Small Group Work</u>: (Culminating the experimental time) a. "How to be a Good Student." b. Historic Geology: Hutton: "The present is a key to the past." c. Buzz group: How can we study the facts, concepts and values by more creative approaches? d. Focus on student value sheets. e. Show and interpret a filmstrip. f. "The Alaskan Oil Dilemma"--Role-Play. g. 16-Item Forced Choice--Science-Social problems. h. In what ways are you <u>like</u> the earth and <u>unlike</u> the earth? i. Take different pictures of the earth's features--determine how the area will look a long time in the future, and how it looked a long time ago. j. Demonstrate: Sensory perception, "Blind-fold touching game" Pass a variety of objects. Communicate feelings from the experience. k. Bring a picture or take a picture that shows something <u>natural</u> has happened. What is natural? l. Action: Select 10 pictures. Tell a story that includes all the pictures, e.g., a story of diastrophism, the geologic time table, or the geologic history of Michigan.			

Descriptions

1. Classroom Inventory--The classroom inventory was taken as a pre-test to measure attitudes toward science, personal attitudes and values and classroom climate. It was also given as a post-test.

2. Autobiography--Students were asked to write a story of their life and to include anything they felt was significant to them. These are useful to give general insights to the teacher, as was the case in this study. Other uses of the autobiography are: as a pre-test and post-test rating for attitudes, as a means for establishing objectives for independent study, etc.

3. Student Objectives--Each student was asked to write two objectives for the following reasons: to involve students in classroom planning, and to help the teacher plan classroom activities around individual objectives as much as possible. These objectives were discussed and listed as goals for planning activities.

4. Teacher Objectives--Teacher objectives were discussed and compared with the list of objectives submitted by the students. Some of our common objectives were:

a. Classroom activities should promote the necessary learning of facts, concepts and skills to promote interest, attitudes and values in earth science.

b. Classroom activities should be open-ended and flexible, according to individual student needs.

c. Students should be given a part in classroom decision-making.

d. Students are given an opportunity to communicate among themselves and with the teachers.

e. Students and teacher are tolerant, open-minded, and respectful of the opinions of others.

f. Students' viewpoints which disagree with the teacher's viewpoint are respected.

g. Students must realize that the inquiry process and critical thinking applies both to science and to our feelings about science.

h. Students must understand the importance of science for understanding the modern world--the environmental crisis.

5. The Value Clarification Process--The value clarification process, which was the central focus of this study, was presented to the students by means of the charts which appear on the following pages.

6. Valuing Through Literature--"I Found an Important Fossil and Lost It."[1] This was the first exercise in which students caught a glimpse of the need for critical thinking as applied to both our feelings and to facts and concepts. This was a general discussion concerning the pros

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[1]"Science Newsmaker: I Found an Important Fossil and Lost It," Current Science, Vol. 56, No. 13 (January 6, 1971), p. 3.

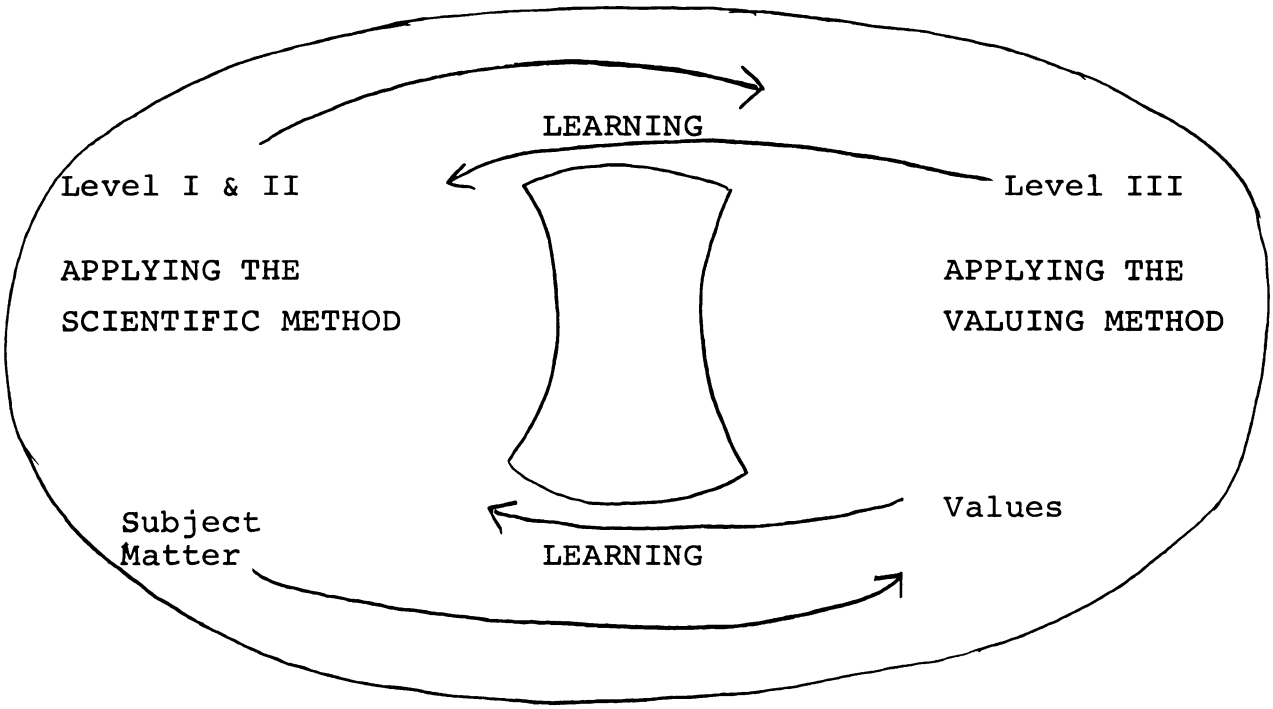

Figure 1. The Value Clarification Process to Learning.

SUBJECT MATTER INDICATORS

1. Earth science facts are means, not ends.
2. Facts lead to understanding generalizations.
3. Generalizations lead to understanding principles.
4. Principles are used in problem solving.
5. Problems are solved by using the scientific method and critical thinking.

VALUE INDICATORS

1. Goals or purposes
2. Aspirations
3. Attitudes
4. Interest
5. Feelings
6. Beliefs and convictions
7. Activities
8. Worries, problems, and obstacles.

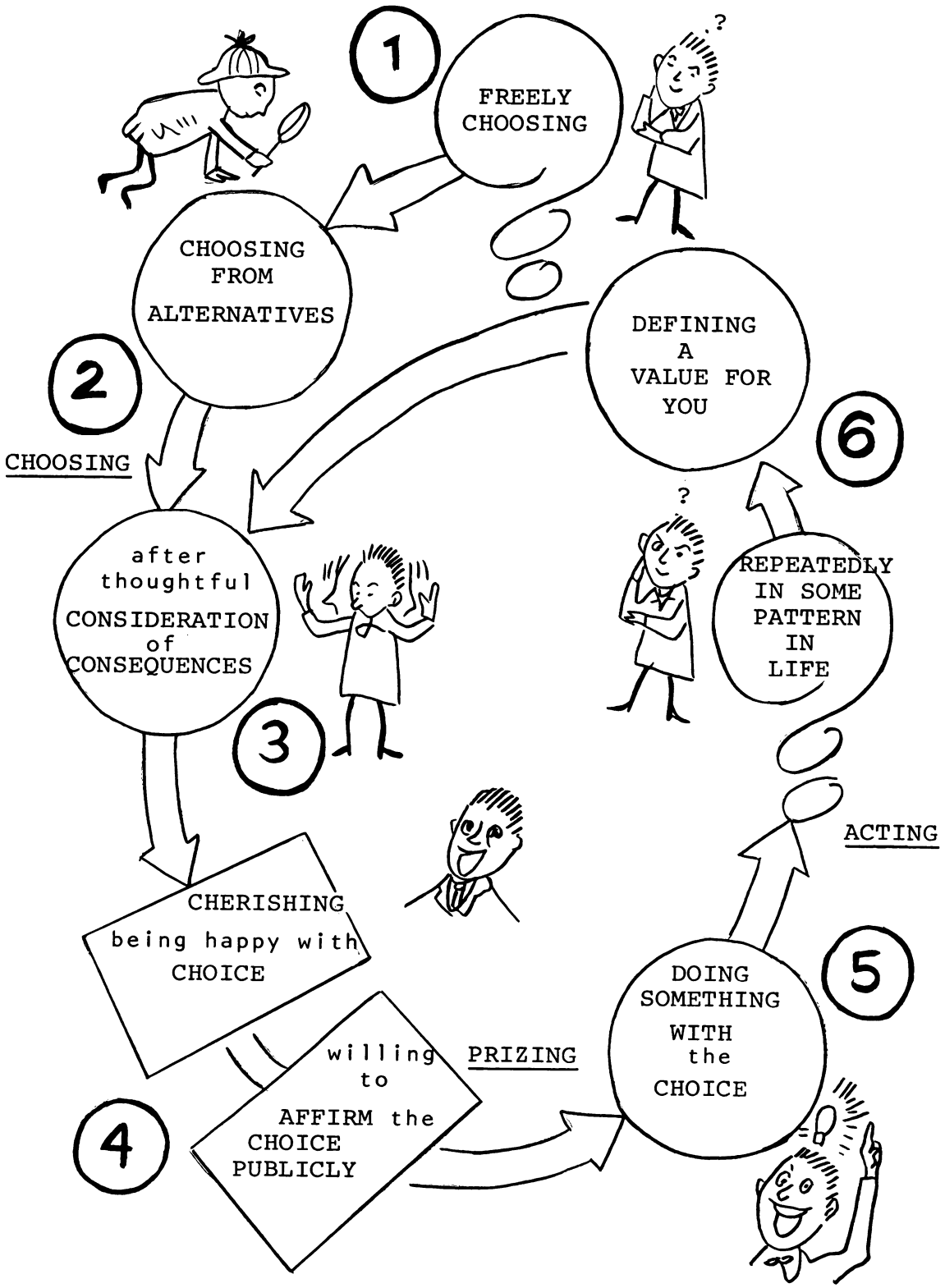

Figure 2. Applying the Valuing Method.

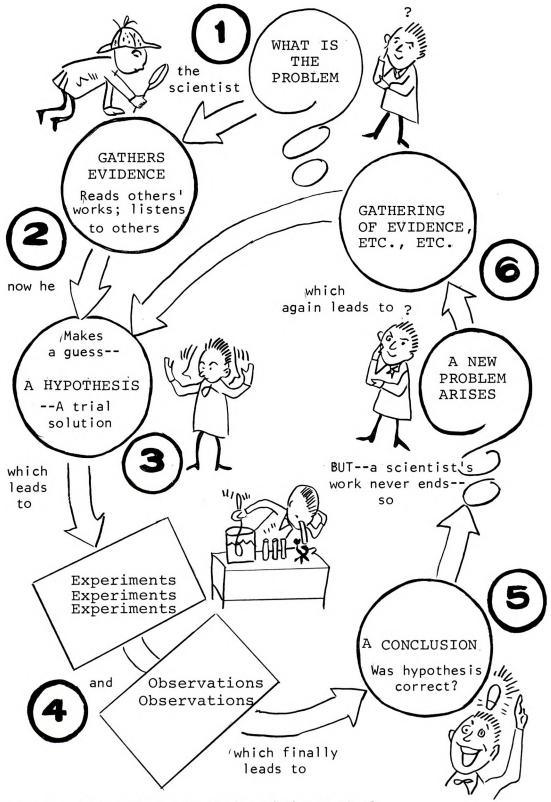

Figure 3. Applying the Scientific Method

and cons of whether a twelve year old student should give his valuable fossil to scientists to further scientific knowledge or to keep it for himself because it belonged to him and he wanted it for his collection.

7. Valuing Through Literature--"World Climate Changed."[2] This exercise was first considered individually, and then in a large group discussion. Later individual opinions were considered as an open forum or five minute quote. The article appears in the following paragraph:

World Climate Changed?

> LONDON, England--A big irrigation program now being planned in Russia could cause worldwide changes in climate.
>
> The plan calls for changing the direction of three large rivers now flowing northward into the Arctic Ocean. The waters of the rivers would be diverted southward to irrigate desert areas in the southern part of Russia.
>
> The diversion would rob the Arctic Ocean of half of its supply of incoming fresh water. This freshwater supply keeps the surface water of the ocean fairly fresh so that it freezes more easily.
>
> If the freshwater supply were reduced or cut off, less water would be locked up in ice. The resulting increase in open waters could cause changes in climates throughout the world.

The animated discussion fell into two areas, the facts and concepts of the oceans as a "climatic control," and

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[2] "World Climate Changed," Current Science, Vol. 55, No. 24, (April 1, 1970), p. 6.

the "right" of any country to change world wide climate. The outcome, in my opinion, demonstrated the teaching of science with a focus on values and the importance of classroom climate to the exploration of divergent views. There were sharp differences of opinion and the communication of these ideas depended upon the feeling of trust and acceptance within the classroom. In the value clarification method, it is the communication of ideas for examination that is important; value issues are not solved or used as questions for evaluation.

8. Role-Play--"Strip-mining Scars Appalachia."[3] The material used (see the Appendix) as background study for this role-play was presented to each student prior to selecting candidates for the roles. The students presenting the role-play volunteered for the parts which were:

- Cecil Combs, the farmer
- The Bulldozer Operator
- The Mining Company Lawyer
- The Conservationalist

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[3]George Pollock, The Conservation Story, (Columbus, Ohio: American Education Publications Unit Book, 1969), pp. 23-26. Not cited for duplication.

A large group discussion followed with some of these value indicators being used: I feel that. . ., I'm against that. . ., I think if. . ., If you ask me. . . I believe. . ., etc. Students clearly revealed what they were for or against. Certainly some potential values and ideas for action were evident from the discussion. Several students reported on hearing and seeing news reports on the disasters of strip-mining. One girl remarked, "If we had not play-roled the issue, I would not have paid any attention to it." Teacher remark, "How did you feel as you heard the report?" Student, "I felt like I was there."

9. The Action Side of Valuing--"Mining in Minnesota Boundary Waters Canoe Area."[4] This action exercise was planned to help bridge the gap between words and deeds. The action exercise and resource materials address sheet are found in the Appendix.

10. Filmstrips on the Environmental Crisis--Two days were spent viewing two new (1970) filmstrips on the environmental crisis and man's changing values. The discussion following the filmstrips revealed some action commitments at the local level, e.g., student: "I asked the manager of the I.G.A. store to consider pick-up service for trash, instead of burning it in the open trash-can."

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[4] "Mining in Minnesota Boundary Waters Canoe Area," National Wildlife, Vol. 9, No. 1 (December-January, 1971) p. 17.

11. Zig-Zag--"Declaration of Dependence."[5] The zig-zag technique starts out as a contrived incident simply by fielding questions either indirectly to or circumventing the real value issue, yet being analogous to the situation. This exercise was planned to help emphasize the interdependency of man and nature and man to man. (See the Appendix for literature used.)

12. Value Sheet--"More Than Minerals."[6] This value sheet was completed by each student as a homework assignment. After clarifying responses were written on the sheets and returned to the students, they were then shared with the class. Again, the sharing by individuals was optional. (See the Appendix for these materials).

13. Value Sheets: Student Prepared.--Students were asked to prepare three value sheets within a three week's period as a homework assignment. These could be subject matter related or a "pure" value lesson. This was a highly successful assignment. Many more than the three assigned, were turned in. Clarifying responses were written on the sheets and they were returned to the student to be shared with the group and then filed in their

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[5]Henry Gibson, "Declaration of Dependence," National Wildlife, Vol. 9, No. 1 (December-January, 1971).

[6]Louis Raths, Merrill Harmin, and Sidney B. Simon, Values and Teaching (Columbus, Ohio: Charles E. Merrill, 1966), p. 104.

folders. (Individual folders were set up for all students. Valuing materials were filed in the individual folders for use later in small group work).

14. 16-Forced Choice Items--"Youth Bill of Rights."[7] Students were given this twenty-five item paper and asked to select sixteen items and then to arrange these items on the "Value Grid" according to "couldn't care less" to "very strong opinion." After the sixteen items were arranged on the grid, the last four "very strong opinion" were checked on the "7-Criteria of Values" to determine whether their choices were their individual values. (See the Appendix for materials described).

15. 16-Forced Choice Items: Student Prepared--Students were asked to select any sixteen items they wished, either subject content or "pure" values, and rank-order them as described.

16. Value Continuum: "Truthfulness."[8]--The concept of truthfulness and its various shades is a difficult value lesson. The continuum is useful in projecting a range of possibilities in a problem or value situation. (See the Appendix for materials used).

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[7]George Lawton, How To Be Happy Though Young, New York: Vanguard Press, Inc. 1959.

[8]J. Bronowski, Science and Human Values (New York) Harper and Row Publishers, 1965), p. 63, p. 52.

17. I See (Perception): "Sky Garden."[9]--Students are often surprised to discover that each of them perceive something differently from viewing the same picture. This exercise helped students understand more clearly the origin of variety in interpretations.

18. Sensory Perception: "Blind-Fold Touching Game."--Too little emphasis is given to the need for development of a keener sense of touch in science teaching. Students were amazed at the sensations experienced taking part in this exercise. Students who volunteered to play the game were blind-folded and passed a variety of articles commonly found in the laboratory and then they communicated their feelings to the class.

18. Small Group Work--As culminating experiences, each group (six) selected two activities which they worked out within the group and then presented the lesson to the class. Some of these experiences were taken from the students' work (value sheets), some ideas came from the teacher, others were adapted from other sources, e.g., the Environmental Studies and J. Weston Walch Materials.[10]

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[9]Taken from a student's value sheet: A picture of Robert Rauschenberg's 7 1/2 ft. high lithograph and silk screen "Sky Garden."

[10]Environmental Science, Boulder, Colorado: Environmental Studies, 1971; and David E. Newton, Social Problems in Science. A poster series. Portland, Maine; J. Weston Walch Publishing Co., 1970.

Some examples are found in the Appendix. These experiences were planned to show the following:

a. To interrelate the three levels of learning as depicted in the chart.

b. To show the dependence, the changingness, and interrelations in all aspects of the earth in the study of earth science.

c. To focus on the importance of both knowledge of the subject (earth science) and a consideration and analysis of individual feelings toward it.

Organization of the Classroom

Patterns For Use Of Time

During the experimental period the classroom time was divided into two thirty-minute modules, except occasionally when the laboratory exercises took most of the fifty-five minute period. Thirty minutes was used by the teacher for presenting and explaining new approaches and materials, bringing some facts and concepts forward in lecture, showing movies, filmstrips transparencies and the all-important opportunity for an "open" discussion on a current topic important to the students. The other half of the daily class time was for small group meeting (e.g., on a long-range value clarification projects), laboratory work, and independent study time for use of classroom resources. This time was also used for student-teacher

conferences. The open discussions and value clarification approaches were, in most cases, coordinated with the subject content. However, occasionally a "pure" valuing lesson was used.

Small Groups

Small groups were used for both the organization and completion of tasks--either of subject matter orientation or the valuing strategies which focused on the group. (The author and the students increased in their "prizing" of the use of the small group as an "instructional tool.") Groups provide for fusion of individualities toward a common whole. In group work, both affective and task-oriented components can be stressed. This process of individual growth in cooperative living is democracy in action. Democracy must be learned; sensitivity to the needs of others must be acquired through experiences. This does not imply harmony; it is more likely to be laced with competition and conflict. However, it is through open discussion that conflicts are resolved and decisions are made.

Summary

In Chapter III, the content and organization of value clarification strategies used have been described. Students were able to select from three patterns of organization: teacher-centered, teacher-student centered, and student-centered. Regardless of the pattern used, all

students participated in the laboratory experiences and in the value-clarifying experiences.

The organization of required experiences was designed to provide three types of learning: facts (Level I), concepts (Level II), or values (Level III). Each experience was designed in an attempt to reach all three levels, i.e., to culminate in a value activity by which students could clarify and choose positions on an issue.

A variety of strategies, used to build toward Level III learning, have been described.

In the next chapter, attention is given to a discussion of the outcomes of the teaching strategies described here. These outcomes are reported as observed and as available from the interpretations made of student responses collected by opinionnaires constructed by the author for use with this study.

CHAPTER IV

ANALYSIS OF THE USE OF A VALUE CLARIFICATION METHOD IN EARTH SCIENCE CLASSES

Introduction

In the preceding chapter, the classroom procedures and strategies used to implement a value clarification method were described. Such a method represents a clear choice between the two major "camps" described and defined in Chapter II. As explained in Chapter II, education seems to be divided between those who would stress the transmission of cognitive knowledge and those who would place an equal or greater emphasis upon the realization of affective objectives within the classroom. The choice of a teaching philosophy which stresses the interdependence of cognitive and affective objectives is the choice which has been expressed to this point. Such a choice does not, however, "free" the teacher from the responsibility for observing and reporting upon the results of the actions taken and the methods employed within the classroom. The current emphasis upon "accountability" is, after all is said and done, a demand for the teacher to be able to describe the outcomes of the actions taken.

As presented in Chapter I, the use of value clarification strategies in the conducting of earth science classes was undertaken with two basic concerns in mind:

1. To increase student perceptions of personal responsibility and involvement in the processes of science, particularly as related to classroom actions and local environmental issues.

2. To encourage a classroom climate more conducive to freedom of thought and acceptance of divergent thinking.

In attempting to achieve these objectives, plans were made to provide students with options to the typical program of teacher-centered activities which had been offered prior to this experiment. Instructional plans made provision for the use of, and inclusion of, value activities in addition to the factual and conceptual issues which had been contained in prior planning for instruction.

The limitations outlined in Chapter I should be kept clearly in mind as findings are reported and analyzed. No claim can be made for the extension of the observations and opinionnaire data reported here to other situations; the procedures of reporting do not permit generalization to other teachers, other schools, or other subjects.

What, then, is the significance of this study? The use of an approach to affective education, as reported here, does provide some questions of importance to those who may wish to search further for ways in which to provide for the

integration of "facts and feelings." More importantly, the approach used in the conducting of this study could be adapted and adopted by classroom teachers as a means of analyzing the effectiveness of any instructional method as applied to their own individual situations.

Observational Information

The definition of "valuing" and "values" given by Raths, Harmin and Simon stress the importance of actions being taken as a result of value clarification having occurred for the individual. During the course of the three months in which the value clarification method was being used in the earth science classes, the following observations were noted:

1. More than 50% of the students in the four classes wrote to one or more agencies for free resources and materials.

2. Approximately 18% of the students wrote letters describing their personal convictions regarding the issue of whether mining should be permitted in the Boundary Waters Canoe Area in Minnesota.

3. One student, employed at a local grocery store, asked for advice on how to approach the owner to request that he cease burning waste materials in uncovered areas. The student followed up on this episode by interviewing the store owner and making the request.

4. A year prior to this experiment, a college student had organized a clean-up campaign to clear the Maple River, a small waterway running through the school district. Many students requested information on "how they could help in this project."

5. For a number of years, students in the author's earth science classes have been encouraged to bring materials and share them with other students. As noted earlier, during the school year being reported, a classroom library was established to provide for the organizing and sharing of student or teacher contributed materials. Typically, about 20-25% of the students have contributed materials for classroom use. After the experimental period was well under way, this figure rose to almost half of all students.

6. One of the freshman English teachers reported a sharp rise in the number of themes written on scientific topics. This increase occurred after the value clarification experiment had begun.

7. Within the classroom, students began taking a more active part in suggesting activities or in supporting and opposing teacher-suggested activities. (In one class, students became dissatisfied with the choice of classroom activities and negotiated for a change).

8. Almost all students became very involved in bringing newspaper clippings related to the topics under discussion.

9. Students continued to construct value sheets even after these were no longer being assigned as part of the experimental process. This was true for more than 10% of the students.

10. Students prepared, on their own initiative, demonstrations for which they then requested class time for presentation.

Overall, the most impressive development has been the generation of, and the collection or sharing of materials. Girls tended to center upon the collection of articles, clippings, and the construction of additional value sheets on topics. Boys tended to be more active in preparing demonstrations for classroom presentation and becoming involved in environmental projects. Overall, girls were--on an observational basis--more actively involved than boys. Compared to earlier years, the level of involvement by students more than doubled in their reaction to the class and its activities, i.e., in ten years of previous teaching of earth science in the same school system, I have never had as much student involvement in the collection of information or willingness to translate study into action.

Opinionnaire Results

At the beginning and at the end of the experimental period, two instruments were given to the students. The first of these instruments, the Classroom Inventory, was intended to provide some general information about student's perceptions of three areas: the importance of science, personal attitudes toward science, the climate of their science classroom. The Classroom Inventory is shown on the following pages. The second instrument, a classroom reaction form, was used to measure changes in the perception of classroom climate.

On both occasions when the Classroom Inventory was given, students tended to reject the same six statements:

1. Science promotes immediate answers.
2. Studying science is of no help to me.
3. In the scientific study of problems, there is only one correct answer.
4. Science can solve all of our problems.
5. I might consider a career in science.
6. Scientific decision-making is based only on facts.

From student responses, it is possible to conclude that the classes studied are composed of students who do not intend to pursue an extended course of study in science. The students do see their science courses as being helpful but reject the idea that science is totally objective or capable of being used to provide immediate, correct,

CLASSROOM INVENTORY

Directions:

1. Use a pencil.
2. Answer each question according to your own opinion. There are no right or wrong answers.
3. Do not put your name on this booklet.
4. Use only the symbols given below for responding to the question asked.

   5 = Strongly Agree
   4 = Agree
   3 = Neither Agree or Disagree
   2 = Disagree
   1 = Strongly Disagree

Questions

_____ 1. Science is important in our daily lives.

_____ 2. The study of science can help us solve problems which face our society.

_____ 3. Science can solve all our problems.

_____ 4. Modern living is based on scientific methods.

_____ 5. In the scientific study of problems, there is only one correct answer.

_____ 6. Use of scientific thought promotes different opinions.

_____ 7. Scientific method requires the ability to be able to state a problem.

_____ 8. One of the major parts of the scientific method is the ability of the scientist to devise ways of gathering information about an idea.

_____ 9. Science promotes immediate answers.

_____10. Scientific decision-making is based only on facts.

_____11. I would like to take additional science courses.

_____12. I might consider a career in science.

_____13. Studying science is of no help to me.

_____14. I enjoy using scientific methods to solve other kinds of problems.

_____15. Science helps me understand life and make my own choices.

_____16. I realize my problems cannot be solved by science.

_____17. In studying science, I have learned to collect evidence before making decisions.

_____18. Studying science has made me more curious about how things work and how people act.

_____19. The study of science makes me more willing to state my own opinions.

_____20. The study of science makes me more willing to listen to the opinions of others.

_____21. In this class, students are involved in planning classroom activities.

_____22. In this class, a variety of methods and materials are available for student use.

_____23. In this class, students are encouraged to share ideas with one another.

_____24. In this class, students are encouraged to share ideas with the teacher.

_____25. In this class, students are allowed to disagree with the teacher.

_____26. In this class other students listen to my opinions.

_____27. In this class, students are encouraged to state their own opinions and collect evidence to support their opinions.

_____28. In this class people can be honest with one another about their opinions and feelings.

_____29. In this class, students have opportunities to work on topics that are of interest to them.

_____30. In this class, the directions given by the teacher are easy to understand and helpful to me as a student.

Please Complete the Following Information

_____Hour

_____Sex (F or M)

and factual answers. Acceptance of statements varied between the two administrations of the Classroom Inventory. Variations were also present in the perceptions of girls as compared to boys. The questions which received high acceptance are given below:

1. Science is important in our daily lives. On the pre-test, boys rated this item highest of any. Girls, however, did not include it among their top five ratings. On the post-test, both boys and girls saw this statement as being the one they could most strongly agree with. During the experimental period, students increased in their perceptions of the importance of science in their daily lives.

2. The study of science can help us solve problems which face our society. The relationships are the same for this question as for the one above. Boys ranked this item as second in importance on both the pre-test and on the post-test. Girls, who did not include it in their top five on the pre-test, also ranked this item as second highest on the post-test. It would appear that the use of the value clarification method helped increase the perceptions of girls as to the relationship between science and either their daily lives (#1 above) or the solution of societal problems.

3. Boys and girls, on both pre-test and post-test, gave high ratings to the statement, "Use of scientific thought promotes different opinions."

4. On the pre-test, both boys and girls gave high ratings to the statement, "One of the major parts of the scientific method is the ability of the scientist to devise ways of gathering information about an idea." Boys continued their emphasis on this statement as reported by pre-test rankings. Girls, however, gave increased emphasis to the statement, "In this class, students are allowed to disagree with the teacher." This shift, considering the rankings given to the importance of different opinions, leads one to conclude that the climate of respect for divergent thinking was increasing during the experimental period. Girls had indicated on the pre-test, however, higher perception (as reported by rankings given) to two related questions. "In this class, a variety of methods and materials are available for student use," and "In this class, students are encouraged to share ideas with one another." On the post-test, both boys and girls gave high ratings to the latter statement.

5. "In this class, students are encouraged to state their own opinions and collect evidence to support their opinions." This statement, ranked in fifth place by both boys and girls on the pre-test, does not appear in the top five statements on the post-test. Boys replaced this statement with increased emphasis on sharing ideas with other students while girls gave additional emphasis to the importance of science in daily life or in solving societal problems.

When one compares the top and bottom five statements, as ranked on the pre-test and post-test of the Classroom inventory, certain conclusions may be drawn:

1. Students see science as important to their daily lives. This increased during the experimental period.

2. Students see science as being useful in dealing with problems of society. This increased during the experimental period.

3. Students have an increased awareness of the possibility of divergent ideas about scientific solutions.

4. Students see increased in-class opportunities for sharing ideas with other students in a climate of respect for divergent thinking.

5. Students see increased in-class opportunities for discussion or disagreement with the teacher, i.e., increased human interaction is possible between teacher and student.

Use of Classroom Reaction Forms

During the experimental period, a classroom reaction form was used to collect information from students. A copy is shown on the next page. Students were asked to indicate whether the emphasis in the classroom was (A) too much, (B) about right or (C) too little. As a guide to interpretation, the following rules were decided upon:

1. The preferred response was "about right." Changes in either of the other two responses were interpreted as signaling potential concerns.

CLASSROOM REACTION FORM

Directions:

The ten items listed below are meant to check your opinions about this class for the last month. Use a pencil. There are no right or wrong answers. Do not put your name on this sheet. For each question, use only one of the following responses:

3 = Too much.
2 = About right.
1 = Not enough.

For each question, read it as though it said: "In this class, during the last month, the attention or emphasis upon _____ has been (too much, about right, or not enough).

_____ 1. Learning new information.

_____ 2. Getting good grades.

_____ 3. Following the teacher's decisions.

_____ 4. Working with other students.

_____ 5. Helping to plan classroom activities.

_____ 6. Listening to the opinions of others.

_____ 7. Being able to state my own opinions.

_____ 8. Understanding the teacher's directions.

_____ 9. Knowledge which I can use in my own life.

_____ 10. Being able to get individual attention from the teacher.

Please complete the following information

_____ Hour

_____ Sex (M or F)

2. Changes between administrations of the test were to be judged by a 5% shift in the "about right" response. Either a positive or negative shift of this magnitude was assumed to have significance.

3. Shifts of $\pm$ 5% or less are coded as N. Shifts of $\pm$ 5% or greater are shown in percentages and the direction of the shift is indicated.

The Tables of responses on the following pages present changes in student perceptions as obtained from the classroom Reaction Form.

The tabled data gives no clear tendency. Collapsing the information into more usable forms, some additional insight may be given: Boys showed increases in two categories, decreases in two categories and no change in six categories. Girls showed increases in eight categories and no change in two categories. When all students are combined, five categories show increases, one category shows a decline, and four categories show no change. The following results can be briefly stated:

1. Boys, as a total group, show no changes as a result of the use of the method.

2. Girls show significant increases in many categories.

3. Combining all students, the net growth is less than the 5% established as a criteria for evaluation. (The change was a positive change of 3.9%).

Table 5. Group I Changes in Satisfaction as Measured by Pre-test and Post-test Responses on Classroom Reaction Forms

Statement	Boys	Girls	Total Class
1. Learning new information	-16.6%	+ 6.2%	N
2. Getting good grades	N	+18.8%	+10.7%
3. Following the teacher's directions	-33.3%	+12.5%	- 7.2%
4. Working with other students	-16.7%	+ 6.2%	N
5. Helping to plan classroom activities	+33.4%	+62.6%	+50.0%
6. Listening to the opinions of others	-33.4%	+37.6%	+ 7.2%
7. Being able to state my own opinions	-32.4%	+18.8%	N
8. Understanding the teacher's directions	+ 8.4%	+12.6%	+10.8%
9. Knowledge which I can use in my own life	-25.0%	+ 6.3%	- 7.2%
10. Being able to get individual attention from the teacher	N	+25.0%	+14.2%
TOTALS	-11.6%	+20.7%	+ 6.8%

N = change of $\pm$ 5% or less.

Table 6. Group II Changes in Satisfaction as Measured by Pre-test and Post-test Responses on Classroom Reaction Forms

Statement	Boys	Girls	Total Class
1. Learning new information	N	-25.3%	-9.6%
2. Getting good grades	N	-21.3%	-10.3%
3. Following the teacher's directions	+ 6.6%	+10.1%	+ 7.1%
4. Working with other students	+26.6%	-22.4%	N
5. Helping to plan classroom activities	- 6.7%	-21.2%	-12.5%
6. Listening to the opinions of others	+20.0%	N	+11.2%
7. Being able to state my own opinions	-13.3%	-16.2%	-13.8%
8. Understanding the teacher's directions	+20.0%	+ 6.0%	+16.0%
9. Knowledge which I can use in my own life	N	N	N
10. Being able to get individual attention from the teacher	-33.3%	+19.2%	-13.5%
TOTALS	N	- 7.8%	N

N = change of $\pm$ 5% or less.

Table 7. Group III Changes in Satisfaction as Measured by Pre-test and Post-test Responses on Classroom Reaction Forms

Statement	Boys	Girls	Total Class
1. Learning new information	+25.6%	+38.3%	+34.3%
2. Getting good grades	N	+ 8.3%	N
3. Following the teacher's directions	+13.6%	+ 6.7%	+ 6.2%
4. Working with other students	+13.6%	+20.0%	+19.5%
5. Helping to plan classroom activities	-12.9%	+30.0%	+15.7%
6. Listening to the opinions of others	-12.0%	- 6.7%	- 7.8%
7. Being able to state my own opinions	-15.4%	-18.3%	-14.7%
8. Understanding the teacher's directions	+ 5.9%	+16.7%	+12.6%
9. Knowledge which I can use in my own life	+ 5.9%	+35.0%	+23.1%
10. Being able to get individual attention from the teacher	+17.9%	+11.7%	+16.4%
TOTALS	N	+14.2%	+11.0%

N = change of $\pm$ 5% or less.

Table 8. Group IV Changes in Satisfaction as Measured by Pre-test and Post-test Responses on Classroom Reaction Forms

Statement	Boys	Girls	Total Class
1. Learning new information	- 8.3%	+ 9.9%	N
2. Getting good grades	+39.3%	+11.5%	+24.5%
3. Following the teacher's directions	+13.1%	+17.6%	+14.1%
4. Working with other students	-11.9%	-19.8%	-16.3%
5. Helping to plan classroom activities	+ 9.6%	-11.5%	N
6. Listening to the opinions of others	-17.9%	-19.2%	-20.0%
7. Being able to state my own opinions	- 9.6%	+ 9.4%	N
8. Understanding the teacher's directions	-19.0%	-19.8%	-18.9%
9. Knowledge which I can use in my own life	N	+26.3%	+13.4%
10. Being able to get individual attention from the teacher	N	-33.5%	-16.4%
TOTALS	N	N	N

N = change of ± 5% or less.

Table 9. Changes in Satisfaction of Students as Measured by Pre-test and Post-test Responses on Classroom Reaction Forms

Statement	Boys	Girls	Total Class
1. Learning new information	N	+11.1%	+ 5.5%
2. Getting good grades	+ 8.1%	+ 8.4%	+ 8.3%
3. Following the teacher's directions	N	+11.3%	N
4. Working with other students	N	N	N
5. Helping to plan classroom activities	+ 5.5%	+21.1%	+13.9%
6. Listening to the opinions of others	- 8.5%	N	N
7. Being able to state my own opinions	-16.8%	N	- 8.3%
8. Understanding the teacher's directions	N	+10.9%	+ 7.4%
9. Knowledge which I can use in my own life	N	+19.9%	+ 8.3%
10. Being able to get individual attention from the teacher	N	+ 5.8%	N
TOTALS	N	+ 8.8%	N

N = change of $\pm$ 5% or less.

Another insight can also be given. On the pre-test of the Classroom Reaction Form, boys were more positive than girls for nine of the ten statements. The post-test indicated a reversal of this tendency; on the post-test, girls were more satisfied than boys in eight of ten categories.

One other observation about the results of the reaction form data should be noted: girls report changes in excess of 10% in five of the ten areas. Boys show no such gains in any category. This increased satisfaction by girls may be related to the changes reported on the classroom inventory, i.e., girls began to perceive a higher relationship between science and their daily lives.

Summary

Upon examination of the data collected from four earth science classrooms during the three months of using the value clarification method, the question may be asked again, can instruments and procedures be developed which will enable the teacher to assess the results of the clarifying strategies used? Limitations of this study make it difficult to make concluding statements, however, certain changes were observed in student behavior which indicated positive changes in their perceptions of the practicalness of earth science in their daily lives. The ratings from the Classroom Inventory indicated a similar movement toward increase valuing of science as related to daily life.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

It has been said that most teachers teach as they have been taught, i.e., they consciously or unconsciously adopt a role model from among the teachers who taught them. Such a route of selection of teaching strategies has built-in assets and liabilities. On the positive side, the teacher is able to select strategies with which they are already familiar and which are "comfortable" to use. If those strategies are unproductive or at least not as productive as the individual might hope, it is always possible to console oneself with the fact that the same set of strategies were relatively successful for another individual. This "adoption" of teaching strategies by "introjection" has some negative characteristics as well; chief among these is the tendency to neglect the assessment of classroom environment and the relationship of strategies used to clearly specified goals or beliefs held by the teacher. With the acceptance of pre-established teaching strategies, i.e., with the failure of the teacher to recreate teaching

strategies for his own use, teaching becomes a routinized occupation rather than a search for meaning and understanding.

The study which has been reported in the preceding pages has been, to no small degree, a result of one teacher's attempt to recreate the teaching strategies used in the continuing struggle to more adequately inform, guide, help, and prepare the youth of today for a future which--although unknown--belongs to them. It is, one might say, a story of the way in which teaching strategies designed for "our" world have been recreated for students so as to prepare them for "their" world.

Conclusions

Both observations and the use of classroom pencil-and-paper instruments indicate that the four classes reported upon in this study maintained and/or increased their valuing of science as important to their daily lives. For the classes reported upon, positive changes in levels of valuing are more easily perceived on the part of girls. The significance of this finding is not clear, however. Boys maintained as active an interest in classroom activities and--in some types of observed data--showed increased in actions which could be characterized as being value-related, e.g., preparation of demonstrations for use in the classroom and involvement in out-of-school activities

related to ecological improvement. Considering the scores obtained on the two pencil-and-paper instruments, boys showed no change while girls moved upward--reaching or surpassing the levels reported by boys.

On the basis of the pencil-and-paper items used, it must be concluded that there was no significant overall gain in the levels of reported values given by the classroom groups as a total, when all four groups are summed together. Changes occurred within different subgroups within the varying classes; on a total basis, these were not significant.

Observational ratings present a slightly different story than do the pencil-and-paper instruments. On the basis of classroom observations and on the basis of the actions entered into by both boys and girls, the conclusion would be that the use of value clarification activities do provide for a significant increase in the involvement and/or commitment of students to science-related issues which they face in their daily lives.

From the role of the teacher, it is also possible to report and conclude that the use of the method led to basic outcomes: (1) better organization of content so as to provide for valuing choices; (2) greater attention to the need to provide for divergent thinking, and (3) an increased emphasis upon evaluation as a concept separate from, although related to, "grading."

From the procedures followed in the conducting of these four classes, certain conclusions can be drawn regarding the use of the value clarification method.

1. Provision should be made for consideration of student-selected objectives. Identification of student objectives permits diagnosis of student needs and desires so that these may be considered in the development of classroom procedures and experiences.

2. The basic framework of cognitive activities should be planned far enough in advance so that two goals can be achieved: (a) Students can be involved in long-range planning and decision-making, and (b) Conducting activities can be kept flexible as auxiliary issues or interests arise in the course of following the planned strategies.

3. Basic classroom procedures, including a variety of learning plans, should be identified; such identification should clearly indicate the criteria for successful completion as agreed upon by teacher and students.

4. Value clarification is less dependent upon the particular type of conducting activities than it is upon the readiness of the teacher to permit and support a climate of open inquiry.

Recommendations

Although the results of this study seem to indicate positive changes for both the students and the teacher

involved, those results remain highly speculative rather than clearly nailed down and generalizable to other situations. Yet, the very "fuzziness" of specifying what the value clarification method is--coupled with the vast array of possible conducting procedures--leads one to speculate that additional research in the area might be unproductive or incapable of systematic and sophisticated analysis and reporting. As I proceeded with this study and with the reporting of the procedures and impressions gained, I became more and more convinced that the particular environment which exists in the classroom is probably more important than the method which is being used, i.e., the "authenticity" of the teacher and the opportunity for students to express divergent views is more important than the teaching method. And, the value clarification approach is primarily that--a teaching method. Future research might be more productive by focusing on other methods which might show promise in the improvement of classroom climate. Although Raths, Harmin, and Simon speak of the value clarification method as a "teaching theory," we seem to be far from the stage of speaking of a clearly articulate theory which can adequately postulate or explain the "right" classroom environment. To an even lesser degree are we able to sharply delineate those approaches by which teachers may create climates which encourage an equal emphasis upon the affective as well as the cognitive domain.

The behavioral observations noted during the experimental period (environmental-studies projects, value sheets, and collecting of resource materials) continued to increase during the post-experimental period. Because these behavioral patterns have continued, for the author of this study, a value clarification approach has been productive and rewarding.

In all honesty, one should conclude that the effectiveness of a value clarification method--or any method--is resident in its impact upon the individual teacher's approach to classroom groups. If a method is merely superimposed, rather than causing clarification and change for the teacher, its impact is likely to be quite moderate. We do not have teacher-proof procedures--only teachers who can choose to seek to become more self-actualizing; in such a search, the value clarification method can be helpful in any classroom and for most teachers.

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APPENDIX

EXAMPLES OF MATERIALS USED IN THE CLASSROOM

EXAMPLES OF MATERIALS USED IN THE CLASSROOM

EXAMPLE I

A SMALL GROUP DECISION-MAKING PROBLEM

"Lost on the Moon: A Decision-Making Problem"[1]

You are in a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Mechanical difficulties, however, have forced your ship to crash-land at a spot some 200 miles from the rendezvous point. The rough landing damaged much of the equipment aboard. Since survival depends on reaching the mother ship, the most critical items available must be chosen for the 200 mile trip. Below are listed the 15 items left intact after landing. Your task is to rank them in terms of their importance to your crew in its attempt to reach the rendezvous point. Place number 1 by the most important item, number 2 by the second most important, and so on through number 15, the least important.

(15)	Box of matches
(4)	Food concentrate
(6)	50 feet of nylon rope
(7)	Parachute silk

[1]Barbara Luke, Dorothy Mial, and Stanley Jacobson, "Lost on the Moon: A Decision-making Problem," Today's Education, Vol. 58, No. 2 (February, 1969), pp. 55-56. (Numbers in parentheses represent the correct rank ordering as given by the creators of the problem).

(13) Portable heating unit
(11) two .45 calibre pistols
(12) one case dehydrated milk
(1) two 100-pound tanks of oxygen
(3) stellar map (of the moon's constellation)
(9) life raft
(14) magnetic compass
(2) 5 gallons of water
(10) signal flares
(7) first-aid kit containing injection needles
(5) solar-powered FM receiver-transmitter

Use In The Classroom

Participants worked on the problem alone, then worked in groups of five, making six groups in each of the four classes. They compared their individual rankings and then agreed on a common ranking for the group. The leader of the group scored the individual and group results according to the correct rankings established by the space survival unit of NASA and posted the scores for class discussion. Dividing naturally into three parts, this exercise was completed in three consecutive laboratory sessions.

The groups were formed by free choice. The problem was briefly introduced without going into details. Two copies of the problem were given to each student. Each group was given a number and that number was recorded on the problem sheets. First, each student worked independently, ranking each item in order of its importance and recording the ranking on both sheets. As the students finished, the scoring committee collected one copy from each student, keeping the group separated. Next, each group worked with

its members' copies to build a Group Summary Form by recording individual rankings on a single fresh copy of the problem.

While the groups were at work, the scoring committee totaled the individual scores by comparing them with the NASA key. For each item the score was the absolute difference between the student's ranking and the correct ranking. The total score was the sum of the scores for each item. The lowest score was the "best." For Part two, each group was asked to complete one ranking representing the decision of the whole group. It was emphasized that the decision must be based on logic and fact rather than any personal preference and should represent common agreement among the members and not a simple majority vote.

When the groups finished, the scoring committee (four students volunteered for the scoring committee and they did not take part in the group decision) collected and scored the group sheets by the same method used for the individual forms. The scoring committee calculated and reported the following:

(1) the difference between each group's score and the average individual score for that group's members

(2) then a sheet was prepared for each group listing the following information:

a. average individual score
b. range
c. group score
d. difference between average individual and group score

Table 10. Summary of Scores on Space Problem

Group Number	Individual Average	Range	Group Score	Net Change*
		CLASS I		
1	45	56-32	7	38
2	37	52-26	20	17
3	58	24-101	28	30
4	48.5	65-38	37	11.5
5	44	52-25	42	2
6	53	60-41	49	4
		CLASS II		
1	43	44-32	16	27
2	45	58-32	34	11
3	52	60-36	56	-4
4a	42	56-30	34	8
4b	37	52-22	34	3
5	51	70-39	38	13
6	50	60-44	36	14
		CLASS III		
1	41.5	47-36	43	(-) 1.5
2	49.8	60.38	41	8.8
3	48.4	58-42	42	6.4
4	42.5	52-18	42	.5
5	57.5	68-48	52	5.5
6	48.5	58.39	38	10.5

Table 10. Continued

Group Number	Individual Average	Range	Group Score	Net Change*
		CLASS IV		
1	41.8	60-26	30	11.8
2	49.6	82-30	38	11.6
3	50	63-42	44	6
4	48	62-28	29	17
5	44	58-26	36	8
6	54	63-48	38	16

*Net change in scores are positive unless marked with a minus (-) sign.

The third session was a discussion of what the students had learned about working in groups. The scoring key and scoring method were explained and each group received the final sheet prepared by the scoring committee. (The summary charts are included in this paper). The following questions were written on the blackboard for group discussion:

1. Did the group do better than any individual? Did it do better than the average individual? Why?
2. Did some members have more influence than others?
3. How did your group reach agreement? What are the advantages and disadvantages of that method?
4. How did you feel about working in the group?
5. What are the advantages and disadvantages of working as a group?

The positive potentials of working as a group in a decision making problem was true for all groups except one (Number 1 group, fifth hour). I believe that all groups realized and valued the importance of identifying member resources, the different roles played by group members, the value of collaboration, and different styles of decision making. I realize that the group process is not an end in itself, however, it seems to be a useful tool for integrating the three domains of learning. Two major concepts evolved from the above group study: (1) joint wisdom, and (2) elements of personal feeling and conflict.

There is some reason to believe that more effective and creative solutions will be found by group action which spends as little as 10% of its time on task activities than can be produced by an individual working alone.[2]

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[2]Edgar A. Kelley. "Improving Instruction Through Group Dynamics," Unpublished working draft, University of Nebraska, Lincoln, Nebraska, 1970.

EXAMPLE II

STRIP MINING SCARS APPALACHIA

The catastrophe that hit Cecil Combs was a consequence of what is called strip mining.

The mining company whose operations ruined Combs had a legal right to mine the coal and did not have to pay damages to the mountain farmer. The mining company held mineral rights to the land on the basis of a "broad-form deed" purchased decades ago from the owner at that time.

Such a deed gives a mining company authority to do whatever is "necessary and convenient" to remove coal, no matter what the surface owner might say.

COURTS UPHOLD DEEDS

At the time of the sales, there was no way to know what damage future methods and heavy machinery would be able to cause to both land and people. Yet Kentucky courts have consistently held the old deeds valid.

Courts have ruled that if surface damage is "arbitrary, wanton, or malicious destruction," the coal industry must compensate property owners. But such intent is difficult to prove, and proof usually requires money for legal services far beyond the resources of people like Cecil Combs.

A mining representative visited Cecil Combs later, after the strip mining was finished. He explained to the farmer that the company was under no obligation to him. He gave Combs a token sum.

"There have been some unfortunate incidents," conceded Fred Bullard, president of the Kentucky Coal Association, "but it really comes down to a question of legal rights."

FIELDS AND HOMES BULLDOZED

Because of strip mining, many mountain people such as Cecil Combs have had their crops, fields, streams, and homes bulldozed or filled in by mudslides. Large areas of Appalachia's natural beauty have been scarred and its fish and wildlife endangered.

Strip mining occurs in more than a dozen states, but most intensively in the mountain states of Appalachia.

The Department of the Interior estimates that 3,200,000 acres of land have been disturbed by strip mining. At least two-thirds of this land lies ruined. And the total of destroyed land has been rising by at least 200,000 acres a year.

Much of the damage is caused by "overburden," the unwanted material that is shoved down the mountainsides. This leads to erosion, stream pollution, and despoilment of valleys.

Former Secretary of the Interior, Steward L. Udall has described strip-mined land: "The face of the earth is riddled with abandoned workings, gashed with quarries, littered with abandoned structures, and piled high with spoil and slag."

THE MOVING OF MOUNTAINS

Strip mining began on a large scale in the 1950's when mining men discovered that it was cheaper to mine coal just below the surface by stripping away land on top, rather than sending down deep mine shafts.

But strip mining today employs giant earth-moving machines that can literally move mountains. Some companies have supershovels that stand 20 stories--higher than Niagara Falls--and take 350,000 pounds at a single bite. A man standing by one of these giants appears to be only inches tall.

FIGHT FOR CONTROLS

In recent years a strong movement has grown to control strip mining. One of its most eloquent leaders is a mountain lawyer named Harry Caudill. His 1963 book, Night Comes to the Cumberlands, presented a strong case against strip mining.

"When man destroys his land, he begins to destroy himself," Mr. Caudill wrote. "The pioneers farmed the soil to death, timber companies stripped the trees, coal companies gutted the hills. Now strip mining compounds the destruction."

Former Governor Breathitt of Kentucky risked his political life to fight for mining control laws. He urged Kentuckians to "take a Sunday drive and see for your self the devastation left in 50 counties." The Governor won the support of conservationists, most public organizations, and many leading newspapers in Kentucky.

In an editorial, the Louisville Courier-Journal declared: "Every Kentuckian should share a deep sense of outrage against what man is doing to desecrate and destroy our natural heritage. Strip mining is a bell that tolls for Kentucy." The newspaper later won a Pulitzer Prize for its strong stand.

LAW IS OPPOSED

In 1966, Kentucky succeeded in passing a mining control law that was the strongest in the nation. It confined strip mining to slopes of less than 28 degrees, and to areas that were more than 100 feet from any stream, road, or public property. In addition, the mining companies were required to reclaim and reseed the area.

The law was passed, however, over the determined opposition of the mining industry. The industry contended that the added costs would put them out of business. The industry argued also that the land being strip-mined was worthless to begin with.

Miners in hard hats, some limping from mining accidents, staged a march on the capitol to plead for their jobs. Kentucky's 400 million dollar coal industry was the state's biggest industry and one of its largest employers.

PROGRESS BLOCKED?

Many in the mining industry regard those who protest strip mining as "bleeding hearts and dogooders who don't understand the real issue." Industry spokesmen see strip mining as a new and cheap method of mining an essential mineral, and this, the industry says, brings jobs and prosperity.

G. Don Sullivan, a consultant to the American Mining Congress, contends that the cheapest coal is the best coal because it brings the most progress. Any other criterion, Mr. Sullivan feels, would violate the "American free enterprise system."

Strip-mined land often can be successfully reclaimed. A 1968 report of the U.S. Department of Agriculture said: "Properly treated and managed, it can be returned to safe and productive use. . . left alone, it may produce only stream-fouling sediment and acid and ugliness.

A number of mining companies have done outstanding jobs restoring land to farmlands, grasslands, forests and wildlife havens, and recreation areas. The Kentucky Reclamation Association, sponsored by Kentucky's coal operators, claims that land reclamation keeps pace with mining.

However, reclamation is all but impossible in Kentucky's steep mountain country, where Cecil Combs lives. And, frequently the mine operator's reclamation is just a token effort.

Some strip miners, though, are beginning to figure the cost of reclaiming land into the cost of doing business. They have concluded that they can mine the coal, then return the land to a safe condition, and still make a profit--in money and public goodwill.

FOR THOUGHT AND DISCUSSION

1. A MOUNTAIN FARMER, Cecil Combs, has his farm ruined by strip mining; vast tracts of land are gouged and left in desolation; and wildlife is endangered. But sufface coal is mined, men are given employment, and the economy of a region is greatly helped.

Are the effects of strip mining an acceptable price to pay for economic benefits? Or is the cost of strip mining too high in exploitation of man and nature? Give some reasons for your answer. Summarize briefly the positions of the following: a farmer ruined by strip mining; a strip mining operator; a mining company lawyer; a crusading conservationist.

2. HISTORICAL RELEVANCE: Compare today's strip mining to the gold mining of the pioneers. Have conditions changed too much for a valid comparison? Or does a comparison reveal that historic issues over land use have persisted to modern times? Cite reasons.

'WHEN THEY TAKE A MAN'S GARDEN. . .'

The day was warm and bright when the bulldozers reached Cecil Combs's 30-acre farm in the Cumberland Mountains of eastern Kentucky. For days he had heard their coughing in the distance, growing ever louder.

Combs was 57 years old and gray haired--his front teeth were missing. He had never gone to school and could not read or write--even to sign his name. He had been a coal miner. But now he was out of work--displaced by new machines.

He had married a widow. She had three retarded sons who could not even shave themselves. Combs depended on the farm for his family's livelihood. It was all he owned.

The soil was rich, and Combs grew potatoes, peas, onions, and tomatoes. He also had a large cornfield on a steep slope.

Combs watched as the bulldozers pushed into the trees at the top of the slope, upending them by the roots. Then the bulldozers shoved the trees and dirt aside to form a large pile on the hillside.

Next, drilling rigs bored into the cut to reach the coal seam that lay near the top of the slope. Then came explosives. Power shoveles heaved the rubble onto the ever-growing heap that clung to the side of the hill looking down on Cecil Combs's farm.

When the coal was uncovered, huge machines shoveled it by the ton into trucks. And before long bulldozers came again to cut into new ground, and the process began all over again. In this way, the operation moved around the moutain and passed beyond Cecil Combs's farm.

But the slag heap the miners left behind soon broke away and crashed down the mountainside into the creek not far from Combs's house. The water backed up and covered his vegetables and seeped into his house, forcing him out. Combs finally moved into a deserted two-room shack in his cornfield.

"They 'stroyed me, that's all there is to it," Cecil Combs said. "When they take a man's garden, I guess they take the last thing he's got that counts for anything."

Did the mining company have the right to gouge the mountain side for coal, or was this an illegal act subject to prosecution?

Did the mining company have the right to destroy the home and livelihood of Cecil Combs, or could the mountain farmer sue successfully for full damages?

EXAMPLE III

ACTION

Mining in Minnesota Boundary Waters Canoe Area

The Facts:

The Boundary Waters Canoe Area, lying along the U.S.-Canadian border in Minnesota, is a unique stretch of interconnected forest lakes in essentially virgin country. The U.S. Bureau of Mines is considering the use of public funds to explore for deposits of copper and nickel ore thought to be in the wilderness area.

The Crisis:

The amount of wilderness near populated areas in the United States is already critically short and the "need" for mineral exploration must be balanced against the preservation of our national heritage.

What you can do about it:

Exercise your civic duty by expressing your opinion, regardless of what it is, to:

Acting Chief Charles W. Merrill, Bureau of Mines
Division of Field Operations, Interior Department
Washington, D.C. 20250

For more information, write:

Lawrence B. Carlson, President
Minnesota Conservation Federation
4313 Shady Oak Rd., Hopkins, Minnesota 55343

Yesterday's quote taken from Science and Human Values by J. Bronowski, page 6.

> The world today is made, it is powered by science; and for any man to abdicate an interest in science is to walk with open eyes towards slavery.

RESOURCES AND MATERIALS

1. Film Loan Service
   Mich. Dept. of National Resources
   Lansing, Mi. 48926

2. National Wildlife Federation
   1412 16th st. N.W.
   Washington D.C., 20036
   (Packet for 9th graders, price-$1.50)

3. American Assoc. of University Women
   2401 Virginia Ave., N.W.
   Washington D.C., 20037
   (Anti-pollution $.75)

4. National Parks Association
   1701 18th St., N.W.
   Washington D.C. 20036
   (Free materials)

5. Conservation Foundation
   1250 Connecticut Ave., N.W.
   Washington D.C., 20036
   (Free materials)

6. Environmental Action

   Environmental Teach-In
   2000 P St., N.W.
   Washington D.C. 20036

7. Conservation Foundation
   381 Park Ave., South
   New York City 10016
   "An Environment Fit for People" ($.25)

8. Supt. of Documents
   Government Printing Office
   Washington D.C. 20402
   "Restoring the Quality of Our
   Environment ($1.25)

9. Project Man's Environment
   National Education Association
   1201 16th St., N.W.
   Washington D.C. 20036 K-12
   Curriculum Environmental Study Areas.

10. Isaac Walton League of America
    1326 Waukegan Rd.
    Glenview, Illinois 60025
    "Clean Water-Its Up To You"--Free

11. Public Affairs Pamphlets
    318 Park Ave. South
    New York, New York, 10016
    #421 The Environment Fit for People
    ($.25 and #403-"The Battle for Clean Air"

12. Clean Water
    Washington D.C. 20242 - Free

13. Superintendent of Documents
    Government Printing Office
    Washington D.C. 20402

    "No Laughing Matter" - $.70
    "Primer on Waste Water" - $.55
    "Showdown" - $.65
    "From Sea to Shining Sea" - $2.50

14. The Wilderness Society
    729 15th St., N.W.
    Washington D.C. 20005
    "Air Pollution Primer"

15. U.S. Naval Oceanographic Office
    Washington D.C. 20390

16. U.S. Government Printing Office
    Division of Public Documents
    Washington D.C. 20402

17. U.S. Atomic Energy Commission
    Post Office Box 62
    Oak Ridge, Tennessee 37830

18. Office of Educational Programs and Services
    NASA, 400 Maryland Avenue, S.W.
    Washington 25, D.C.

19. U.S. Department of the Interior
    Geological Survey
    Washington, D.C. 20242

20. National Council for Geographic Education
    Illinois State University
    Normal, Illinois 61761

21. Publication Sales American Geological Institute
    1444 N. Street, N.W.
    Washington D.C. 20005

22. American Geological Institute
    1444 N. St., N.W.
    Washington D.C. 20005

23. National Geographic Society
    Washington D.C. 20036

24. U.S. Department of Commerce
    Environmental Science Services Administration
    Coast and Geodetic Survey
    Washington D.C. 20235

25. National Anthropological Archives
    Smithsonian Institution
    Washington D.C. 20560

26. U.S. Department of Commerce
    Environmental Science Services Administration
    Coast and Geodetic Survey
    Washington Science Center
    Rockville, MD. 20852

27. United States
    Department of the Interior
    Geological Survey
    Washington, D.C. 20242

28. General Weather Science Study
    Supt. of Documents
    Government Printing Office
    Washington 25, D.C.

29. National Anthropological Archives
    Smithsonian Institution
    Washington D.C. 20560

30. Department of Natural Resources
    Publications and Tourism
    Room 128-Stevens T. Mason Bldg.
    Lansing, Michigan 48926

31. Photographic Library
    United States Dept. of the Interior
    Geological Survey
    Washington D.C. 20242

32. National Education Assoc.
Sales Section 31, 1201-16th St., N.W.
Washington D.C. 20036

33. Commandant (OMS-1)
U.S. Coast Guard
Washington D.C. 20591

34. Oak Ridge Assoc. Universities, Inc.
P.O. Box 117
Oak Ridge, Tennessee 37830

35. Bureau of Sport Fisheries and Wildlife
U.S. Dept. of the Interior
Washington D.C. 20240 (Animals)

36. National Park Service
Washington D.C. 20240 (Parks)

37. U.S. Forest Service,
U.S. Dept. of Agriculture
Washington D.C. 20250 (Forests, trees, plants)

38. Environmental Protection Agency
1129-20th St., N.W.
Washington D.C., 20013 (Pollution control, pesticides)

Your state Government (Fish and Game or Conservation Department)

39. Zero Population Growth
330 Second St.
Los Altos, California 94022 (Population problems)

40. Defenders of Wildlife
2000 N. St., N.W.
Washington D.C. 20036 (Animals)

41. Keep America Beautiful
99 Park Avenue
New York, N.Y. 10016 (Litter control, recycling)

42. Sierra Club Endangered Species Newsletter
Atlantic Chapter
250 57th St.
New York, N.Y. 10019

EXAMPLE IV

ZIG ZAG

VALUE: Man's dependence and need for each other.

VALUE: Man's dependence and need for nature.

"Elements"

I used to
Like
Fresh air
When it was there.
And
Water. . .
I enjoyed it
Each day
The land's diminished.
I think
I'm
Finished.

I am a part of Nature.
I am a part of everything that lives.
I am bound together with all living things
in air, in land, in water.
My life depends upon Nature-
Upon its balance, upon its resources,
and upon the continuity of both.
To destroy them is to destroy myself.
As a member of the human race
I am responsible for its survival.
I am a part of Nature.
I will not destroy it.

Taken from TV's Henry Gibson's writings, "I Feel a Little Sick"
(of Laugh-In fame)

"The Wonder of It All"

There are so many small, incessant things--
The constant whir of tiny unseen wings,
The steady beat of hearts too small to hear--
That never reach the conscious eye or ear.

The crack of seedlings breaking through the pod,
The tender grasses pushing through the sod;
The bustle of the world down underground,
The air above so full of soundless sound.

The world within a world, where lives repeat
Their own small cycles, infinite, complete;
The unseen, steady flow of death and birth--
The business of an ever-changing earth.

The order and the wonder of it all--
A universe so great--a world so small!

by Helen Marshall

QUESTION:

1. List some ways in which man is dependent upon one another.

2. How is dependency related to earth science?

3. Can you think of areas of living in which man can function by himself without the aid of anyone? What are those areas? List as many as you can.

4. Make a list of people who depend upon you for something specific.

EXAMPLE V

VALUE SHEET

More Than Minerals?

The human being is made up of oxygen, nitrogen, phosphorus, hydrogen, carbon and calcium. There are also 12 1/2 gallons of water, enough iron to make a small nail, about a salt-shaker full of salt, and enough sugar to make one small cube. If one were to put all of these materials together and try and sell it, the whole thing would be worth about one dollar.

1. What is the point of this statement?
2. Are you serious in believing that you are worth more than $1.00? Explain.
3. What are some ways to measure the worth of human beings?
4. Can you list some things you have done which show what you think human beings are worth?

EXAMPLE VI

Youth's Bill of Rights*
(A petition directed to parents, teachers and other adults)

1. Stand by us, not over us
   Give us the feeling that we are not alone in the world, that we can always count on you when we are in trouble.

2. Make us feel that we are loved and wanted.
   We want to love you, not as a duty but because you love us.

3. Train us by being affectionately firm.
   You really will achieve more with us through patient teaching than by punishment or preaching. Say "NO" when you feel you have to, but explain your rules, don't merely impose them.

4. Bring us up so that we will not always need you.
   Teach us how to take on responsibility and become independent of you. We will learn this faster and better if you will let us question you, your ideas and standards.

5. Don't act shocked when we do things we shouldn't.
   It is going to take us time to learn how to grow into life properly.

6. Try to be as consistent as possible.
   If you are mixed up about what you want from us, why shouldn't we be mixed up too in what we give you?

7. Don't try to make us feel inferior.
   We doubt ourselves enough without your confirming it. Predicting failure for us won't help us succeed.

8. Say "Nice work" when we do something really well.
   Don't hold back the praise when we deserve it. That's the way to spur us on.

9. Show respect for our wishes even if you disagree with them.
   Respect for you will flow naturally from your respect for us.

10. Give direct answers to direct questions.
But don't give us more than we ask for or can understand. When you don't know, say so, but find someone for us who does know or work with us to find answers.

11. Show interest in what we're doing.
Even though by your standards our activities may not be important or interesting, don't reduce them in our eyes by your indifference.

12. Treat us as if we are normal, even when our conduct seems peculiar to you.
All God's children have problems. That doesn't mean we're all problem children.

13. Sometimes all of us run into serious emotional difficulties.
Should that happen, obtain for us professional counselling. It isn't always easy for boys and girls to understand themselves or know just what they want. That's why there are specialists in personal adjustments and vocational selection.

14. Teach us by example.
"What you are speaks louder than your words."

15. Treat each one of us as a person in his own right.
Children are people, not carbon copies of grownups. Treat all children in your care farily; that is, as of equal value to you. That is how we will learn to respect the rights of other people and to treat them fairly.

16. Don't keep us young too long.
We want a chance to prove what we can do as soon as we are ready to give proof. Don't hold us back by love which over-protects and paralyzes.

17. We need fun and companionship.
Help us share our interests and happy feelings with groups of friends. Give us time to be with them and make them welcome when they come to visit.

18. Make us feel that our home belongs to us.
We are at least as important as the furniture. Don't protect "things" at our expense by making us feel like intruding bulls in a china shop.

19. Don't laugh at us when we use the word "love." The need to love and be loved starts early (and never ends). Getting romantic is merely setting to soft music the eternal desire to belong to someone and have someone belong to us.

20. Treat us as junior partners in the firm. Democracy starts at home. If you want us to be worth successors to you, take us into your confidence, and let us help you in managing our family, our school and our community.

21. Make yourself an adult fit for a child to live with. Prove to us "it ain't so" that parents are the worst persons in the world to have children, or that teachers are precisely the people least suited to teach. Show that home and school are not simply places where children learn how to get along with disagreeable adults.

22. Prepare us to lead our lives, not yours. Find out what we can do or we want to be before you force us beyond our capacity or make us become what you want us to become.

23. Give us the right to a major voice in our own lives. Decisions that will affect our whole future should be made with us, not for us. We have a right to our kind of future.

24. Let us make our own mistakes. To make wise decisions takes experience. That means we have to try ourselves out and find out ourselves. We can learn through our own actions--not yours.

25. Permit us the failings of average children, just as we permit you the failings of average parents and teachers. Let us both break the rules sometimes. We can grow only at our own rate, which means in easy stages. We want to become the best we can become, but we would not be human if we were perfect.

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*George Lawton, "How to be Happy Though Young," Vanguard Press Inc., New York, N.Y.

EXAMPLE VII

VALUES GRID

WHO ARE YOU? DO YOU REALLY KNOW WHAT YOU VALUE IN LIFE?

Couldn't Care Less	Mild Opinion	Strong Opinion	Very Strong Opinion

The numbers in the boxes indicate the strength of the opinion. While 1-4 are all in the "Couldn't Care Less" category, 4 is stronger in feeling than 1. 16 is the strongest of all.

Variations

Instead of plotting your own feelings on the grid, pretend you are_____. Plot the situation on the grid according to the way you think he or she would feel.

Present 16 situations to go with the following:_____

EXAMPLE VIII

7-Criteria of Values

WHO ARE YOU? DO YOU REALLY KNOW WHAT YOU VALUE IN LIFE?

Item	Have you chosen from alternatives	Is this part of a pattern	Free choice	Do you prize or cherish this stand	Are you willing to affirm in public	Have you ever taken action	Have you thought much about it

In the item column there are 4 boxes. Put 1 item (in each box) of which you have very strong feelings.

For each item, go along the row putting an "X" in each box if you can answer the question at the top in the affirmative. If you cannot, do not mark the box. Only items in which all 7 boxes have an "X" can be true values. All others are merely value indicators or beliefs.

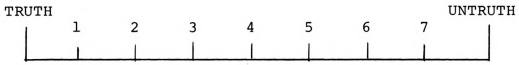
Some value indicators are: GOALS OR PURPOSES, ASPIRATIONS, ATTITUDES, INTERESTS, FEELINGS, BELIEFS AND CONVICTIONS, ACTIVITIES, PROBLEMS AND WORRIES.

EXAMPLE IX

Truthfulness

The Value Continuum

"Science is indeed a truthful activity. And whether we look at facts, at things, or at concepts, we cannot disentangle truth from meaning--that is, from inner order. Truth, therefore, is not different in science and in the arts; the facts of the heart, the bases of personality, are merely more difficult to communicate.". . .Science and Human Values, J. Bronowski, p. 52.



Questions:

1. Do you want people to like you?

2. Do you always behave in ways so people can like you?

3. If your friend buys a new hat that you think is ridiculous, and she asks you if you like it, how would you answer her? Where on the continuum would you place your answer?

4. When does truth cease to be truth?

5. When our behavior lies in the right half of the continuum, how do we justify ourselves for not being wholly truthful?

6. How do you feel about the statement: "Honesty is the best policy?"

EXAMPLE X

Using the 16-Forced Choice Item Exercise--
Rank Order these Science-Social Problems:

1. Noise
2. Wiretapping and Electronic Detectors
3. Atomic Weapons
4. Chemical and Biological Warfare
5. The "Greenhouse Effect" (caused by air pollutants)
6. Defoliation
7. Pesticides and Herbicides
8. Fluoridation
9. Waste Disposal Problems
10. Genetic Transformations
11. Oil Spill
12. Population Problems
13. Space Research
14. "Big Science"
15. Atomic Power
16. Technological Progress and Conservation
17. Solid Wastes
18. Social Responsibilities of Scientists