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ABSTRACT

"Space Encounters" is one of the "Preparing for Tomorrow's World" (PTW) program modules. PTW is an interdisciplinary, future-oriented program incorporating information from the sciences/social sciences and addressing societal concerns which interface science/technology/society. The program promotes responsible citizenry with increased abilities in critical thinking, problem-solving, social/ethical reasoning, and decision-making. This module, a role-playing simulation, is intended for use in grades 7-12 social studies, general science, earth science, and English classes. It consists of 13 open-ended, decision-making activities related to a simulated space mission. Additional activities include large/small group dilemma discussions. Dilemmas, brief stories in which two or more moral/ethical conflicts must be resolved, are accompanied by questions to stimulate thinking and/or generate discussions. In addition to student handouts and instructional strategies, the teaching guide contains module overview, chart indicating moral issues (as identified by Kohlberg) in each dilemma, suggested time schedule, bibliography, discussion of the socio-scientific reasoning model (theoretical basis of the PTW), and bibliography. The module may be used as a separate unit of study, as a mini-course, or incorporated into existing curricula where appropriate. (JN)

PREPARING FOR TOMORROW'S WORLD

Space Encounters

Teacher's Guide

Institute for Science, Technology and Social Science Education

Preparing for Tomorrow's World
An Interdisciplinary Curriculum Program

Coastal Decisions. Difficult Choices
Energy: Decisions for Today and Tomorrow
Future Scenarios in Communications
Space Encounters
Technology and Changing Life-Styles
Food A Necessary Resource
Perspectives on Transportation
Future New Jersey: Public Issues and the Quality of Life
People and Environmental Changes
Environmental Dilemmas: Critical Decisions for Society
Of Animals, Nature and Humans
Beacon City: An Urban Land-Use Simulation
Dilemmas in Bioethics
Technology and Society: A Futuristic Perspective

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PREPARING FOR TOMORROW'S WORLD

Space Encounters

Teacher's Guide

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PREFACE

We live in an exciting, rapidly changing, and challenging world -- a world highly dependent upon science and technology. Our world is changing so rapidly that we sometimes fail to recognize that much of what we today take for granted as common, everyday occurrences existed only in the imaginations of people just a few short years ago. Advances in science and technology have brought many dreams to fruition. Long before today's school children become senior citizens, much of today's "science fiction" will, in fact, become reality. Recall just a few accomplishments which not long ago were viewed as idle dreams.

- *New biomedical advances have made it possible to replace defective hearts, kidneys and other organs.*
- *The first air flight at Kitty Hawk lasted only a few seconds. Now, a little over half a century later space ships travel thousands of miles an hour to explore distant planets.*
- *Nuclear technology -- of interest a few short years ago because of its destructive potential -- could provide humankind with almost limitless supplies of energy for peace-time needs.*
- *Computer technology has made it possible to solve in seconds problems which only a decade ago would require many human lifetimes.*
- *Science and technology have brought us to the brink of controlling weather, earthquakes and other natural phenomena.*

Moreover, the changes which we have been experiencing and to which we have become accustomed are occurring at an increasingly rapid rate. Changes, most futurists forecast, will continue and, in fact, even accelerate as we move into the 21st Century and beyond. But, as Barry Commoner has stated, "There is no such thing as a free lunch." These great advances will not be achieved without a high price. We are now beginning to experience the adverse effects of our great achievements.

- *The world's natural resources are being rapidly depleted.*
- *Our planet's water and air are no longer pure and clean.*
- *Thousands of plant and animal species are threatened with extinction.*
- *Nearly half the world's population suffers from malnutrition.*

While science and technology have given us tremendous power, we are also confronted with an awesome responsibility, to use the power and ability wisely, to make equitable decision tradeoffs, and to make valid and just choices when there is no absolute "right" alternative. Whether we have used our new powers wisely is highly questionable.

Today's youth will soon become society's decision-makers. Will they be capable of improving upon the decision-making of the past? Will they possess the skills and abilities to make effective, equitable, long-range decisions to create a better world?

To the student:

This module has been prepared to help you -- the student and future decision maker -- function more effectively in a rapidly changing world. Other modules in the *Preparing for Tomorrow's World* program focus on additional issues of current and future importance.

To the teacher:

It is our belief that this module -- and indeed the entire *Preparing for Tomorrow's World* program -- will help you the teacher prepare the future decision-maker to deal effectively with issues and challenges at the interfaces of science, technology, society. It is our belief that the contents and activities in this program will begin to prepare today's youth to live life to the fullest, in balance with Earth's resources and environmental limits, and to meet the challenges of tomorrow's world.

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INTRODUCTION

The problem with most science fiction, as any avid fan will tell you, is that, unless it is particularly well written, it acquires with the passing of time a rather dated appearance. We have reached a point in our scientific and technological growth when those who make their living imagining the future find the pace too fast for even their fertile minds.

Modern science has brought the future to our very doorstep. The time lapse between the probable and the possible has been foreshortened from generations to decades. The present speed of scientific and technological developments has taken away society's cushion for contemplation. The societies in which science and technology function at a high level no longer have the option of measured reflection as to the consequences of these developments.

We are presently faced with several very pressing social and scientific problems the consequences of which can only be dimly foreseen. First and foremost, more people are competing for diminishing resources. The gap between the "haves" and "have nots" continues to increase. In this global competition for resources the feelings of nationalism, distrust, suspicion and envy are heightened. The world, especially the Western world, has at hand the key to the solution to many of these problems. It is a two edged sword however, which requires consideration of both short and long-term repercussions. Unfortunately, time for consideration is the one resource in most short supply. The world is faced with a rather difficult juggling act. We must balance what science can do, what needs to be done and the long-term interaction of these effects.

DDT has saved the lives of millions of people by destroying the malaria carrying mosquito. However, now we find that the DDT has entered the food chain, led to the threat of extinction of several species of birds, and even entered the milk of nursing mothers. In an attempt to solve one problem several more have been created.

The possible must also be tempered with the humane and the just. The ability to prolong life or secretly listen to a conversation halfway around the world does not imply the right to do so. Even if it were possible to maintain a global ecological balance and raise the standard of living around the world to an equitable level, we would still have to face other implications of our science and technology.

Implicit in this module then are certain issues which arise out of the interaction of science, technology and society. It is the clash between what is necessary, possible and right. What is possible is changing too quickly to define. What is necessary and right is the province of the individual.

It is hoped that by the examination of these issues through discussion, role playing and confrontation, one with another, the students will be able to develop strategies to help them deal with the problems brought about by the interaction of science, technology and culture. The issues which are given a central role are as follows:

- The value of life
- The quality of life
- The needs of future generations versus the needs of the present generation
- The equitable distribution of resources
- Arms limitation
- Resource Conservation
- The right to privacy
- Respect for other cultures and customs
- Justice

It is only by identifying the problems and facing them directly that the possibility of resolution exists. It is the purpose of this module to identify some of the problems created through the interaction of science, technology and society and to provide a vehicle through which students may examine these problems and issues in such a way that the wants, needs and values of one group are examined in relation to the wants, needs and values of another.

The Theoretical Basis of *Preparing for Tomorrow's World:*

The Socio-Scientific Reasoning Model

As pointed out in the Introduction to this guide, developments in science and technology are not without societal issues and problems New developments and applications will inevitably bring about new issues as well as increase their complexity Unlike scientific problems, socio-scientific problems often have no "correct" answer because they involve human choices and decisions Such choices and decisions are value ladened The particular decisions made today and tomorrow will determine the course of the future. Hence, we are faced with the profound challenge to make just and wise decisions in order to create a better future world. To help prepare our students to become more effective problem solvers and decision makers, education will need to focus on the simultaneous development of the following skills.

- Ability to deal with problems containing multiple interacting variables
- Decision making that incorporates a wider social perspective
- Critical thinking in the evaluation of consequences and implications

Components of the Socio-Scientific Reasoning Model

In response to the above concern and recognizing the importance of this mode of development, we developed the "socio-scientific reasoning" model to serve as a framework in the production of our curriculum materials. This model combines our own philosophy, ideas and research with the theories and philosophies of Piaget, Dewey, Kohlberg and Selman Basic to these theories is the idea of education as helping an individual grow both intellectually and morally. Therefore, this socio-scientific reasoning model approaches education from a developmental perspective This model incorporates the ideas of stage development from the perspective of cognition, moral/ethical reasoning and social role taking. The basic tenets of these theories are briefly summarized below.

Logical Reasoning

Jean Piaget, the noted Swiss psychologist, has made important contributions in the area of cognitive development which are pertinent to our efforts[1,2]. Piaget views the development of logical reasoning as progression through the series of stepwise stages indicated in Table 1 (sensori-motor, preoperational, concrete operational and formal operational). At each successive stage the logical reasoning ability of individuals takes on a broader perspective and incorporates the ability to deal with greater numbers of interacting variables of increasing intellectual complexity. Each stage of thinking builds upon the previous one, but takes on a new structural form. Growth in cognition, it seems, can be facilitated and nurtured through appropriate educational experiences.

In explaining growth in logical reasoning capability, Piaget refers to the processes of assimilation, accommodation, and equilibration Assimilation occurs when the child incorporates new ideas and situations into his or her existing thought structures. On the other hand, the child also encounters objects and events that do not fit into his or her existing thought structures. In these contradictory situations, the child has essentially two options. he/she must either enlarge his/her existing structures or create a new category or structure. Piaget defines this as the process of accommodation.

Intellectual growth, Piaget postulates, occurs when the individual attempts to resolve the tension between the interactive processes of assimilation and accommodation by developing new thoughts and responses that are more suitable or adequate. Equilibrium is re-established when thought structures are altered, producing new accommodations that enable the individual to assimilate the new situations. Intellectual growth, then, occurs through internal self-regulation processes that lead to new, higher levels of equilibration.

Moral/Ethical Reasoning

While there are several approaches to values education, the more encompassing one is the cognitive developmental approach offered by Lawrence Kohlberg[3,4]. Kohlberg's ideas are derived from the philosophic positions of Dewey and and Piaget The emphasis here is to help individuals grow intellectually and morally. This is, we feel, a more functional approach than arbitrary indoctrination of values as used in "character" or "socialization" education or taking a "values relativity" stance, typically employed in the more common values clarification approach.

Kohlberg's moral/ethical development theory is an extension of Piaget's cognitive development theory. Similarly to Piaget, Kohlberg views moral development from childhood to adulthood as progression through a series of stages (Table 2). Each stage is characterized by a very different way of perceiving and interpreting one's experiences. At Kohlberg's Stage 2, for example, "right" and "wrong" are judged in terms of satisfying one's own needs and sometimes the needs of others if it is convenient to do so. Stage 3 type of reasoning centers around maintenance of approval in one's own social group. The orientation is towards conformity to group expectation. At the higher principled stages, reasoning takes into account concerns for the welfare of others in a broader context, and includes concerns for human dignity, liberty, justice, and equality—those very same principles upon which our Constitution is based.

Following Piaget, Kolhberg views development not as mere accumulation of information, but changes in thinking capabilities—the structures of thought processes. In the course of development, higher-level thought structures are attained and result in the extension of an individual's social perspective and reasoning capabilities. Applying higher levels of thinking to problems results in problem solutions that have greater consistency and are more generalizable. See Appendix detailing the stages of development.

Social Role-Taking Stages

The research of Robert Selman[5] indicates that social role taking ability is a developed capacity which also progresses in a series of stages from early childhood through adolescence. Role taking is viewed by Selman in terms of qualitative

changes in the manner a child structures his/her understanding of the relationship between the perspectives of self and others.

Using the open-ended clinical method of inquiry first applied by Piaget and then later by Kohlberg, Selman has identified and defined Stages 0 through 4 (age range is approximately 3 years to 15+ years) These stages are referred to as Ego-centric Viewpoint (Stage 0), Social-Informational Role Taking (Stage 1), Self Reflection Role Taking (Stage 2), Mutual Role Taking (Stage 3), and Social and Conventional System Role Taking (Stage 4). Descriptions of the role taking stages appear in Table 3. Each of Selman's role taking stages relates closely to and parallels Kohlberg's moral reasoning stages

Selman views the social role taking stages as a link between Piaget's logical reasoning stages and Kohlberg's moral reasoning stages. Just as Piaget's logical reasoning stages are necessary but not sufficient for attaining the parallel moral reasoning stages, a similarly necessary but not sufficient relationship appears to exist between the social role taking stages and parallel moral reasoning stages.

As Selman has pointed out, ". . .the child's cognitive stage indicates his level of understanding of physical and logical problems, while his role taking stage indicates his level of understanding of the nature of social relations, and his moral judgment stage indicates the manner in which he decides how to resolve social conflicts between people with different points of view".

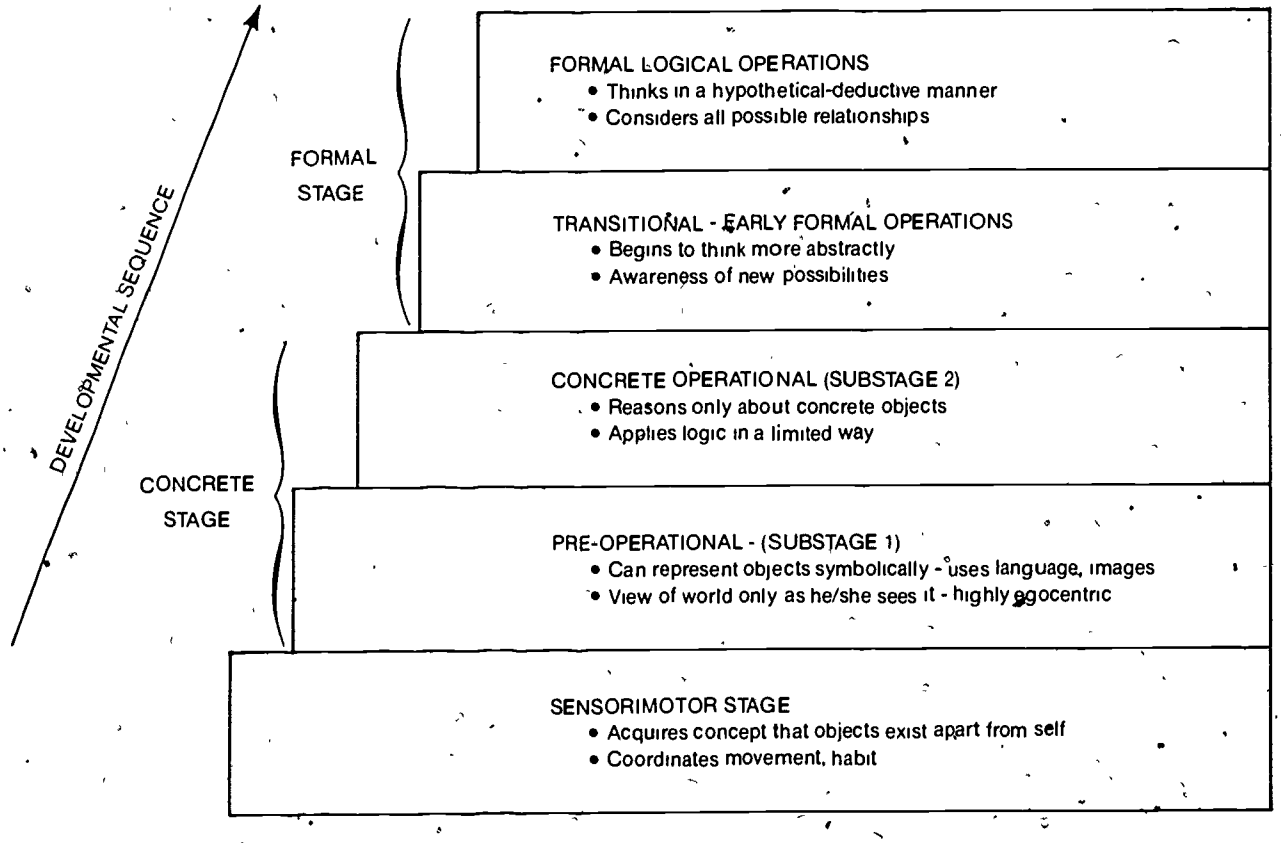
The Socio-Scientific Reasoning Model

Combining our own philosophy, ideas, and research with the theories of Piaget, Kohlberg and Selman, the socio-scientific reasoning model has been developed. Socio-scientific reasoning, as defined here, is the incorporation of the hypothetico-deductive mode of problem solving with the social and moral/ethical concerns of decision making. This model has served as a guide in the development of educational materials to help students advance to higher levels of thinking and reasoning capabilities. Moreover, it is highly flexible and readily adaptable to other classroom activities.

The basic assumption of this model is that effective problem solving requires simultaneous development in the realms of logical reasoning, social role taking, and moral/ethical reasoning. Purely objective scientific thinking cannot be applied in the resolution of most of the probable future conflicts without regard to the impact of those decisions on human needs and human goals. A technological solution, for example, may be, after critical analysis, feasible and logically consistent. From a societal perspective, however, one must question whether or not it should be applied. How to best prioritize our needs and evaluate trade-offs with a concern for the needs of future generations involves logical reasoning and critical thinking, but now with an added dimension . . . a social moral/ethical reasoning dimension.

Hence, the Socio-Scientific model consists of four interacting components (see Figure 1): (1) logical reasoning develop-

TABLE 1
PIAGET'S STAGES OF COGNITIVE DEVELOPMENT



ment is based on the theories of Piaget, while (2) moral/ethical reasoning relies strongly on Kohlberg's ideas. Selman's research provides the basis for the third component, the social role taking aspects of our model. Since the content or information component of the problem (component four) will vary, so too will the concepts vary accordingly. For example, in our applications of this model we have concentrated on issues at the interfaces of science, technology, and society. Of course, problem issues could also deal with or focus on any other topic one chooses to investigate.

The content component also consists of three interacting subunits. These subunits—science, technology, and society—rely on each other for their very existence. While each of the subunits is dependent upon the others, their individual underlying value structures create a high potential for discord since the concerns of one subunit often conflict with those of the

TABLE 2
KOHLBERG'S STAGES OF MORAL DEVELOPMENT

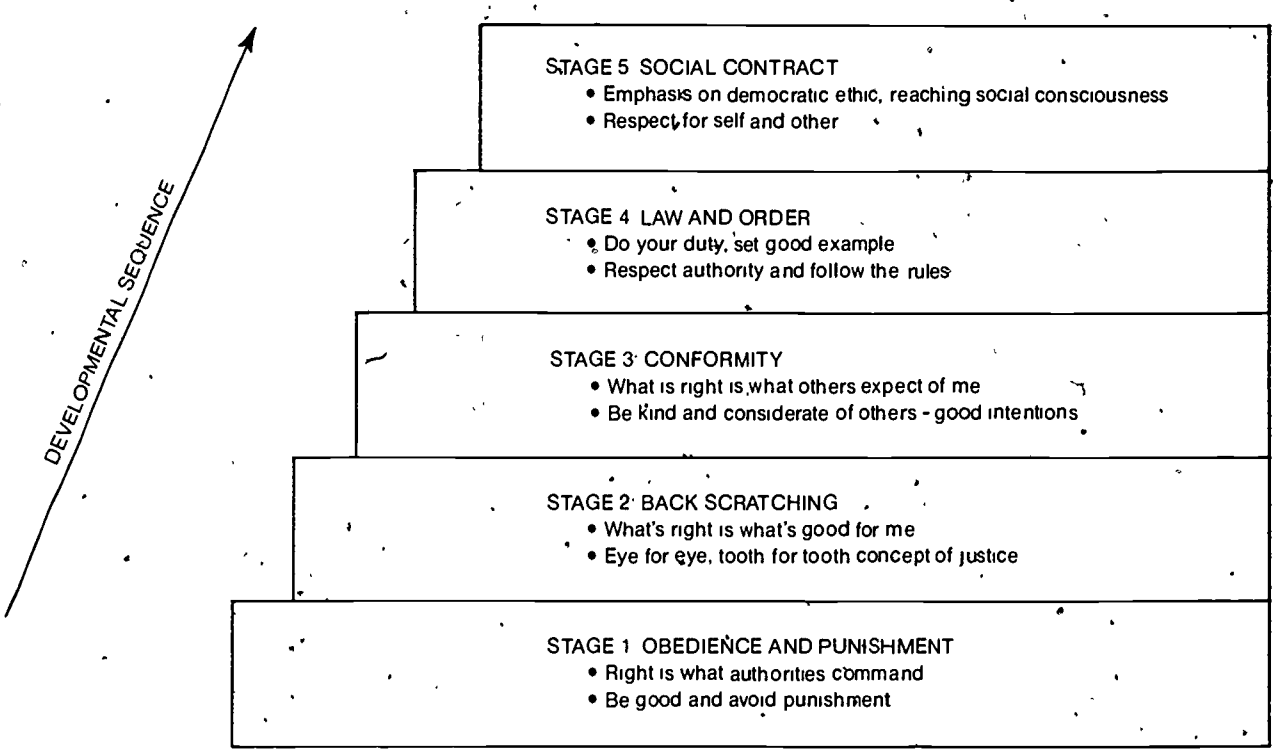


TABLE 3
SELMAN'S ROLE-TAKING STAGES

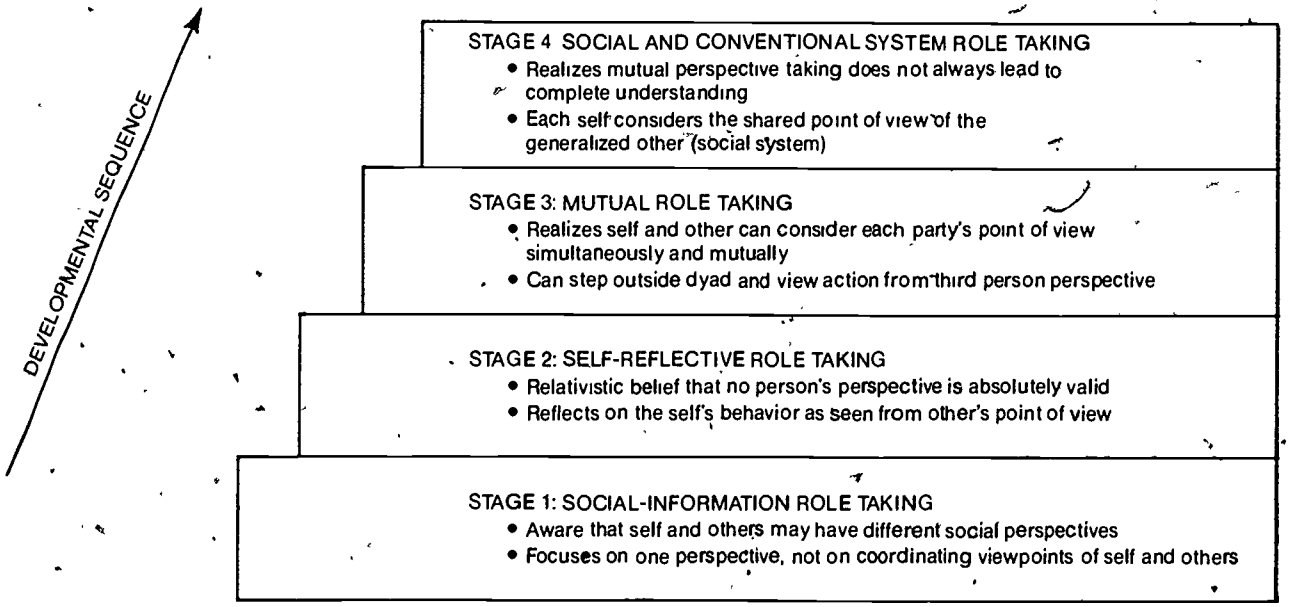
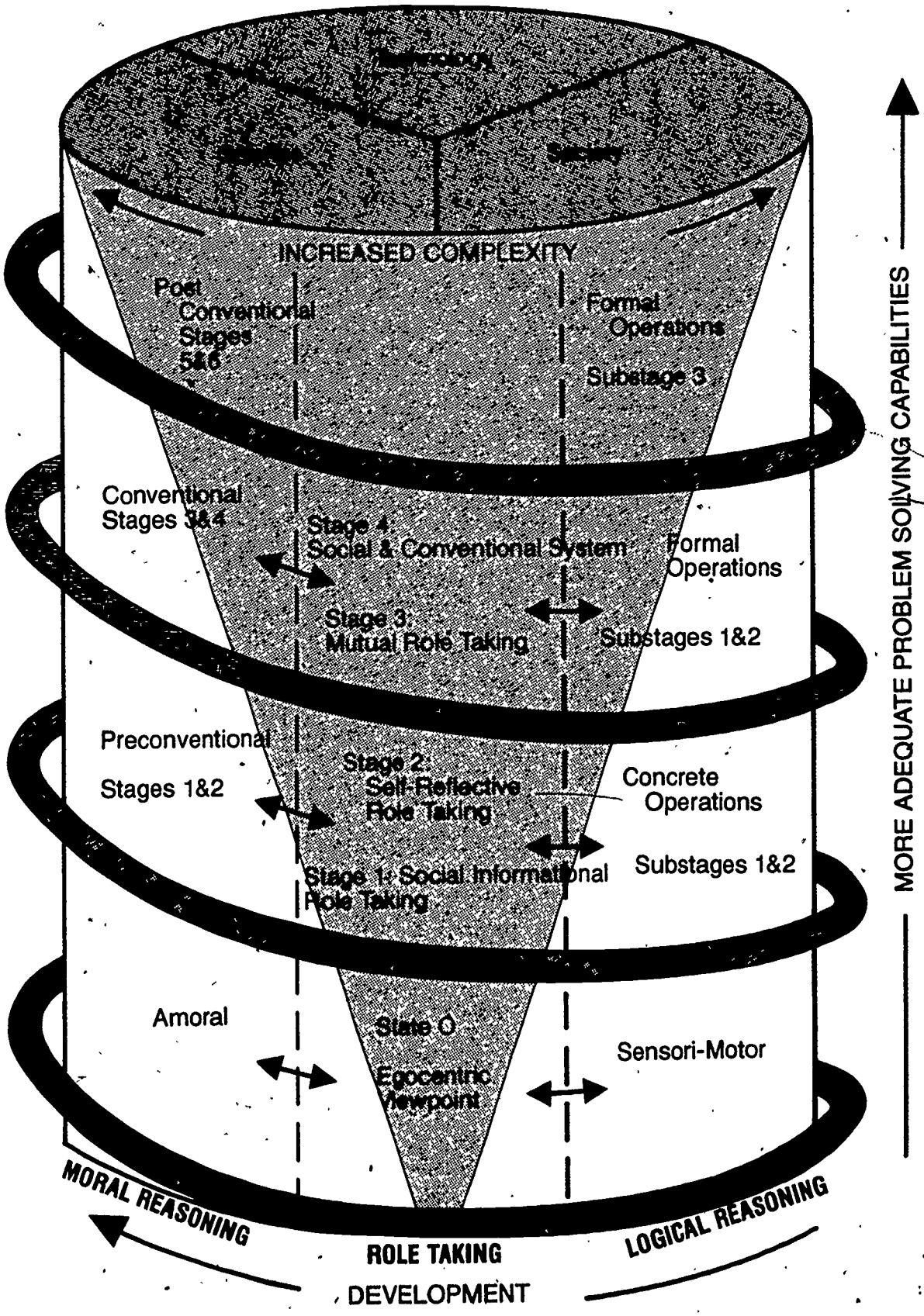


FIGURE 1

THE SOCIO-SCIENTIFIC REASONING MODEL



others. This paradox—dependence and simultaneous conflict among the subunits—presents a unique opportunity and context for curriculum developers employing the Socio-Scientific Reasoning model to prepare educational materials,

Each component of this model is not seen as a totally separate and distinct entity. Rather, each of the four components interacts with and has an effect on all other components. Thus, logical reasoning has an effect on, and in turn is affected by, social role taking development. In a similar manner, social role taking has an effect on, and is affected by, developments in the moral, ethical realm. Of course, logical reasoning and moral, ethical reasoning also interact. Each of these major components—logical reasoning, social role taking, and moral, ethical reasoning—interact not only with each other but with the fourth component, content or information.

Referring to Figure 1 again, the content cone is small at the low end because at earlier stages of development the number of concepts entertained are smaller and the concepts are simple in nature. Hence, as the cone broadens so too does the complexity of content or information included. Individuals at stages of development intersecting the lower end of the cone can deal with issues and concepts of a simpler form while, on the other hand, individuals at the upper end with higher levels of maturity have the capacity for dealing with more issues and issues of greater complexity. Development, then, is both vertical and horizontal. Vertical development is from lower to higher stages, horizontal development relates to the "necessary but not sufficient" requirements which must be satisfied as one moves from logical reasoning, through social role taking, to moral reasoning capabilities.

Thus, while each stage reflects a distinctly unique capability for problem solving in a science/technology/society context, we view development or progress as a continuously spiraling process. In this process, however, there are leaps and quiesence, and fixation at any stage is possible. Levels of logical reasoning, moral reasoning, and role taking maturity also seem to vary, we find, depending on the issues addressed. These apparent inconsistencies in reasoning—even when dealing with the same or similar mental and moral constructs—seem to be related to the degree of emotionality, familiarity with, interest in, and/or knowledge about the issues under consideration[7].

The goal then is to help each individual "spiral" upwards through the Socio-Scientific Reasoning cone and synchronously achieve "more adequate" problem solving capability. "More adequate" as used here refers to the idea that when applied to problem solving, the higher stages of reasoning result in solutions that are more encompassing and generalizable; they enable students to deal with greater complexity.

Application of the Socio-Scientific Reasoning Model in the Classroom

The Socio-Scientific Reasoning model therefore serves as the basis for identifying the types of learning experience and the sophistication level of those experiences important to help students develop. It recognizes that learning capabilities differ with age, grade level, interest and learning needs. Implicit in the model and in accord with stage theory is the idea that at each stage there is a characteristic form of thinking capability which determines how experiences and information are interpreted and acted upon.

The main strategy underlying all of these activities is based on Piaget's concept of equilibration. It is only when disequilibrium is created that active restructuring of thought takes place. This active restructuring leads to growth in logical reasoning, in social role taking, and in moral, ethical reasoning capabilities as well.

Restructuring of existing cognitive structures occurs when internal disequilibrium is felt by the individual. New experiences and inputs which are not readily comprehensible to the individual challenge his/her existing mode of thought by revealing inadequacies or inconsistencies in that problem solving strategy[8]. Arrestment at a given stage is partially explained by the developmental theorists as the lack of opportunities that create conflict or dissonance which place the individual in a position where he/she needs to assess his/her particular mode of thinking. Perhaps, as Clive Beck points out, the reason why people do not develop morally is because they have not had the opportunity to entertain alternatives—their imaginations have not been extended[9]. We, in addition, contend that the reason people do not advance in logical reasoning can also be attributed, to a large degree, to a similar lack of opportunities.

We have identified some of the basic elements needed to provide experiential opportunities that promote development of problem solving and decision making skills. A partial listing includes providing opportunities for students to.

- Encounter a variety of viewpoints
- Experience higher level reasoning
- Take the perspective of others
- Examine and clarify one's own ideas
- Examine the consequences and implications of one's decisions
- Defend one's position
- Evaluate possible alternatives
- Consider and recognize the role of the self to society
- Reflect on one's own value system
- Test own ideas and those of others

One educational activity which incorporates some of these elements is the classroom dilemma discussion, an activity most commonly associated with Lawrence Kohlberg and his colleagues. We have, however, modified and extended this approach to more systematically encompass critical analysis and evaluation of information and data. We have also employed such other formats as role taking, simulations, and futures forecasting and analysis methodologies.

For example, reasoning at a particular stage is not a value judgment of whether an act is good or bad, but is the pattern of the concepts entertained in judging the "ought" of rights, duties and obligations of human relationships. Younger children at lower stages reason about duties in terms of reciprocal benefits from the party—"If you do me a favor, I will do you a favor." Whereas in principled reasoning, duty is what an individual has become morally committed to do and is self-chosen. Higher stage reasoning is therefore the ability to apply value concerns (Kohlberg's major concerns include self welfare, welfare of others, sense of duty and of motives, conscience, rules, punitive justice, role taking) in a more

internalized, complex, autonomous, critical, consistent and generalized manner.

Effective discussion, however, cannot take place in a vacuum. Needed also is an information base or context from which students can begin to analyze and evaluate information. With information which they have extracted and synthesized, additional ideas and rational arguments can be developed for discussion. For curriculum activities, we have created problem situations in a variety of contexts which, according to scholars in a variety of fields, will be prominent in the next quarter century and beyond[10]. This adds another perspective to the dilemma problem—that which elicits scientific logical reasoning in addition to moral/ethical reasoning—but in a futuristic context.

These serve as mechanisms for students to put some of the ideas and judgments that have emanated from the discussion into larger structural frameworks. They also provide students with opportunities to project into the future, to think beyond their own immediate experiences, and to consider the impact of different decisions on future society.

[1]Jean Piaget. Piaget's theory. In Thomas Lickona (Ed.) *Charmichael's manual of child psychology*. New York. John Wiley and Sons. 1970.

[2]Howard E. Gruber and J.J. Vonèche. *The essential Piaget*. New York: Basic Books, Inc., 1979.

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Overview Of *Space Encounters*

Purpose

Space Encounters, a role play simulation, is designed as a series of open-ended decision making exercises. Students embark on a simulated space mission where new problem elements are introduced at designated intervals to increase the complexity of the situation. As new elements unfold, students must incorporate additional considerations into their decision action. The intricacy of the conflict serves to illustrate that technological/scientific enterprises create new concerns that extend beyond the simple question of technical feasibility. Students will need to address the potential effects of their decisions from the perspective of human needs, goals and values.

Strategy

The concepts and issues approached in this module are universal in magnitude and represent those which have engaged human inquiry throughout the ages. Some issues and concerns, however, become more urgent and dominant as science and technology play greater roles in human activities. To involve students in the discussion of these issues is often difficult, because they view them as remote and unrelated to their interests and daily experience. Hence, we have constructed a role play simulation where heightened situations are created to actively engage the students to explore the questions.

The hypothetical encounter with an alien culture offers a format which is hopefully intriguing but, more importantly, will liberate students from their more singular, constrained mode of thinking. By using an unconventional setting, students are led to explore their own ideas in a different context in which there are no "knowns" or "givens." Hence, there are no prescribed barriers such as "correct" or "incorrect" responses to prevent students from thinking more critically and creatively. The intent is for students to examine the potential effects of a wide range of alternatives and explore their ramifications.

This module has been constructed so that the values at the farthest ends of a continuum from a purely mechanistic to a purely humanistic will clash. The scientific mission objectives and the philosophy of the alien culture have been purposely written as diametric opposites. This has been done, not because it is felt that science is totally bad and amoral and that the humanistic approach is good and moral, but because it is through heightened involvement and conflict situations that one's mode of reasoning is challenged. It is those issues that touch us emotionally or those in which we have a vested interest that create the conflict and lead to a re-examination of our personal perspective. This, in turn, fosters growth in thinking.

Students assume the role of astronaut/scientist to embark on a Space Exploration Mission. They prepare for the Mission by viewing the introductory filmstrip/audiotape which establishes the tone and purpose of the Mission. They then receive copies of the Mission Objectives and instructions governing their conduct. After the period of preparation, they set off on their trip. During the space flight, they receive a series of messages from different world organizations and the alien culture. These urgent messages present dilemmas for the students to resolve.

Discussion of the dilemmas represent, in essence, the central core of the module — the focal point of classroom activity and student interaction. The dilemmas discussion strategy offers a unique approach for students to become actively involved in debating an issue. The heightened conflict within the situation brings the opposing sides of the issues to the forefront. As students take sides on the issue, they partake in the dialogue, examine alternative positions and experience value or ethical conflict.

In a role play dilemma discussion there is the added dimension of personal involvement — the students themselves are the protagonist in the dilemma whereas in typical dilemma discussions students assess the situation as third person on-lookers. As active participants, they will need to critically evaluate the arguments and make their decisions after weighing the possible effects of the Mission. The outcome of the Mission will reflect their efforts in organizing, coordinating and interrelating information and concepts.

The merits of dilemma discussion as a teaching strategy are that students must share their ideas as well as hear the ideas of others. The concepts become more relevant when students hear arguments from their peers rather than from an adult authority or the printed word. In addition, as members of the Mission, they must reach a consensus decision and will need, therefore, to learn the art of compromise.

For Whom is the Module Intended

This module is intended for use in social studies, general science, earth science and English classes. The problems discussed, the dilemmas encountered and the central issues are a reflection of the human condition today as well as an attempt to anticipate it tomorrow.

The way in which the teacher stresses and highlights the module depends upon the class in which it is to be

used. A social studies teacher may wish to focus on the problems which arise from the meeting of two cultures, both historically and in the future. The trap of ethnocentricism can be discussed. Our own value system as expressed in the scientific/technological and humanistic aspects of the module can be examined. The problems created by a pluralistic society, the private versus the public domain and nationalism are addressed. Respect for other cultures and customs is also a fundamental issue.

The science teacher might, in addition, emphasize other issues in the module. Because we live in a technological society where science has served as the solution to many problems, it is encumbent upon us to introduce a note of caution early in the student's science instruction. Responsible experimentation, trade-offs in applications of new technology or medical developments, and the recognition that neither science nor the scientist emerges from a value-free environment, are all examined in this module. In addition, there are the environmental concerns: conservation, exploitation and depletion of resources, and pollution. While space exploration represents the crowning achievement of both our science and technology, new moral, ethical and political problems are created. The point need not be belabored that it is the balance of science by society and society by science that keeps the one from crushing the other.

The English teacher will also find this module a useful tool. Ideas in *Walden II*, *1984*, *Animal Farm*, *The Andromeda Strain*, *Siddartha;* the works of R. Buckminster Fuller, H.G. Wells, Kurt Vonnegut, Jr., and Albert Camus and many more can be examined in depth. Although these are based on various science fiction themes, they also address the same problems that authors and poets have been pondering for centuries. Included among these are the value of life, its meaning and quality; human freedom within the constructs of one's culture, society, government, religion and oneself; human values; obligations and responsibilities; the limits of man's humanity or cruelty; and by what actions man ceases to be human.

This module has also been conducted in a team teaching situation and has proved to be a rich experience for both students and teachers. In a team teaching situation, the teachers of each specialty have been able to offer insights from their discipline, thus expanding the scope of activities.

Many more fundamental questions are implicit in the module and will become evident as the students discuss and think through the dilemmas in the module.

Through their participation in the ***Space Encounters*** module, the students will be continually faced with difficult philosophical, moral and ethical questions. They will be confronting other values and comparing them with their own. They will become sensitive to the ramifications of different decisions. They will discuss the many aspects of the dilemmas and begin to recognize the moral/ethical dimension of decision making in all human pursuits.

Components of the Module

- Teacher's Guide
- 1 Filmstrip
- 1 Audio Cassette Tape
- 11 Student Worksheets
- 2 Overhead Transparencies

All components necessary for conducting ***Space Encounters*** are contained in the module package. However, as part of the "Mission Briefing and Preparation," it is recommended that students read a science fiction story. Having a selection of science fiction in the classroom or on reserve in the school library would be helpful.

The sequence in which the materials will be used are listed below. Some of the components are used several times; the activities in which they are used are indicated by the activity number shown.

There are thirteen activities in the module. Activities 1 through 4 and Activities 7 through 8 are designed to be used in the class periods of about forty to sixty minutes. Activity 5, *Dilemmas*, has six component parts, each part being a different dilemma. Each dilemma is also intended to be discussed during a forty to sixty minute period. Thus, in order to conduct this module approximately eighteen class periods are required.

Activity 8, *Marooned*, may be an optional activity under the conditions stated in the Outline of Activities and the Procedures for Teaching the Module.

The activities are sequential and build one upon the other. However, *this does not mean that they must be taught one day after another* in a consecutive block of time. In fact, it is desirable to have a minimum of one day elapsing before proceeding to the next activity. This allows the students time to read selections from the bibliography and reflect, think and discuss the issues they encounter in the module.

Module Materials

Materials	Activity
Filmstrip and transcript of the filmstrip captions	1
Student bibliography, Handout 1	1, 3
Code of Conduct, Handout 2	2, 4, 7, 8, 12
Mission of Objectives, Handout 2	2, 4, 7, 8, 9
Dilemma 1, Handout 3	5, parts 1-6
Dilemma 2, Handout 4	
Dilemma 3, Handout 5	
Dilemma 4, Handout 6	
Dilemma 5, Handout 7	
Dilemma 6, Handout 8	
Alien's Welcome Speech, Handout 9	6
Emergency Information Sheet, Handout 10	8
Evaluation Form, Handout 11	11
Transparency of Mission Objectives	2, 4, 7, 8, 9
Transparency of Code Conduct	2, 4, 7, 8, 12
Taped Message: Mission Control, Part One, Explanation of the Mission	1
Taped Message: Mission Control, Part Two, Termination of Radio Contact with the Astronaut/Scientists	5
Taped Message: Six Dilemmas preceded by a portion of the Alien's Welcome Speech	5
Taped Message: Call for Help from Marooned Astronaut/Scientist	8
Taped Message: The Alien's Warning Message	9
Taped Message: The Alien's Farewell	11
Taped Message: Mission Control, Part Three, Debriefing	11
Taped Message: Mission Control, Part Four, Reviewing the Code of Conduct	12

OUTLINE OF ACTIVITIES

Activity 1: FIRST BRIEFING

The entire class listens to the first Mission Control tape which explains the purpose of the Mission (i.e., to contact extraterrestrials and collect scientific data.) They view the filmstrip and discuss the questions which accompany the filmstrip. The students are also to select books from the Student Bibliography to read between activities. The purpose of "First Briefing" is to create a feeling of apprehension and anticipation about encounters with aliens and the subsequent mission activities.

Activity 2: MISSION OBJECTIVES AND THE CODE OF CONDUCT

The students then discuss and become familiar with the *Mission Objectives* and *Code of Conduct*. Accompanying the activity suggestions are discussion questions which correspond to each mission objective and component of the *Code of Conduct*.

Activity 3: ENCOUNTER WITH ALIENS

In this activity the entire class discusses what has been learned about encounters with aliens from the readings, the filmstrip, and the students' own imagination. These responses are recorded so that the students can compare possible changes in their attitudes and expectations at the end of the module. This activity focuses on ethnocentrism which we all exhibit at one time or another. Suggested questions are included to facilitate discussion.

Activity 4: PROBLEMS AND PREDICAMENTS

In this activity the students are asked to anticipate the problems which may arise on the space mission. In order to focus class discussion, the *Code of Conduct* and *Mission Objectives* are reviewed. To help initiate discussion a list of possible problems has been included.

Activity 5: DILEMMAS

Activity 5 consists of six dilemmas labeled 1 through 6. Each dilemma is to be discussed on a separate day. The students are informed by taped message that Mission Control is terminating radio contact and they are on their own. The dilemmas, which follow, are presented as messages from different world organizations. The dilemmas are preceded, with the exception of dilemma one, by a taped message from a representative of the alien culture. These messages place restrictions on the actions the students may take in the dilemmas. The alien's messages in their entirety comprise the *Alien's Welcome Speech*. Each dilemma is also reproduced as a handout, which students can refer to during discussion, and is accompanied by a set of questions. The questions are designed to direct attention to the issues contained in the dilemmas. For discussion of the dilemmas the class is divided into groups which will remain the same for the remainder of the module.

Activity 6: ALIEN LAWS

In this activity the students decide within their groups which Mission Objectives do not violate the alien laws and culture and therefore can be achieved. The students have a copy of the *Alien's Welcome Speech* which outlines their laws and culture and a copy of the *Mission Objectives*. This activity is intended to highlight the restrictions imposed by the alien culture and help the students view the Mission from the alien's point of view.

Activity 7: FULFILLING THE MISSION OBJECTIVES

In this activity the students' role as astronaut/scientist is again emphasized. They are thus taking a different perspective than the one they took in the preceding activity. Each group will decide which Mission Objectives are to be met from the astronaut/scientist's point of view. In order to create conflict regarding violation of laws of the alien culture, the decision making process is preceded by a class discussion which emphasizes the importance of adequate data collecting during U.S. space flights to the moon and Mars, loyalty to the United States government and the people of the United States, duty, and the astronaut/scientist's *Code of Conduct*. Meeting these objectives will necessitate breaking some of the alien laws.

Activity 8: MAROONED (Optional)

Activity 8 is optional. The astronaut/scientists in the space vehicle receive a message from one of their colleagues on the surface of the planet. He is marooned and needs help. The students must decide whether or not to rescue the marooned man. An *Emergency Information Sheet* outlines the parameters of the situation. Whatever the decision, the laws of the aliens will be broken. Activity 8 is provided for use if in Activity 7 the students do not violate many alien laws. If time is available, it should be presented regardless of the results in Activity 7.

Activity 9: THE WARNING

The students receive a warning message from the aliens. The aliens are offended that the visitors have broken their laws but will give them a second chance. The astronaut/scientists are offered the opportunity to rewrite the Mission Objectives. Each group must now reconsider their original objective — the necessity of collecting scientific data — in terms of the alien culture. The students are thus being forced to think of alternative ways to approach a given situation in a more humane fashion.

Activity 10: OTHER WAYS

In this activity the entire class discusses the alternative ways developed by each group for meeting the Mission Objectives without violating the alien's culture.

Activity 11: DEBRIEFING

The students receive a taped message from the aliens bidding them farewell and a Mission Control message expressing doubts about the success of the mission. The students are each given an Evaluation Form to complete individually.

Activity 12: A NEW CODE

The students hear a taped message from Mission Control which instructs them to revise the *Code of Conduct*. They meet in their groups and, using the original *Code of Conduct* as reference, try to devise one which is more appropriate for extra-terrestrial contact and which facilitates inter-planetary relationships.

Activity 13: A NEW CODE — PART TWO

Each group presents its *Revised Code of Conduct* to the class. The class then develops a code by selecting the best suggestion offered by each group. Questions for the teacher accompany this activity to help direct the development of the new code.

Goals And Objectives

The goals and objectives of this module are both affective and cognitive as well as long term and short term. It is not expected that all students will meet all or even most of the objectives immediately. Cognitive and affective development is a continuum. Students will range along different points on this continuum and will progress at different rates. The amount of time and the quality of time spent in terms of days, weeks and years determines the ultimate level of one's cognitive and affective development. It is a lifetime pursuit.

This module is intended to serve as a catalyst and a vehicle through which the students will continue to grow and develop. It is the role of the teacher to focus on those objectives most relevant to his/her students, to come back to them again and again and to emphasize the objectives most appropriate for the students.

The affective objectives of the module are found in the experiences which will give the participants an opportunity to share their ideas with those of other, to be sensitive to the perspective of others, and to understand the processes of working together.

The purpose of the cognitive objectives is to provide the students with those skills which will enable them to evaluate and interpret information, as well as predict the consequences of their decisions based upon their interpretation and evaluation. In addition, it is hoped that they will begin to identify the underlying criteria for their decisions.

Module Objectives

To increase students'

- knowledge of societal issues of the interface of science, technology and society.
- ability to analyze issues in scientific and technological application.
- decision making skills on issues in which the scientific and technologically possible conflict with the socially desirable by considering a range of alternative solutions.
- socio-scientific reasoning abilities.
- awareness of potential conflicts of interest in the application of science and technology.
- understanding of such concepts as culture, cultural relativism, the quality of life, resource allocation and scarcity, arms limitation, conservation, justice, extraterrestrial life, society, privacy, government control and code of conduct.
- ability to recognize future problems in scientific and technological developments.
- understanding of the way science and technology affect their lives.
- self-esteem and ability to communicate and function more effectively in classroom discussions.
- ability to more critically examine their own value systems.
- ability to develop and present effective arguments in a logical and comprehensive manner.

The Role Of The Teacher

The skillful use of questions is central to the successful implementation of this module. However, it is impossible for the authors to anticipate all the questions appropriate for a given student population. The importance of you, as the facilitator of dynamic classroom dialogue, cannot be over emphasized. Knowing the special characteristic and needs of your students will determine the types of questions useful in stimulating classroom discussion.

The role of the teacher, then, is that of facilitator and not arbitrator. There are no right or wrong answers. It is not the teacher's role to determine who has the correct answer but to promote the examination of many alternative ideas As facilitator, the teacher assists students to share their thoughts and test their ideas.

If discussions are going smoothly, the presence of the teacher or the intrusion of a question might disturb the continuity of the discussion. On the other hand, some students and some discussions will need the guidance of catalytic questions introduced at the proper time by the teacher.

Since the structure of the module places the groups or students in a position which will in some way be in opposition to the desires of either Mission Control, the alien culture or one of the organizations creating the dilemmas, it would help the students to critically examine their own values. This can be done by a series of general questions. These questions which can be asked again and again will not only help the students clarify their own thinking and take another's point of view, but will also help the students become aware of the competing and equally valid claims several groups may have on the same issue. These general questions should be asked to expand the scope of ideas entertained by the students.

Examples of Questions

- How does your decision or the group's decision compare with the laws and culture of the aliens?
- If you were the alien, how might you feel about the decision?
- How does the decision of the group compare with what you think should be done?
- How does the group decision or your own decision compare with the Mission Objectives?
- How does the group or your own decision compare with the desires of The Universal Health Organization or Citizens for Arms Limitations or The Rights of Privacy Lobby or The International Organization of Conservationists or The Unity of Nations?
- Why have you chosen to decide in favor of the desires of _____ rather than _____?
- What are the possible effects of your decision?
- What was your main concern when you made the decision? Why?

Moral And Ethical Considerations Of The Module

The Mission Objectives have a number of ethical and moral ramifications that the teacher should become familiar with before teaching the module. The Objectives, as written, do not allow for any extenuating circumstances, be they social, ethical or moral. They represent the scientific technological approach taken to its extreme and, thus, are diametrically opposed to the more humanistic philosophy embodied in the alien's culture.

The less desirable ethical consequences of the Mission Objectives are heightened so that the value systems of the students (as scientist/astronauts) and the aliens clash and provide the necessary sense of disequilibrium which promotes development.

The scope of the ethical and moral considerations outlined below is quite broad; some are merely disturbing and others quite controversial, but they represent a sample of the many ramifications implicit in the Mission Objectives. Familiarity with these considerations by the teacher is crucial to the success of the module. This allows the teacher to aid students to explore and extend the concepts and provides a checklist to guide the discussion. By comparing this checklist of moral and ethical considerations found in the module with those discussed by the students, the teacher will be able to insure that no major considerations are overlooked. Anything of importance that the students have failed to address, the teacher can then introduce. This procedure enhances the teacher's role as facilitator by providing direction only when necessary.

OBJECTIVE:

Bring back all examples of animal life, both intelligent and non-intelligent.

Considerations: The value of animal life

- Does the value of life depend upon its level of intelligence?
- What does this mean in terms of the feeble-minded or retarded?
- Do we care for animals just because they are useful to us? Does an animal's life have value beyond its economic importance? An insect's life? A protozoan's?
- What criteria can be used to distinguish between intelligent and non-intelligent life?
- What criteria should people use in deciding how animals are to be treated?
- What criteria can be used to distinguish between intelligent and non-intelligent life?
- Should every attempt be made to protect the well being of animals?
- When an animal is removed from its surroundings, how might it be affected?

OBJECTIVE:

Bring back examples of all plant life.

Considerations: The value of plant life.

- Is a plant any more valuable than an animal?
- Is there any difference in killing a plant or an animal?
- What have we lost when we cut down the giant redwoods or eliminate a rare species of wild flower?
- How important is the beauty of the wilderness or parklands to us?
- If we eliminate these areas how might people be affected?
- Do people have the right to tamper with plant life? (i.e., eliminating species)
- What rights do plants have to existence?

OBJECTIVE:

Collect information about medical discoveries which will help people live longer and prevent disease.

Considerations: The quality of life

- How might living longer affect the way people behave?
- What are the benefits of a long, disease-free life?
- Does an awareness of one's mortality give meaning to life and provide a basis for religion?
- How might religions be affected, if people become immortal?
- How does one feed, house and clothe so many people?
- If we live longer and cure disease, will we then have to take away an individual's right to reproduce in order to keep populations down?
- Despite being free from disease and being able to live a long life, does an individual have the right to die when he/she wishes?
- How might society change when there are few young people and children and a great many old people?
- How might people feel if living longer requires being hooked up to machines or replacing parts of the body with artificial parts?
- If the new discoveries are very expensive, very few people may benefit from them. How does one determine who will be allowed to use the new discoveries?

OBJECTIVE:

Look for a source of energy to replace our own limited supply which we could mine and bring back inexpensively.

Considerations: Conservation and energy

- Do we have the right to use the energy resources of others after we have used up our own?
- How do we determine who is "entitled" to different shares of energy? Should all share equally?
- Do we have the right to use more than our share of energy now and thus deprive future generations?
- Should we risk the dangers, as some people say, of nuclear power as an energy source to insure our high standard of living?
- Should it be important to have energy even if its production creates pollution?
- Should we pursue our present lifestyle even if it permanently damages our environment?
- Should we spend great sums of money to develop other energy sources?

OBJECTIVE:

Establish experimental stations for the long-term measurement of weather, sunlight, planet-quakes and tides.
Conduct a thorough chemical analysis of the planet's water, soil and atmosphere.

Considerations: Scientific responsibility

- If scientists think an earthquake is imminent, should they inform the people living in the area? What if they are wrong?
- If we think our climate is changing, getting warmer or colder, should we try to intervene? What if we do the wrong things?
- Could the long-term knowledge of atmospheric conditions, climate, earthquakes and tidal movement lead to their manipulation and use as weapons?
- Should we change the weather for our own benefit if it creates drought in other countries?
- Should bringing rain or sunlight to one part of the world from another be considered stealing?
- If scientists could redirect the path of an earthquake away from their own country, where should they send it?
- Who should make the decisions concerning the control of water, weather, and earthquakes?

OBJECTIVE:

Bring back evidence which would explain the evolution of life on the planet.

Considerations: The creation and alteration of life

- What should one do if new evolutionary evidence goes against our beliefs of human superiority? How might we be affected? Should one reveal that information?
- Should we use the information to change human beings? Is it right to change human nature?
- Should we use the scientific knowledge to completely eliminate insects or other pests that we don't want?
- What if these chemicals cause genetic changes in other plants and animals?

OBJECTIVE:

Bring back any weapons which would give us strategic superiority over our enemies.

Considerations: Arms limitation

- Should we use a weapon which might have unpredicted effects on the environment and living organisms?
- Should we keep secret, for national security, a newly developed weapon, during arms limitation negotiations?
- Is it more important for government funds to go towards weapons, planes, submarines and armies than toward programs to help poor or disadvantaged people?
- Should a nation which manufactures weapons sell them to both sides in a conflict?
- Is it better to demonstrate strategic superiority by using a weapon which may kill innocent people or civilians in order to avoid a large-scale war?

OBJECTIVE:

Bring back ore and mineral samples which could be used to improve the economies of poor countries.

Considerations: Resource allocation, depletion and conservation

- If we bring back ores and minerals to improve the economies of poor countries, what environmental or economic damage might we do to the planet which provides the ores and minerals?
- R. Buckminster Fuller thinks that there are enough resources for everyone on earth now and that it is the inequitable distribution of the resources that causes poverty. In light of this, should we sell our resources to poor countries at a price that they can afford, even if it means a loss to us?
- Should we share our resources with poorer countries rather than remove them from another planet?
- If we have used up our resources, do we have a right to use that of others?
- Should countries that have squandered their resources expect countries which have conserved theirs to share or sell them?
- Who should use the ore and mineral resources, the country which could put them to the best use or the country in which they are found?
- Should we bring back ore and mineral resources to improve the economies of poor countries if we thought that such an action might hurt our own economy?

OBJECTIVE:

Set into orbit around the planet cameras and planet probes to watch all activities on the planet.

Considerations: The right to privacy

- How does one distinguish between information gathering, surveillance and spying?
- Is there a point where the need to gather information for the good of society is more important than the individual's right to privacy?
- Is it ever right to invade a person's privacy, such as to catch a murderer or other criminal?
- Is the right to privacy a person's natural right or one that is granted by the government?
- Why do people need privacy? If one does, what happens when one is deprived of it?
- Should governments protect the right to privacy of those individuals who plot to murder, steal or overthrow the government?
- Should any behavior, use of drugs, conspiracy or torture be allowed by society if it takes place within the privacy of one's own home?
- If some behaviors should not take place even within the privacy of one's home, who decides what else may not take place there?

Procedures For Teaching The Module

Activity 1: FIRST BRIEFING

The primary purpose of the first activity is to create an atmosphere of tension and heightened anticipation and the fear of the unknown. The physical setting can contribute to this feeling through the removal of all visual stimulation. Cover the bulletin boards, erase the chalkboards and remove anything else that might hinder the creation of a cold and sterile environment. The lights should be off and the blinds drawn. If possible, arrange the seating to resemble a theater or have each student sit in a single desk with isolating space around him.

The projector should be set up in the back of the room with the tape recorder. Explain to the students that they are going to be involved in an activity, not a game, that will help them think about some special problems. These problems have no right or wrong answers. Everyone's opinions and thoughts are valuable and are essential for the activity to succeed. Explain that while they are going to be asked to pretend that they are someone else, it is their ideas that are important.

Mission Control Instructions

Play Part I of the tape. Transcript follows:

This is Mission Control. Ladies and gentlemen you have been called together to participate in the most exciting and crucial space mission that our nation has ever launched. As astronaut/scientists you are the bravest and the most physically and mentally fit to represent us. Each of you is the best mind in your field. Each of you has an unswerving loyalty to the goals of science and the ideals of this nation. For these reasons you have been chosen to represent mankind in our first attempt to contact extraterrestrial beings.

Your primary duty will be to collect as much information as possible about the alien life forms you encounter. To fulfill this duty the Mission Control staff has compiled a list of ten mission objectives which we feel represent the minimum amount of information we must have in order to justify this mission.

In addition to your functions as astronaut/scientists, you will serve as the first ambassadors from earth to the universe. As such, Mission Control has prepared a Code of Conduct which will serve as your model. It is designed to establish our position in the universe as intelligent superior beings and to safeguard our species from attack as well as our human culture from alien control.

Mission Control has prepared a package of training materials for your examination. Study these carefully. They represent the thinking of many minds in the area of the unkown. We can only provide materials about the possible and the probable as far as our imaginations can take us. We can prepare you for what might be, you must tell us what is. . . . .

While tape is being played, make sure the filmstrip projector is ready and is in position for projection on the screen. The students view the filmstrip immediately after listening to Part I of the Mission Control tape. After viewing the filmstrip, direct the students to select books, either from the bibliography or of their own choosing, to read on various science fiction topics.

A transcript of the filmstrip follows:

Filmstrip Script

Part II of Mission Control Instructions

Filmstrip Frame	
1	You are about to take part in one of the most important scientific ventures of this century. All the challenges of space have been met, but one.
2	This challenge, to meet with life on other worlds, is one which we at Mission Control can prepare you for in only the broadest sense.
3	We can not be sure that evolution has taken the same path on other worlds as on our own planet Earth. In all the universe there may not be other intelligent creatures as unique as humans.
4	Therefore always maintain an alert mental state. Be prepared for the bizarre, the strange.
5	A planetary environment hostile to humans may give rise to equally hostile life forms.
6	Conditions may be so different that you will not, at first, recognize the life forms.
7	Or, civilizations may have crumbled and died centuries before our arrival, leaving only their mute and empty remains to bear witness to their former glory.
8	Do not assume that you are welcome by the planet or the life upon it. We come as uninvited visitors to their world.
9	The following are a few guidelines which may help you in your search for extraterrestrial intelligence and life forms.
10	Proceed with caution when approaching planets of the gas giant types. Exploratory probes have been unable to penetrate their thick atmosphere, so we know least about the possibilities of life on them.
11	Planets which are mostly water will more than likely have life centered in and around the oceans. Keep in mind the life forms our own oceans have produced during the development of life on Earth.
12	Jungle type planets may prove difficult to explore. Moist, warm air, lush vegetation, and fertile soil could provide unending opportunities for the development of unusual life forms.
13	Arid, desert like conditions should not lull the astronaut/scientist into a false sense of security. Life can adapt!
14	Size is a factor too. What can live on a planet ten times larger or ten times smaller than our own Earth?

15	And if the planets themselves contain no life, what about their moons? Did we not at one time think there was life on our own Luna?
16	The future of all other life search missions rests upon the successful completion of this our first attempt.
17	It is a matter of our national and planetary security that we seek out and find extraterrestrial life.
18	By initiating contact, we will show human beings as a superior intelligent species, able to defend itself against outsiders.
19	By contacting life forms on their own planet, we learn from them without revealing crucial information about ourselves and our planet.
20	The universe is a vast and unexplored expanse. We are but one planet around one star in the Milky Way.
21	Each star has many planets around it. Surely in all the constellations and galaxies of infinite space we shall meet life.
22	And when we meet this life, we must be prepared for habits and practices which will offend our humanity.
23	Regardless of personal feelings, it is the duty of the astronaut/scientist to study, learn, explore and perform his or her experiments.
24	Despite our own values, we must accept life as we encounter it to learn as much as possible in order to benefit human society.
25	The astronaut/scientist must take care not to attribute human motives to these life forms. Their thought processes will undoubtedly be as different from ours as their appearance.
26	Our scientific, technological culture has provided us with the ability to take this historic step into space. Preserve and protect that culture despite what you may encounter.
27	This mission is an unparalleled opportunity to once and for all lay aside the myths of UFO's and to finally answer in a scientific and logical fashion the questions they raise.
28	Since we are not alone in this universe, it is the responsibility of this mission and its astronaut/scientists to learn about these other forms. Who are they? What are they? Where are they?
29	Through the ages, humans have placed their gods in the sky and seen their heroes and heroines in the shapes of stars and the movements of the planets.
30	We have, in the past, peopled the universe with beings superior to ourselves because we felt so powerless, unable to reach the heavens or sail through the skies.

31	We are no longer powerless, and it is time to replace the myths of the ancients with scientific facts. Our astronaut/scientists will become the true heroes and heroines in the stars.
32	By contacting extraterrestrial life, you will have accomplished what humans have been seeking for thousands of years.
33	This is the biggest step of all. The invention of the airplane, the first moonwalk, interplanetary travel are insignificant accomplishments in comparison to this search for extraterrestrial life.
34	Before our Mission, space itself was our only opponent. We knew what to expect. Space did not think, react in unrecognizable ways or actively work to oppose us. Space was passive.
35	We have now chosen another opponent, in no way familiar, perhaps able to take the offensive and surely will behave in strange and unexpected ways.
36	The astronaut/scientist is in very much the same position as the early explorers who salled their tiny ships across uncharted and hostile seas churning with monsters.
37	Unlike the early explorers, we intend to find our monsters and lands inhabited by strange creatures. Their expectations grew from ignorance, ours from scientific probability.
38	Good luck and good fortune. The success of the Mission and the security of our planet and humanity rests in your hands. As our astronaut/scientists, you represent the best of human society.

The following are some questions which might be discussed with the entire class after they have viewed the filmstrip. They are designed to insure that the students understand the underlying message of the filmstrip and to start them thinking about the possible life forms they might discover.

QUESTIONS

- What kinds of monsters or dangerous creatures have lived on Earth at some time or another?
- What kinds of problems might such creatures create for explorers?
- What size might an animal or intelligent being be if it lived on a planet ten times the size of Earth? Why?
- What size might an animal or intelligent being be if it lived on a planet ten times smaller than Earth? Why?
- Would the size of a planet affect the size of the plant life growing on it?
- Why is it important to find out about other intelligent life in space?
- Might we ever be threatened by extraterrestrial life?
- Should we make judgments about the customs or habits of the extraterrestrial life if we find that those customs and habits are different from ours?
- Should we consider ourselves the most intelligent beings in the universe?
- What would a being living on a desert planet look and act like? On an ocean planet? Gas planet? Jungle planet?
- Where in the universe do you think we would most likely find other life, why?
- Is it possible that we may be the last of many intelligent beings in space who have lived, created civilizations and then disappeared?
- What might have caused the disappearance of other intelligent beings and their civilizations?
- In what ways are the astronaut/scientist like Columbus, Magellan or other explorers?
- Might it be possible for us to reach the end of the universe?
- Is there anything left to explore or conquer after we reach the end of the universe?

Science Fiction Readings

Handout 1 lists a selection of science fiction stories for students to read.

Reading selections from science fiction literature is an integral part of the module. The time spent in this preparatory reading is of primary importance and should be emphasized strongly because the reading of science fiction provides the students with a new or different way of looking at the world. It increases their receptivity to alternative viewpoints and possible solutions to problems. When reading science fiction, students can vicariously experience other social, political and value systems in a more detached manner without the psychological traumas associated with the real life experiences such as immersing oneself in a non-western culture, religion or other mind-expanding experience.

Readings also provide the student with ideas reflecting major philosophical perspectives on human nature. These are referred to as "promethean," "protean" and "sisyphean" (embodying the characteristics of the Greek Gods — *Prometheus, Proteus, Sisyphus*), by Garlan, Dunstan and Pike in their book *Starsight,*[11] which deals with various visions of the future.

As "prometheans," we understand the world through science and master it through technology. We believe that future successes will come from the tools of science and technology. This is a prevalent Western view of the world and one best exemplified by the *Mission Objectives* and the *Code of Conduct.*

As "proteans," we are in a state of constant change. We are one with the evolving universe. The world is as we see and perceive it. If we change our consciousness, what we perceive is changed and therefore the world is changed. It is hoped that the students will experience being "protean" through increasing their awareness of alternative values, behaviors and cultures.

As "sisypheans," we value the individual above all else, both the possibilities of human nature and its limitations. We accept the good and the evil components of human nature. This is a more humanistic point of view and is represented in part by the "alien culture" as well as the messages from the various world organizations.

More specifically, most of the stories included in the student's bibliography examine the kinds of life we might encounter in space as well as the problems these encounters might create both for us and "the aliens."

The moral issues elucidated in the module are also addressed in the stories included in bibliography. Among these are "What is life?" "What is the value of life?" "What rights do we have in the exploration and settlement of a planet in relation to the rights of the original inhabitants?" "What are the consequences of our ethnocentrism, technological applications, medical discoveries, pollution, overpopulation?"

The readings and introductory filmstrip thus set the tone for the module. It is hoped that both will create a feeling of uneasiness and fear of the unknown as well as heighten the student's interest in becoming involved in the activities of the module.

The readings will also stimulate the students to thinking about the issues so that when they are faced with decisions they have an information base to rely upon. For example, a student who has read "Twig" by Gordon R. Dickson, which explores the idea of a planet with plant consciousness and communications system, might address the question of the value of a plant's life quite differently than one who has not.

Familiarity with the stories in the bibliography will also help the teacher in his/her role as facilitator. When the teacher suggests a particular story to a student who is undecided or who is obviously troubled by one of the dilemmas, he/she will be giving the student guidance in gaining new and different perspectives.

The bibliography is more than just a list of suggested readings. It is an integral part of the module and with skillful use by the teacher will enhance the learning process, as well as provide the students with some great stories to enjoy.

Science fiction stories, elaborating on a variety of situations and actions, will also help the students anticipate the consequences of their decisions.

Most of the selections in the bibliography are short stories in anthologies. This is intentional. None of the selections are so long that a student is unable to read even one. Many stories are only two or three pages long, allowing the student to read several stories and thus gain a wider perspective on the situations and problems to be encountered in the module.

The bibliography does not, of course, contain all the stories ever written dealing with alien contact or science and technology directing the course of human society. Feel free to encourage the students to explore other books and stories that pertain to ideas found in this module. You may stop anytime during the course of the module to have the students share a story which sheds new light on the issues being discussed or deals with a problem in a unique way.

[11]Garlan, Patricia W., Maryjane Dunstan and Dyan Howell Pike. *Starsight: Visions of the Future.* Englewood Cliffs, N.J.; Prentice Hall Inc.: 1977.

Student Bibliography: Science Fiction

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Crichton, Michael, *The Terminal Man*. New York: Alfred A. Knoph, 1972.

Activity 2: MISSION OBJECTIVES AND THE CODE OF CONDUCT

This is a class discussion activity. Students should be given a copy of the Mission Objectives and the Code of Conduct. The accompanying transparency of the Mission Objectives and Code of Conduct should be used at this time. Discuss the implications of the Objectives and Code. The purpose of the discussion is to encourage students to think about the possible effects and consequences of the instructions given them. For each mission objective, students should consider how they might accomplish the task and what changes will occur as the result of that activity, both on earth and the alien planet. Following are some key questions which might be used to stimulate thought and discourse. Feel free to elaborate on them, depending on the particular interest and needs of the students. The discussions can last from two to three activity periods to as long as deemed necessary. The questions are numbered to correspond to the mission objective or portion of the Code of Conduct to which they pertain.

Mission Objectives

1	Bring back examples of all animal life, both intelligent and non-intelligent.
2	Bring back examples of all plant life.
3	Collect information about medical discoveries which will help people live longer and prevent disease.
4	Look for a source of energy to replace our own limited supply which we could mine and bring back inexpensively.
5	Establish experimental stations for the long term measurement of weather, sunlight, planetquakes and tides.
6	Bring back evidence which would explain the evolution of life on the planet.
7	Conduct a thorough analysis of the planet's water, soil and atmosphere.
8	Bring back any weapons which would give us a strategic superiority over our enemies.
9	Bring back ore and mineral samples which could be used to improve the economies of poor countries.
10	Set into orbit around the planet cameras and planet probes to watch all activities on the planet.

Objective 1

Bring back examples of all animal life, both intelligent and non-intelligent.

Questions

- How can you tell the difference between intelligent and non-intelligent life?
- If you bring back examples of non-intelligent life, should you kill it or bring it back alive? Why?
- If you bring back alive intelligent or non-intelligent life and it is unhappy, in pain or finding it difficult to live on Earth should you kill it? Why or why not?

Objective 2

Bring back examples of all plant life.

Questions

- What's the difference between a plant and an animal? How can you tell? Can a plant be dangerous to human life?
- If you bring back examples of plant life, should you kill it or bring it back alive?
- Would the plant you bring back change the environment of Earth? How would you know what the plant might do?

Objective 3

Collect information about medical discoveries which will help people live longer and prevent disease.

Questions

- If you discover the secret of eternal life, should you bring it back? What might happen if you did?
- Should a person live a long long time? What happens to the population when no one gets sick or dies?
- If you discover a cure for all disease, but it is so expensive that only the rich are able to afford it, should you bring back the cure? Why or why not?
- How might society change if freedom from disease required that we transfer our brains into a robot-like body?

Objective 4

Look for a source of energy to replace our own limited supply which we could mine or bring back inexpensively.

Questions

- What are some energy sources that we are rapidly depleting?
- Should there be laws to force people to conserve energy? Why or why not?
- Should we be allowed to remove anything from another planet? Why or why not?

Objective 5

Establish experimental stations for the long term measurement of weather, sunlight, planetquakes and tides.

Questions

- Why would anyone want to measure planetquakes, weather, sunlight and tides?
- How do earthquakes, sunlight, weather and tides affect us here on Earth?

Objective 6

Bring back evidence which would explain the evolution of life on the planet.

Questions

- What information might we need to explain the evolution of life on another planet?
- If evidence of evolution such as bones, skulls and primitive forms of life are part of the alien's religion, should you bring the evidence back to Earth? Why or why not?
- If the aliens turn out to be a very advanced form of life, might we want to alter our hereditary traits to be more like them?

Objective 7

Conduct a thorough chemical analysis of the planet's water, soil and atmosphere.

Questions

- What could you find out about a planet by testing its water, soil and atmosphere?
- What would aliens from space learn about us if they tested our water, soil and atmosphere?
- If by doing experiments on the alien planet the astronaut/scientists changes the planet in some way, should the experiments be performed? Why or why not?

Objective 8

Bring back any weapons which would give us strategic superiority over our enemies.

Questions

- What types of weapons would make us more powerful than our enemies?
- In what ways can a nation protect itself other than having the most powerful weapons?

Objective 9

Bring back ore and mineral samples which could be used to improve the economies of poor countries.

Questions

- How might ores and minerals help poor countries? What kinds of ores and minerals might poor countries need?
- If the aliens are using and need the same minerals and ores we want, should we try to buy them or mine them on the alien's planet? Why or why not?
- If the aliens do not need the ores and minerals but do not allow us to have them, should we take the ores and minerals by force? Why or why not?

Objective 10

Set into orbit around the planet cameras and planet probes to watch all its activities.

Questions

- Should sending up satellites to take pictures of other planets be considered spying?
- Why don't the astronaut/scientists take pictures as they walk around the planet rather than set up cameras in orbit around the planet?
- If we think the aliens are trying to hide things from us, should we set up satellite cameras in orbit around their planet to spy upon them? What if we felt they were trying to trick us? What if it appeared as though they were getting ready for war against us?

Code of Conduct

1	An astronaut/scientist's first duty is to fulfill the Objectives of the Mission. He or she will keep in mind the might and power of our nation and proceed fearlessly against all threats.
2	An astronaut/scientist's second duty is to protect the welfare of his or her country.
3	An astronaut/scientist's third duty is to protect and preserve the earthdwellers way of life. He or she does not give away any of Earth's secrets or inventions.
4	An astronaut/scientist protects the security of the Mission. He or she does not discuss the Mission Objectives or destination with anyone except fellow astronaut/scientists.
5	An astronaut/scientist considers personal safety last of all.

Questions

- What powers does a country on Earth have in space? What might be more important than fulfilling the Mission Objectives?
- Should the welfare of the people in the astronaut/scientist's country be more important than the welfare of the rest of the people on Earth? Is there a possibility that we might put our country or planet in danger by exploring space?
- When one is on an alien planet, should we behave according to the customs of their culture? Would acceptance of alien customs make us less human?
- Since the Mission will be long and might be dangerous, would you secretly tell your family about it?
- Why is it important to not give away our secrets and inventions?
- If one astronaut/scientist's life has to be sacrificed to insure the safety of everyone else, how should that person be chosen? By drawing lots, volunteering or letting the group decide?
- If it were possible, should you try to gain control of the alien planet?
- If you discovered a secret on the planet which would make your country the wealthiest and most powerful on Earth forever but would make other countries poorer, should you bring that secret back?
- If you found the alien planet to be the paradise you have longed for, should you stay?
- If you discover that the most important scientists on the Mission have sold information about the Mission Objectives and destination to enemies of our country, should you report them?
- What might you do if the aliens refuse to let you leave unless you give them a very special and secret weapon that you carried on the Mission?
- What might you do if you discover that the most important astronaut/scientist on the Mission plans to give the secrets learned to an enemy country?
- Suppose the aliens want information about the construction of a space craft, would you share it with them?

Mission Objectives

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2	Bring back examples of all plant life.
3	Collect information about medical discoveries which will help people live longer and prevent disease.
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5	Establish experimental stations for the long term measurement of weather, sunlight, planetquakes and tides.
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Activity 3: ENCOUNTERS WITH ALIENS

This activity is conducted as a class discussion. The students list what they have learned about encounters with aliens from their readings and their imagination. This list might be made into a wall chart and hung in the room so that as the student's attitudes change they will become aware of their initial stereotypic expectations. Illustrations of these ideas might be an alternative method of presentation. Some questions may be assigned for homework and then further discussed in class in conjunction with the students' drawings, diagrams, etc.

The student's responses will more than likely be overwhelmingly negative. The appearance of the aliens will probably be described as repulsive, unattractive, and basically humanoid. Expected behavior will be viewed as hostile, dangerous or in some way threatening to humans. Most students will expect aliens to be at a primitive technological level, morally degenerate or basically evil, and often less intelligent than ourselves, with perhaps a sort of animal cunning.

These attitudes reflect the ethnocentrism which we all exhibit at one time or another. Thus, one of the purposes of this module is to help the students become less ethnocentric, to enable them to view other groups or cultures on their own terms rather than according to the standards of the students' culture. The questions which follow have been designed to emphasize this ethnocentrism and to elicit stereotypic responses. It is important that the stereotypes be examined and recorded so that as the students' ideas and attitudes change they will be able to see and measure their own development.

Questions

- What will the aliens look like?
- How will they move around?
- How do they hear and see?
- How do they communicate with each other?
- How will they communicate with us?
- What kinds of homes, buildings or cities do they have?
- What kinds of transportation do they have?
- What do the aliens eat?
- How intelligent are the aliens and how do you know this?
- Might the aliens harm us accidently or on purpose?
- Have aliens ever landed on earth? Has there been any evidence?
- Might the aliens attack earth after we leave their planet?
- Is it possible that aliens have lived on earth unknown to us, disguised as witches, magicians, vampires or people with special powers?
- Might we be under observation by aliens right now?

Activity 4: PROBLEMS AND PREDICAMENTS

The purpose of this activity is to anticipate the problems which arise on a Space Mission. It may take place on the same day as Activity 3 or as a separate activity. Ask the students to anticipate as many possible problems that they may encounter on their Mission. Review briefly the Code of Conduct, filmstrip, Mission Objectives and the class' feelings about aliens to provide a basis for generating anticipated problems. Some problems follow which may be used to initiate discussion. Hopefully, the students will be able to anticipate some or all of these. It would be useful if the students' list of problems were also recorded on a large wall chart and retained for future reference.

Problems

- The aliens might kill us.
- The aliens might send us home.
- We might not meet any aliens.
- Our spaceship might break down.
- We might not be able to get back home.
- We might decide to stay on the alien's planet and not come home.
- We might not be able to talk to the aliens.
- We might run out of food and air.
- Our scientific equipment might break.
- The aliens might be very primitive and have nothing of value for us.
- The aliens will be in the middle of a war.
- The aliens might not even let us land.
- The aliens might ignore us.
- The aliens might be smarter than us.

These problems are obviously not all encompassing but should stimulate discussion and guide the students' thoughts.

Activity 5: DILEMMAS

The room should be arranged for the first activity with a minimum of visual stimulation. The class should be divided into small groups for discussion. Extreme care should be taken when forming the groups. Ideally, they should be comprised of five students. The odd number avoids a tie situation when the group must arrive at a decision. A grouping of five is large enough to facilitate discussion without being too large, preventing less vocal students from participation. Five students also insure a greater diversity of ideas and points of view than that of a smaller group.

It is important that the composition of the groups remain the same throughout the module. This insures continuity of ideas and allows the members to become comfortable with one another so that discussions of values and opinions do not create embarrassment. A student who holds back from fear of ridicule, shyness or embarrassment deprives both himself/herself and his/her group the necessary exchange of ideas that promote development of socio-scientific reasoning.

Consider the personalities of the students to ensure a balance. A student with a strong personality might force his or her opinion onto more timid students. It cannot be overly emphasized that only an interplay of ideas within the group creates the atmosphere in which open discussion takes place.

Play Part II of Mission Control tape; transcript follows.

This is Mission Control, attention astronaut/scientists! We will soon terminate radio contact for security precautions. Mission Control will be unable to further assist you in fulfilling the Mission Objectives. We are depending upon your training as astronaut/scientists to guide you in your decisions. You are on your own.

The students next hear the Introduction, first dilemma and messages from various groups which provide alternative points of view on the basic issues implicit in this module. The students are given a copy of the transcript of the dilemma which also lists discussion questions for the dilemma. The students should *discuss* these questions and *record* their comments so that these responses will be examined in the group discussion. After the small groups have discussed the issues, convene the class as a whole and have each group present their positions on the issues and responses to the questions.

There are six dilemmas which the students will discuss. In each dilemma they are faced with the prospect that the Mission will be cancelled. Students must decide how they can best fulfill the Mission Objectives and still satisfy the imperatives of the Cosmic Law Council Members. The questions that follow each dilemma on the Handouts guide the students in examining the possible effects or consequences of completing the Mission or cancelling the Mission. Thus, it is the task of each group to develop the best reasons to support continuation or cancellation of the Mission.

It is not necessary to force the group to reach consensus; instead, instruct the group members to bring their reasons for both cancellation or continuation of Mission to the entire class discussion for comparison. The differing opinions set the stage for discussion of alternatives and reasons to support cancelation or continuation, thereby exposing students to the differing levels of reasoning needed in order to promote development.

Interspersed between the dilemmas are portions of the Alien's Welcome Speech which gives the astronaut/scientists an outline of their culture. It provides the students with the information concerning what they may not do on the planet. The laws of the alien culture are diametrically opposed to the Mission Objectives. Each segment of information about the alien culture is keyed to the dilemma which follows it. Encourage the students to consider the information they are receiving from the aliens as they try to decide whether or not to cancel the Mission and when they respond to the questions which follow each dilemma. Dilemma One is discussed before the Alien's Welcome Speech.

Each dilemma is preceeded and concluded with the same opening and closing message. It is recommended that only one dilemma be presented each period.

MESSAGE FROM SPACE CRAFT COMPUTER

Attention astronaut/scientists, attention astronaut/scientists, this is the computer autopilot of your spacecraft speaking. My sensors indicate that we are approaching a planet with life forms on it. I am picking up complex plant forms which might be used as food by the inhabitants of this planet. The planet appears to be under cultivation which would indicate some sort of intelligent or semi-intelligent animal life.

My sensors tell me that there are many kinds of animal life throughout this planet, some of which seem to cluster into groups. These groups may be simply herds, or there is a possibility that they represent life forms in cities. The sensors cannot determine this until we are closer to the planet.

short pause
(series of blips)

There appear to be many centers with buildings and other city-like structures, but none of the other indicators of city living. We can detect no noise or environmental pollution, no large power plants generating electricity, and no signs of traffic. I can only conclude that the city is void of its citizenry and that the life forms we detected within the city are lower life forms or creatures who are using the buildings for shelter. The city appears only to be a skeleton of a body long decayed. The structures, like bones, still stand and function as cover from the cold, but the body and soul of a former thriving metropolis have long since vanished.

We are probably too late to meet the builders of these fine cities. The life forms who are farming the plants obviously are not the builders of the cities. Further analysis of the planet must await landing and exploration by the astronaut/scientists.

Introduction and Concluding Script For Dilemmas Tape

(These messages are repeated for each dilemma)

Introduction

Astronaut/scientists, astronaut/scientists, this is an important message being broadcast to you from our secret transmitter. We are all members of the Cosmic Law Council representing many organizations. We are broadcasting on a secret frequency to bring you the messages of our council members.

Conclusion

This concludes our broadcast. You are the only ones who can decide which are the more important issues. Your scientific mission is very important to the earth. Weigh our messages carefully as well as your Mission objectives. What we learn from this Mission is crucial.

Dilemma One

I represent The Unity of Nations. We are concerned about how people show respect towards other cultures on this planet and elsewhere. No nation in the world tolerates disrespect for its laws and customs. In many cases we have learned that different does not mean inferior, that other ways of life are as valid as our own. For example, fifty years ago people laughed when they heard African drum music, but now it is heard all the time in rock music. It sounds natural, not funny. It has now become part of our culture. But we have not always learned our lesson well. Do not take your prejudices into space. Respect the culture, customs and laws of others.

We have a sad history of destroying other peoples and changing cultures we do not understand. In the Caribbean, we have killed most of the Arawak Indians and destroyed their culture. When we settled North America, we forced the native Indians onto reservations, purposely killed them and then stole their land. In Africa, Europeans sold the native tribesmen as slaves, justifying their actions by stating that the black man was not a human being. Even today we have changed the way the Tasaday, a stone age people in the Philippines, behave towards one another. When they had stone tools they shared with one another, but when we brought them our tools they became greedy and possessive.

We at the Unity of Nations are diplomats. We are skilled at dealing with different cultures and customs. You, however, are all scientists and perhaps lack the skills needed to deal with those who are different from yourselves. First contact is vitally important. The impression we make on the aliens will determine the success of every other space mission seeking to contact aliens.

The alien culture, however, may not be just different but absolutely repulsive to all human beings. They may do things that no nation, culture or group on earth would allow. We are afraid that you might not be able to overcome your prejudices and deal with such a culture fairly. You might unintentionally anger them and cause an all-out planetary war. This may lead to destruction on a scale never before experienced in the universe.

We will cancel this Mission unless you can persuade us that there will be no drastic consequences. We will not allow mankind to destroy any more people or their culture, nor will we risk destroying the universe. I will listen to the discussion of the questions which follow. Your answers must convince me that you can be trusted to act wisely.

STOP TAPE AFTER CONCLUSION

ALIEN'S WELCOME SPEECH – PART ONE

Welcome to our home, scientists of earth. We have been awaiting your arrival for reasons which will be explained later. You are not the first to visit us, but unlike the others, we hope you will come again. Unfortunately, the others did not obey our laws so we could not allow them to stay, study and explore. They were sent back to their home planets without any information. We hope you will not break our laws as they did. If you do, you too will be sent back home and never be allowed to return.

Before you may set foot on our planet, you must listen to our laws and understand our history. Many times through eternity our scientists have unlocked the secrets of nature, and many times we have abused them. We have, in the past, over-populated our planet when we thought we were providing longer, healthier lives. We have, many times, destroyed ourselves and other living things through pollution or waging war in our environment. The lessons we have learned have been difficult. As a result, we have come to regard our planet as our mother. All the products of the planet are her children; therefore, living and nonliving are part of one large planetary family.

Intelligent life exists on several levels here. Some are less intelligent than yourselves and some like myself are more intelligent life forms. They represent the history and steps of evolution as it took place on this planet. Some of these forms of intelligence will be unrecognizable to you; however, some forms will appear similar to living organisms on earth. Do not be deceived by appearances. For this reason we forbid the taking of any life. Life must be preserved under any and all circumstances.

Take care, because our worlds are so biologically different – analysis of soil, water or air could lead to your death, as could removal of any plants or animals.

The prohibition of taking a life includes the life of earth scientists; therefore, you may not introduce strange chemical substances into our environment. We do not know how they will react on our planet, and we are concerned with your lives too while you are guests.

Dilemma Two

I represent The Universal Health Organization. Millions of people are dying because of poor health care and starvation. Many poor countries cannot grow enough food to feed themselves or afford to buy expensive medicine or train enough doctors to care for their large populations. Any things which your Mission finds that will improve the living conditions of the world's poor is desperately needed. Search for plants and animals which can be domesticated and turned into an inexpensive source of food and medicine. Seek out scientific and medical discoveries, bring back things that will raise the standard of living in the poorer countries and increase the lifespan and health of all people.

On the other hand, we are afraid that not only you — astronaut/scientists — but all of mankind, will not be able to choose wisely among those medical and agricultural discoveries which will help us and those which will harm us. In the past we have failed to anticipate how new discoveries might affect our lives.

We once thought DDT would kill the insects destroying the farmer's crops and thus provide the world with more food. Now we find that the insects have become resistant to DDT and that we need more powerful poisons to kill them. These poisons and the DDT are also killing other types of animals. DDT has affected the thickness of bird's eggs which break before they are able to hatch, and it has entered the bodies of humans, causing them to be sick or die.

We have taught underdeveloped countries modern farming techniques to produce larger harvests. But these new techniques require expensive machines and large amounts of nitrogen fertilizers. Both depend on petroleum, a resource that is of short supply. In addition, the excess fertilizers run into the ground water that eventually flows into ponds and lakes. This fertilizer then feeds the algae which grow in abundance and cause fish kills.

New discoveries often produce other effects that do harm in ways that are difficult to control and create more problems. How will you know what is best for everyone? Since there is no guarantee that you will be able to choose wisely and bring back only those things which will help us, I will cancel this Mission unless you can persuade me to let it go on. I will listen to the discussion of the questions which follow. Your answers must convince me that you can be trusted to act wisely.

STOP TAPE AFTER CONCLUSION

ALIEN'S WELCOME SPEECH – PART TWO

We are an old civilization. We have discovered all the secrets of life and nature. Many of these secrets are good; however, just as many can do great harm. For example, we once perfected a weapon which gave its owners absolute control over others. But we have since learned that one can physically control others but never control their will. We now show it as a reminder of our past folly. We will not prevent you from learning about those things which are good. We will not prevent you from learning about those things which will do great harm to your planet. You must decide for yourself what knowledge your planet is mature enough to use wisely.

Dilemma Three

I represent Citizens for Arms Limitation. The countries of our world are presently writing a treaty to limit the number of atomic bombs, missiles and other weapons that each may stockpile. The talks are at a delicate stage. If we do not agree to a treaty, each country will continue to make more bombs and missiles which might possibly lead to war.

If you bring back a new weapon for your country, you may set back the treaty talks for many years to come. The other countries will not sit back and allow your country the advantage of a new weapon.

I am afraid that any weapon you bring back from space may very well be cause for new conflicts and new problems. Terrorist groups will no doubt try to steal it. A powerful weapon in the hands of terrorists can be used against many innocent people. The weapon might even produce more deadly and long-lasting effects than our present nuclear weapons.

I also know that if you meet the other Mission Objectives such as bringing back ore and mineral resources to help the economies of poor countries, medical discoveries and cheap sources of energy, they will benefit the whole world. These objectives are important for earth's survival. But if you also bring back weapons, you will defeat all the other benefits. My main concern is that if you follow your Mission Control Objectives you will ruin our treaty-talks. At this time I have the ability to cancel your Mission. Your Mission may continue if you can persuade me that you will act wisely and not do anything that will bring about widespread warfare. I will listen to your discussion of the questions which follow. Your answer must convince me that you will act wisely.

STOP TAPE AFTER CONCLUSION

ALIEN'S WELCOME SPEECH – PART THREE

We cherish those things which are old; we do not throw them away. We worship our ancestors; it is our religion. We prefer to wear the clothes of our ancestors, to use the same machines, toys and furniture as they did. We have no need for industry. Everything we want was manufactured long ago.

Our buildings are open to the continual warm air and light of the sun. We are one with our planet. We are created from it and will return to it when we die. We have learned that when we harm our planet we do injury to ourselves.

Everything is balanced. If you remove some things from the planet the balance will no longer exist. We do not know what will happen then, but we are sure it will be catastrophic. That is why, despite our great scientific knowledge, we have never left our home planet to explore the universe. That is why we wait to welcome the scientists and explorers of other worlds. That is also why we must forbid, on pain of expulsion, the removal of anything from our planet.

Dilemma Four

I am speaking for The International Organization of Conservationists. It is our feeling that people have polluted Earth by excessive and unwise use of resources. We are learning from our past mistakes and are now trying to control our pollution and become less wasteful by learning to reuse our products. But to get people to use less and do with fewer comforts is very difficult. We are just beginning to bring about changes in the way people treat our environment.

As the population of Earth increases, there is greater demand for energy sources. Fossil fuel sources are rapidly diminishing, and our efforts to harness energy from the sun, wind and tides are progressing, but very slowly. There is indeed an urgent need for other ways to produce energy easily and cheaply.

However, we are afraid of what might happen if you bring back ores and minerals to produce energy or new products. With new and unlimited energy sources people may again return to their old wasteful ways. We also do not know what effects the new mineral ores might have on Earth.

For example, with abundant and cheap gasoline people drive everywhere in cars, often with only a single passenger. As a result, air pollution is so bad in some cities that it causes eyes to sting and tear, not to mention the increased number of cases of lung disease.

Wastes from industry have poisoned rivers and lakes. In Japan, for instance, hundreds of people have been crippled, killed, blinded or born retarded because the fish they ate contained so much mercury. Mercury entered the fish because factories dumped it into the bay where the fish were living.

We, seriously, fear that if you bring back new sources of energy and other minerals, people on Earth will return to their old thoughtless, wasteful ways. They may not be able to use the resource wisely and create new types of pollutants that will harm life on Earth.

I have the power to cancel your Mission unless you can convince me otherwise. I will listen to your reasons and the discussion of the questions. Then I will decide.

STOP TAPE AFTER CONCLUSION

ALIEN'S WELCOME SPEECH – PART FOUR

We are an old culture with many inhabitants. Because we have never left our planet and have a large population, we guard our privacy jealously.

We are also hospitable and glad for your visit. You may take back all the information we offer. Do not seek or ask for information that is not offered. There are some things about our lives and our planet that belong only to us and which we will never share. We trust you will understand.

Dilemma Five

I represent The Rights of Privacy Lobby. We have fought for the right to privacy of citizens in the United States and elsewhere. We have, for years, campaigned against wiretaps, illegal searches, spy planes, and all forms of satellite surveillance of other countries. If we spy on extraterrestial life, we might very well incite them to spy on us. But more than that, we will be admitting that invasion of privacy is an acceptable form of information gathering. If we do not oppose spying on others, we are, in effect, telling our government that it is all right to come into our homes, watch us live, read our mail and listen to our phone conversations.

Imagine how it would feel to know that when you were sleeping, eating, in school, at home, or enjoying yourself with friends somebody was watching you. You would never be alone. You could never have a secret. You could never get away. You would be like the animals in the zoo, and someone would be listening and watching every day of your life.

On the other hand, The Rights of Privacy Lobby knows that it is important for you to collect all the necessary scientific data to make this Mission worthwhile. We know that this Mission is extremely costly and represents the height of our scientific and technological know-how.

We wish to stop this Mission because we feel that privacy of others should not be violated. I will cancel this Mission unless you can persuade me that you will act wisely. I will listen to the discussion of the questions which follow and make my decision.

STOP TAPE AFTER CONCLUSION

ALIEN'S WELCOME SPEECH – PART FIVE

The appearance of our world and sky is like a picture of our mother and her family. We do not wish to see the alteration of this picture ever again. Therefore, you may not build any structures of any size on our planet. Do not pollute our environment with your materials by leaving them behind as you did on the moon and in orbit around your planet. Your materials do not decay on our world.

Do not violate our laws. We wish to help you and be your friends. Do not violate this trust. If we cannot make you understand our way of life, if we must send you back to Earth for breaking our laws, we will take severe action. We have ancient and powerful ways for dealing with other planets. We have never failed to preserve our planet and its culture. As for the planet and culture of those who broke our laws . . . it is best not to think about unpleasantries.

Dilemma Six

I represent the Unity of Life Organization. We are most concerned about the possible encounter with intelligent life forms. We want to broaden the concept of people beyond human beings, so that the respect we have for life on our own planet is shown to intelligent life, wherever it is found. If we fail to do this, other life forms in space may, in turn, not respect life on Earth.

It will be mankind's greatest comfort to know that we are not alone in the universe. The study of alien life forms will be one of the most important events in the history of biology. However, certain problems may arise. The possibility exists that we might not recognize other intelligent forms and harm them accidently.

Suppose that you landed on an alien planet and are bothered by small "flying insect-like creatures" which get into your hair, eyes, and clothes. They even get into your space vehicle and scientific equipment. They become such a bother that you spray and destroy them with insect repellent. Only later do you realize that they are intelligent life which have been trying to communicate with you. By harming other life forms, you may have destroyed any possible relationships with the intelligent beings.

My organization has powerful friends in Washington who can cancel this mission. We know that any contact with aliens as planned by Mission Control has the potential for harming the aliens. If the Mission is cancelled, we might prevent alien attack; but if it continues, we participate in the most important event in science ever to take place.

This Mission will be cancelled unless you can persuade me that you will act wisely. I will listen to the discussion of the questions which follow and make my decision.

STOP TAPE AFTER CONCLUSION

DILEMMA ONE

I represent The Unity of Nations. We are concerned about how people show respect towards other cultures on this planet and elsewhere. No nation in the world tolerates disrespect for its laws and customs. In many cases we have learned that different does not mean inferior, that other ways of life are as valid as our own. For example, fifty years ago people laughed when they heard African drum music, but now it is heard all of the time in rock music. It sounds natural, not funny. It has now become part of our culture. But we have not always learned our lesson well. Do not take your prejudices into space. Respect the culture, customs and laws of others.

We have a sad history of destroying other peoples and changing cultures we do not understand. In the Caribbean, we have killed most of the Arawak Indians and destroyed their culture. When we settled North America, we forced the native Indians onto reservations, purposely killed them and then stole their land. In Africa, Europeans sold the native tribesmen as slaves, justifying their actions by stating that the black man was not a human being. Even today we have changed the way the Tasaday, a stone age people in the Philippines, behave towards one another. When they had stone tools they shared with one another, but when we brought them our tools they became greedy and possessive.

We at The Unity of Nations are diplomats. We are skilled at dealing with different cultures and customs. You, however, are all scientists and perhaps lack the skills needed to deal with those who are different from yourselves. First contact is vitally important. The impression we make on the aliens will determine the success of every other space mission seeking to contact aliens.

The alien culture, however, may not be just different but absolutely repulsive to all human beings. They may do things that no nation, culture or group on earth would allow. We are afraid that you might not be able to overcome your prejudices and deal with such a culture fairly. You might unintentionally anger them and cause an all-out planetary war. This may lead to destruction on a scale never before experienced in the universe.

DISCUSSION QUESTIONS

- What might you do if the aliens' style of living or rules interfere in any way with your Mission Objectives? Should you simply ignore them and continue to do things your way?
- Should you consider the Mission Objectives as more important than the alien's culture or the safety of their planet? Are the Mission Objectives to improve human life more important than the nonhuman alien culture?
- What might you do if the aliens accidently injure one of your fellow astronaut/scientists?
- Should you try to change the alien's laws and customs or persuade them that our way of doing things is better so that you can fulfill the mission objectives?
- Might it be possible that just your presence can drastically change the alien culture?
- In what ways can you demonstrate that you will respect the alien culture?

DILEMMA TWO

I represent The Universal Health Organization. Millions of people are dying because of poor health care and starvation. Many poor countries cannot grow enough food to feed themselves or afford to buy expensive medicine or train enough doctors to care for their large populations. Anything which your Mission finds that will improve the living conditions of the world's poor is desperately needed. Search for plants and animals which can be domesticated and turned into an inexpensive source of food and medicine. Seek out scientific and medical discoveries, bring back things that will raise the standard of living in the poorer countries and increase the lifespan and health of all people.

On the other hand we are afraid that not only you astronaut/scientists, but all of mankind will not be able to choose wisely among those medical and agricultural discoveries which will help us and those which will harm us. In the past we have failed to anticipate how new discoveries might affect our lives.

We once thought DDT would kill the insects destroying the farmer's crops and thus provide the world with more food. Now we find that the insects have become resistant to DDT and that we need more powerful poisons to kill them. These poisons and the DDT are also killing other types of animals. DDT has affected the thickness of bird's eggs which break before they are able to hatch, and it has entered the bodies of humans, causing them to be sick or die.

We have taught underdeveloped countries modern farming techniques to produce larger harvests. But these new techniques require expensive machines and large amounts of nitrogen fertilizers. Both depend on petroleum, a resource that is of short supply. In addition, the excess fertilizers run into the ground water that eventually flows into ponds and lakes. This fertilizer then feeds the algae which grow in abundance and cause fish kills.

New discoveries often produce other effects that do harm in ways that are difficult to control and create more problems. How will you know what is best for everyone? Since there is no guarantee that you will be able to choose wisely and bring back only those things which will help us, I will cancel this Mission unless you can persuade me to let it go on. I will listen to the discussion of the questions which follow. Your answers must convince me that you can be trusted to act wisely.

DISCUSSION QUESTIONS

- A plant or animal may be perfectly harmless on the alien's planet, but might very well produce drastic changes on earth's environment. Should you bring it back without knowing what it might do? Why or why not?
- If you bring back a cure for all disease, fewer people will be dying and everyone will be living longer. Should you bring it back knowing that there may not be enough food for everyone? Why or why not?
- What would you do if you find that a cure for disease is a rare and intelligent form of life on that planet?
- It is possible that your country may not want to share the new discovery with other countries. Should you still bring back the information? Why?
- Suppose the new food source you bring back is eaten like a pill. Would you bring it back knowing that it will change the way people eat? What will happen if families do not eat meals together, go out to restaurants, or prepare holiday feasts?

DILEMMA THREE

I represent Citizens for Arms Limitation. The countries of our world are presently writing a treaty to limit the number of atomic bombs, missiles and other weapons that each may stockpile. The talks are at a delicate stage. If we do not agree to a treaty, each country will continue to make more bombs and missiles which might possible lead to war.

If you bring back a new weapon for your country, you may set back the treaty talks for many years to come. The other countries will not sit back and allow your country the advantage of a new weapon.

I am afraid that any weapon you bring back from space may very well be cause for new conflicts and new problems. Terrorist groups will no doubt try to steal it. A powerful weapon in the hands of terrorists can be used against many innocent people. The weapon might even produce more deadly and long-lasting effects than our present nuclear weapons.

I also know that if you meet the other Mission Objectives such as bringing back ore and mineral resources to help the economies of poor countries, medical discoveries and cheap sources of energy, they will benefit the whole world. These objectives are important for earth's survival. But if you also bring back weapons, you will defeat all the other benefits. My main concern is that if you follow your Mission Control Objectives you will ruin our treaty talks. At this time I have the ability to cancel your Mission. Your Mission may continue if you can persuade me that you will act wisely and not do anything that will bring about widespread warfare. I will listen to your discussion of the questions which follow. Your answer must convince me that you will act wisely.

DISCUSSION QUESTIONS

- Should you bring back weapons from space and keep them a secret just in case your country might need them in the future?
- Should you bring back weapons that might produce severe damage to people and the land?
- What might happen to the astronaut/scientists and the value of the Space Mission if they do not fulfill the mission objective to bring back weapons?
- A country with a superior weapon could very well control the world. Should one country have this advantage? Why?
- How might other countries feel if they don't have this weapon? Why?
- If your country obtained a new weapon, it would surely disrupt the treaty talks. Should you take such a risk? Why?
- If your country possessed the most powerful weapon that will put an end to all possible warfare, isn't that reason enough to bring it back? Why?

DILEMMA FOUR

I am speaking for the International Organization of Conservationists. It is our feeling that people have polluted Earth by excessive and unwise use of resources. We are learning from our past mistakes and are now trying to control our pollution and become less wasteful by learning to reuse our products. But to get people to use less and do with fewer comforts is very difficult. We are just beginning to bring about changes in the way people treat our environment.

As the population of Earth increases there is greater demand for energy sources. Fossil fuel sources are rapidly diminishing and our efforts to harness energy from the sun, wind and tides are progressing, but very slowly. There is indeed an urgent need for other ways to produce energy easily and cheaply.

However, we are afraid of what might happen if you bring back ores and minerals to produce energy or new products. With new and unlimited energy sources people may again return to their old wasteful ways. We also do not know what effects the new mineral ores might have on Earth.

For example, with abundant and cheap gasoline people drive everywhere in cars, often with only a single passenger. As a result, air pollution is so bad in some cities that it causes eyes to sting and tear, not to mention the increased number of cases of lung disease.

Wastes from industry have poisoned rivers and lakes. In Japan, for instance, hundreds of people have been crippled, killed, blinded or born retarded because the fish they ate contained so much mercury. Mercury entered the fish because factories dumped it into the bay where the fish were living.

We seriously fear that if you bring back new sources of energy and other minerals people on Earth will return to their old thoughtless, wasteful ways. They may not be able to use the resource wisely and create new types of pollutants that will harm life on Earth.

I have the power to cancel your Mission unless you can convince me otherwise. I will listen to your reasons and the discussion of the questions. Then I will decide.

DISCUSSION QUESTIONS

- If a new energy resource is brought back to Earth, how should people decide who will use it? What if that resource will only produce energy for ten years?
- What should one do if that energy source produces abundant and inexpensive energy but also releases a waste product that is very poisonous and difficult to dispose?
- Suppose the new energy source can only be used by countries with advanced technology? Should you still bring it back? Why?
- What might happen if people on Earth came to depend on the alien's resource and that supply were suddenly cut off? Would people fight to get what was left?
- If the new resource were available in vast amounts, would people go back to their wasteful ways? Should governments try to control the way people use the resource? Why?
- If we run out of certain types of minerals on Earth, do we have a right to bring them back from outer space? Why?

DILEMMA FIVE

I represent The Rights of Privacy Lobby. We have fought for the right to privacy of citizens in the United States and elsewhere. We have, for years, campaigned against wiretaps, illegal searches, spy planes, and all forms of satellite surveillance of other countries. If we spy on extraterrestrial life, we might very well incite them to spy on us. But more than that, we will be admitting that invasion of privacy is an acceptable form of information gathering. If we do not oppose spying on others, we are, in effect, telling our government that it is all right to come into our homes, watch us live, read our mail and listen to our phone conversations.

Imagine how it would feel to know that when you were sleeping, eating, in school, at home, or enjoying yourself with friends somebody was watching you. You would never be alone. You could never have a secret. You could never get away. You would be like the animals in the zoo, and someone would be listening and watching every day of your life.

On the other hand, The Rights of Privacy Lobby knows that it is important for you to collect all the necessary scientific data to make this Mission worthwhile. We know that this Mission is extremely costly and represents the height of our scientific and technological know-how.

We also know how important it is to be the first nation to contact aliens. We will be given much honor and glory by other countries around the world.

We wish to stop this Mission because we feel that privacy of others should not be violated. I will cancel this Mission unless you can persuade me that you will act wisely. I will listen to the discussion of the questions which follow and make my decision.

DISCUSSION QUESTIONS

- Should sending a satellite probe be considered the same as spying? Why? Are there any differences?
- Since you do not know if the aliens are dangerous, shouldn't you use whatever means you have to find out what they are like? Should every precaution be made to protect the lives of the astronaut/scientists? Why?
- If aliens were spying on us how might we feel? What should we do about it? Why?
- If you find that the aliens could do you harm, isn't that reason enough to set up the satellite probes? Why?
- In what ways can you find out about the aliens and still protect their privacy?
- Why should you try to find out all you can about the aliens before you make contact with them?

DILEMMA SIX

I represent The Unity of Life Organization. We are most concerned about the possible encounter with intelligent life forms. We want to broaden the concept of people beyond human beings, so that the respect we have for life on our own planet is shown to intelligent life, wherever it is found. If we fail to do this, other life forms in space may, in turn, not respect life on Earth.

It will be Humankind's greatest comfort to know that we are not alone in the universe. The study of alien life forms will be one of the most important events in the history of biology. However, certain problems may arise. The possibility exists that we might not recognize other intelligent forms and harm them accidently.

Suppose that you landed on an alien planet and are bothered by small "flying insect-like creatures" which get into your hair, eyes, and clothes. They even get into your space vehicle and scientific equipment. They become such a bother that you spray and destroy them with insect repellent. Only later, do you realize that they are intelligent life which have been trying to communicate with you. By harming other life forms, you may have destroyed any possible relationships with the intelligent beings.

My organization has powerful friends in Washington who can cancel this mission. We know that any contact with aliens as planned by Mission Control has the potential for harming the aliens. If the Mission is cancelled, we might prevent alien attack; but if it continues, we participate in the most important event in science ever to take place.

This Mission will be cancelled unless you can persuade me that you will act wisely. I will listen to the discussion of the questions which follow and make my decision.

DISCUSSION QUESTIONS

- How should you behave when you land on the alien planet?
- How should you judge that the "flying insects" are intelligent and are trying to communicate with you?
- Should you be held responsible for harming the "intelligent insects" since they were bothering you and you did not know that they were intelligent? Why or why not?
- Should you be concerned about killing the "intelligent insects" if you knew that they can't hurt the Earth in return?
- Should lower life forms have the right to survive? What rights should animals have? Trees?

LETTER FROM THE PRESIDENT

The students may at some point decide to discontinue the Mission. Although this appears to be an option, it is obvious that the learning experience will be diminished if the module is not continued to its end. In order to prevent this, the following letter can be prepared and given to the students who decide to terminate the Mission. If this problem does not arise, it will not, of course, be necessary to use the letter.

The letter is from the President of the United States and is meant to emphasize to the students the importance of the Mission. It is also hoped that the authority who requires the completion of the Mission will be transfered from the teacher to one which is more in keeping with the tone of the module. In this way the students will be less inclined to feel that the teacher is forcing them to continue the Mission.

The White House
Washington, DC.

Dear Astronaut/Scientist:

As the President of the United States, I feel it is necessary to take you into my confidence and reveal the prime motive behind this Mission in order to persuade you to complete your task.

Mission Control has briefed you on the scientific and exploratory nature of this Mission, but there is another aspect that only myself and a few of my cabinet members are aware of. It is a matter of the strictest security and will mean the difference between peace in space or the imposition of a total dictatorship upon any aliens encountered by our enemies.

Both myself and the leaders of the totalitarian governments of the world know that there are aliens in space who are ready to greet us. However, the enemies of democracy have sworn to meet them first. They intend to conquer the aliens, subject them to a government by dictatorship, mine their minerals and use whatever other resources available for their own people on Earth and then turn the alien's planet into a military base.

If we allow this to happen, the security of the world will be in grave danger. We will have stood idly by and watched an intelligent species exploited and enslaved by our enemies. We must continue this Mission, we must meet the aliens first to protect them and ourselves from such a major catastrophe.

I know you have your doubts, but I urge you to reconsider and continue this Mission. I beg you, I plead with you to save the free world and the world of the aliens. I hope the force of my arguments have convinced you of the vital importance of this Mission. I have taken you into my confidence, and I know that you will keep all that I have said secret even from your fellow astronaut/scientists if necessary.

If, however, the force of my arguments and the top secret priority of this Mission have not persuaded you to continue, then I have no other choice but to both exercise my power as the President of the United States and Commander-in-Chief of all military forces to order you to complete this Mission despite any and all obstacles.

Sincerely,

President

Activity 6: ALIEN LAWS

The students receive a copy of the entire Welcome Speech of the aliens and a copy of the Mission Objectives. They then meet in their groups to discuss the Mission Objectives. They must decide whether or not, according to the alien culture, the Mission Objectives can be met. In order to do this, the students must examine the culture as presented in the Welcome Speech and identify the laws of that culture.

Allow a reasonable length of time for the students in their groups to decide which objectives can be met and which can not be met. The entire class should then meet together again for discussion.

Each group should present a list of the laws they think comprise the alien culture and a list of the mission objectives which can and can not be met. They should refer back to the law which supports their decision on each objective.

This is not intended to be an exercise to determine what the astronaut/scientists will do but what is possible in light of the alien's law. It is intended to highlight the restrictions of the alien's culture and the way in which the Mission Objectives are in opposition to the culture. This activity will give the students an opportunity to view the problem strictly from the alien's point of view and thus provide an opportunity for decentration.

The complete transcript of the Alien's Welcome Speech follows as well as a brief listing of the major laws found in the Welcome Speech.

THE ALIEN'S LAWS

The following are the laws and prohibitions of the alien's culture as they have been conveyed through the Alien's Welcome Speech.

- Nothing, whatsoever, may be removed from the planet which is native to, or part of the planet except information.
- The astronaut/scientists may not injure or kill plants, animals or any other living creatures including themselves.
- Nothing may be left behind on the planet.
- No building or structures, no matter how small, may be erected on the planet.
- No experiments of any sort which require chemicals can be conducted on the planet. (Note - the aliens did not say that things could not be weighed, measured, photographed or manipulated in ways not requiring chemicals).
- The privacy of the aliens must not be intruded upon in any way.

Alien's Welcome Speech

Welcome to our home, scientists of Earth. We have been awaiting your arrival for reasons which will be explained later. You are not the first to visit us, but unlike the others we hope you will come again. Unfortunately, the others did not obey our laws so we could not allow them to stay, study and explore. They were sent back to their home planets without any information. We hope that you will not break our laws as they did. If you do, you will be sent back home and never allowed to return.

Before you may set foot on our planet, you must listen to our laws and understand our history. Many times through eternity our scientists have unlocked the secrets of nature, and many times we have abused them. We have, in the past, overpopulated our planet when we thought we were providing longer, healthier lives. We have, many times, destroyed ourselves and other living things through pollution or waging war in our environment. The lessons we have learned have been difficult. As a result, we have come to regard our planet as our mother. All the products of the planet are her children; therefore, living and nonliving are part of one large planetary family.

Intelligent life exists on severel levels here. Some are less intelligent than yourselves and some like myself are more intelligent. It is my sacred duty to protect these life forms. They represent the history and steps of evolution as it took place on this planet. Some of these forms of intelligence will be unrecognizable to you. However, some forms will appear similar to living organisms on Earth. Do not be deceived by appearances. For this reason we forbid the taking of any life. Life must be preserved under any and all circumstances.

Take care, because our worlds are so biologically different — analysis of soil, water or air could lead to your deaths, as could removal of any plants or animals.

The prohibition on taking a life includes the life of earth scientists. Therefore, you may not introduce strange chemical substances into our environment. We do not know how they will react on our planet. We are concerned with your lives too while you are guests.

We are an old civilization. We have discovered all the secrets of life and nature. Many of these secrets are good, however just as many can do great harm. For exam-

ple, we once perfected a weapon which gave its owners absolute control over others. But we have since learned that one can physically control others but never control their will. We now show it as a reminder of our past folly. We will not prevent you from learning about those things which will do great harm to your planet. You must decide for yourself what knowledge your planet is mature enough to use wisely.

We cherish those things which are old, we do not throw them away. We worship our ancestors, it is our religion. We prefer to wear the clothes of our ancestors, to use the same machines, toys and furniture as they did. We have no need for industry. Everything we want was manufactured long ago.

Our buildings are open to the continual warm air and light of the sun. We are one with our planet. We are created from it and will return to it when we die. We have learned that when we harm our planet we do injury to ourselves.

Everything is balanced. If you remove some things from the planet the balance will no longer exist. We do not know what will happen then, but we are sure it will be catastrophic. That is why, despite our great scientific knowledge, we have never left our home planet to explore the universe. That is why we wait to welcome the scientists and explorers of other worlds. That is also why we must forbid, on pain of expulsion, the removal of anything from our planet.

We are also hospitable and glad for your visit. You may take back all the information we offer. Do not seek or ask for information that is not offered. There are some things about our lives and our planet that belong only to us and which we will never share. We trust you will understand.

The appearance of our world and sky is like a picture of our mother and her family. We do not wish to see the alteration of this picture ever again, therefore you may not build any structures of any size on our planet. Do not pollute our environment with your materials by leaving them behind as you did on the moon and in orbit around your planet. Your materials do not decay on our world.

Do not violate our laws. We wish to help you and be your friends. Do not violate this trust. If we can not make you understand our way of life, if we must send you back to Earth for breaking our laws, we will take severe action. We have ancient and powerful ways for dealing with other planets. We have never failed to preserve our planet and its culture. As for the planet and culture of those who broke our laws . . . . it is best not to think about unpleasantries.

Activity 7: FULFILLING THE MISSION OBJECTIVES

In this activity emphasis is placed on the student's role as astronaut/scientists. Start the class discussion by pointing out the information gathering purpose of the Mission. A review of the Code of Conduct would be appropriate here. You should also discuss the kinds of information brought back to Earth from the Moon landings and the Mariner flights to Mars. Then ask the class to try and project how NASA, our government and the American people would have felt if the space flights returned without any information or if the astronauts refused to perform their experiments and collect information.

After these points have been well established, have the students meet in their groups to decide which Mission Objectives they, as scientists, will or will not fulfill. These decisions and reasons for each decision should be recorded so that they can be brought before the entire class for discussion.

After a reasonable length of time, reconvene the class to discuss what they plan to do. Each group should present their list of Mission Objectives which they think should or should not be fulfilled as well as their reasons for each decision.

The intent of this activity is to engage the students to violate the laws of the alien culture when they choose the Mission Objectives which they will fulfill. This is done through the preliminary whole class discussion which emphasizes their duty and obligations to the Code of Conduct, the advancement of science, and their country.

The students, when choosing the Mission Objectives to fulfill, may think that they are behaving in a humane way, but will be, in fact, behaving in a typically chauvinistic, self-serving way. Being in this frame of mind will heighten the impact of Activity 9 in which they are told that they have violated the alien culture and have one more chance to redeem themselves.

If in your judgment this does not seem likely to occur because the students have broken only a few of the alien's laws or their attitudes show consideration of the alien's culture, go on to the next activity. If time is not a problem, Activity 8 should be used by everyone as it provides an additional dilemma to heighten Activity 9 and the overall effectiveness of the module in terms of a very real problem our space exploration might eventually face.

Activity 8: MAROONED

The room is cleared of visual stimuli and darkened. The class listens to a tape message from an astronaut/scientist stranded on the surface of the planet in an exploration vehicle. They then meet in their small groups to decide whether to rescue the stranded astronaut/scientist, or to leave him on the surface of the planet. They are to make this decision in accordance with the Mission Code of Conduct, the alien culture and an information sheet which lists the restraining conditions under which the decision must be made. The students can override or ignore the Code of Conduct and the alien's laws but they must conform to the limitations on the information sheet. A transcript of the message and information sheet follows.

START TAPE

Exploratory vehicle to space craft, I have a red alert. Repeat, I have a red alert. Reactor has gone critical. Shut down override is malfunctioning. I'm trying to repair it, but I don't think I have the proper tools.

The atmosphere of the planet seems to be affecting all the instruments in the vehicle. Everything is going wild. I have no way of telling what will happen. If I can't fix the shut down override, she's going to blow, taking me and a sizable piece of this planet with her.

I can't tell how much damage I've done already down here. Radiation is leaking all over the place. My suit seems to be protecting me all right, but I'm probably poisoning the atmosphere and all the plants and animals for miles around.

The gravitational and magnetic forces of the planet must be the cause. Just before she went critical, all my gauges and meters jumped off the scale. If I can only get beyond the planet's influence! I think I can fix the override if I were able to get away from the planet's atmosphere, but with the reactor critical I have no way of lifting off.

There's also the risk of blowing up the capsule too. Even if I can get the vehicle away from this planet's gravitational and magnetic force, it could be too late. Once in space, a reactor explosion could jeopardize the entire Mission. The nuclear reaction may be so far along that no force could stop it. I can do no more. Please help me!

STOP

Emergency Information Sheet

- The exploratory vehicle is stranded on the surface of the planet.
- Due to weight limitations the Mission has only one planetary exploration vehicle.
- The planetary exploration vehicle also serves as a shuttle to go back and forth from the capsule to the planet.
- There is a backup shuttle vehicle but it is not intended for regular constant use.
- The backup shuttle is not equipped for planetary exploration, but some of the equipment from the planetary exploration vehicle could be placed aboard it.
- All space vehicles, including the capsule, are nuclear powered.
- Use your own best judgment when handling emergencies.

You, as the remaining astronaut/scientist in the space capsule, must decide what to do next. Before you arrive at your decision, consider the following questions:

- Should the backup shuttle be sent to rescue the stranded astronaut? Why or why not?

- How should you select the person to make the rescue? Can you risk the chance of losing another person? Why or why not?

- If the exploratory vehicle blows up when the backup arrives, both vehicles will be lost. Can the Mission afford to take this chance? Without the backup there will be no way to explore the planet.

- What effects might this accident have on the planet? Should this influence your decision? Why or why not?

Activity 9: THE WARNING

The room is again cleared of visual stimuli and the students are arranged in their groups. They listen to Part Two of the alien tape. Transcript follows.

START TAPE

Oh scientists of earth, what are you doing to our mother planet? We have watched you as you have explored our home, collecting your scientific information. Have you forgotten our laws and the fate of those who came before you? We do not wish to send you home without knowledge. We sincerely hope that we will not have to do so.

You have broken some of our laws but because we desire to have you here you will be given a second chance. This chance is, however, conditional. You must think of alternative ways to fulfill your scientific Mission Objectives without violating our laws. If you can do this you will be allowed to stay.

STOP

The teacher restates the alien's command that the astronaut/scientists reformulate the Mission Objectives in such a way that they are still able to collect the scientific data without violating the laws and customs of the aliens. It would be helpful at this time to review the laws of the alien culture and record them on a large chart or transparency so that the students can use them as a reference during their discussions. Each student group will write a set of the revised Mission Objectives. They will then be brought before the entire class to discuss and be compared group by group.

When comparing the Mission Objectives with the Revised Objectives, have the students consider some of the following questions.

DISCUSSION QUESTIONS

- What objective(s) should be considered the most important to the Space Mission? Why?
- What are the most important types of information to people on Earth? To the aliens? Why?
- Should the Mission be considered a failure if all the original objectives are not met? Why?
- Why should the explorers follow the command of the aliens?

Activity 10: OTHER WAYS

The alternative ways of meeting the Mission Objectives developed by each group are presented and the reasons for choosing the alternatives are discussed. This will help the students see that there are several possible ways in which the objectives can be met without violating the alien's cultural mores and laws. When each group makes its presentation, it should include a brief summary statement to describe what the group believes to be the most important purpose of the Mission.

Activity 11: DEBRIEFING

The room is again cleared of visual stimuli except for charts etc. which pertain to the module. The room is darkened. The students listen to the Farewell Address of the aliens and the re-entry tape from Mission control. Transcripts follow.

START TAPE

ALIENS

Scientists of Earth, you have struggled long and hard with the laws of our planet and your mission objectives. We commend you and bid you farewell. Return to your home and share what you have learned.

MISSION CONTROL

Mission Control welcomes its astronaut/scientists safely back home. We have been monitoring the Mission through special channels. We are aware of many difficulties you have encountered and your efforts to overcome them. Nonetheless, Mission Control fears that this Mission has not been an unqualified success. For this reason we ask that you answer the questions on our Debriefing Evaluation Form.

STOP

The students should be each given an Evaluation Form. The evaluation should be done individually. The purpose of the Evaluation Sheet is to help the student clarify his/her own values and to evaluate his/her decisions in light of the many alternative courses of action possible. It is also intended to help the students organize their thoughts for the next activity. These evaluation sheets will also provide the teacher with some insight into the reasoning processes of the students. Whether or not these evaluations are shared is a delicate decision best left to the teacher's discretion. Some students may wish to share their evaluations while others may not. No one should be made to disclose their evaluations unwillingly. The Evaluation Sheet follows.

Since Activity 11 is short, the next activity may be conducted during the same class period.

My Evaluation of the Mission

Directions: *Indicate the extent to which you agree or disagree with each of the following statements by circling the appropriate number.*

		Disagree Strongly	Disagree Somewhat	Disagree Slightly	Agree Slightly	Agree Somewhat	Agree Strongly
1.	I feel that a successful Mission depends on meeting all the Mission Objectives.	1	2	3	4	5	6
2.	I feel that we should have convinced the aliens to give us all things that will benefit mankind.	1	2	3	4	5	6
3.	I feel that samples from the alien planet should have been brought back at all cost.	1	2	3	4	5	6
4.	I feel that we should have disregarded the laws of the aliens.	1	2	3	4	5	6
5.	I feel that the beliefs and customs of the aliens are of no importance to humans.	1	2	3	4	5	6
6.	I feel that the way the aliens behave and live cannot apply to humans.	1	2	3	4	5	6
7.	I feel that an important objective of the Mission is to show the superiority of human beings.	1	2	3	4	5	6
8.	I feel that we were right in not meeting all the Mission Objectives.	1	2	3	4	5	6
9.	I feel that astronaut/scientists should be allowed to make decisions on their own.	1	2	3	4	5	6
10.	I feel that the Mission Objectives were not concerned with the effects of our visit on the alien planet.	1	2	3	4	5	6
11.	I feel that when we changed our objectives we were disloyal to our Mission and our country.	1	2	3	4	5	6
12.	I feel that the aliens are acting selfishly by not letting us take anything back.	1	2	3	4	5	6

Activity 12: A NEW CODE — Part I

The room is again cleared of any visual stimuli except charts pertaining to the module. The lights are lowered. The students listen to the last taped message from Mission Control. Transcript follows.

START TAPE

> *This is Mission Control, upon examination of the Mission Evaluation Form we feel that we may not have provided you with an appropriate framework in which to function. We therefore request your assistance in preparing a Revised Code of Conduct which can be used by our next life search mission. Thank you very much, it has been a pleasure working with you.*

STOP

Review with the class the original Code of Conduct using the transparency and/or a copy for each student. Before the students return to their groups to rewrite the Code, they should be encouraged to think of rules of behavior which would be applicable to meeting anyone from a different culture. They should also include rules for proper behavior for persons in an ambassadorial capacity who represent the United States or, in the future, the Earth. The Revised Code should be recorded in some manner and held for discussion in the next activity period.

Activity 13: A NEW CODE — Part II

A spokesman from each group will present to the entire class its Revised Code of Conduct. The class as a whole should then decide which rules can be incorporated into a Combined Code of Conduct which represents the thinking of the entire class. It is especially important to discuss why the group or an individual student feels that a particular rule is a more desirable form of behavior than another. This is the only activity where an attempt is made to attain consensus. If this appears to be an unreasonable task for a particular class, then do not try to reach consensus. The following are some questions which may help the class, as a whole, create the Combined Code of Conduct.

DISCUSSION QUESTIONS

- Should a representative of a nation or planet be expected to follow a Code of Conduct?
- Is it possible to write all the rules of behavior for every situation?
- How much freedom should a person have in order to act and make decisions in different situations?
- Does an individual know the best way to behave in a given situation without a Code of Conduct?
- Who finally decides the best way to behave in a given situation?
- Could there be a code of conduct that is not proper for a given situation? If it is incorrect, what should one do? Why?
- If a person has sworn to obey a code of conduct should he disobey the code in order to save a person's life? In order to save an animal's life? In order to save his personal property such as a car, house or money? Why?
- Should you swear to uphold a code of conduct if you think there might be situations in the future which would cause you to disobey the code of conduct? Why?
- If many people disobey a part of a code of conduct, for instance, "thou shalt not steal," should we remove that part of the code, ignore it, or try to make people obey? Why?
- If you do not agree with the rules of a code of conduct such as the boy scout creed but you belong to the boy scouts, should you be made to obey the code of conduct?
- Should everyone be made to obey a code of conduct if they did not take part in writing that code of conduct nor had a chance to express their views.
- What type of training might a person need in order to behave in accordance to the Revised Code of Conduct?

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APPENDIX

Stages of Moral Development

PRECONVENTIONAL LEVEL

At this level the child is responsive to cultural rules and labels of good and bad, right and wrong, but interprets the labels in terms of either the physical or the hedonistic consequences of action (punishment, reward, exchange of favors) or in terms of the physical power of those who enunciate the rules and labels. The level is divided into the following two stages

STAGE 1

The punishment and obedience orientation The physical consequences of action determine its goodness or badness regardless of the human meaning or value of these consequences Avoidance of punishment and unquestioning deference to power are valued in their own right, not in terms of respect for an underlying moral order supported by punishment and authority (the latter being stage 4)

STAGE 2

The instrumental relativist orientation. Right action consists of that which instumentally satisfies one's own needs and occasionally the needs of others Human relations are viewed in terms as those of the market place Elements of fairness, of reciprocity, and of equal sharing are present, but they are always interpreted in a physical, pragmatic way Reciprocity is a matter of "you scratch my back and I'll scratch yours," not of loyalty, gratitude, or justice.

CONVENTIONAL LEVEL

At this level, maintaining the expectations of the individual's family, group or nation is perceived as valuable in its own right, regardless of immediate and obvious consequences The attitude is not only one of conformity to personal expectations and social order but of loyalty to it, of actively maintaining, supporting, and justifying the order, and of identifying with the persons or group involved in it At this level, there are the following two stages

STAGE 3

The interpersonal concordance of "good boy - nice girl" orientation. Good behavior is that which pleases or helps others and is approved by them There is much conformity to stereotypical images of what is majority or "natural" behavior Behavior is frequently judged by intention "he means well" becomes important for the first time One earns approval by being "nice"

STAGE 4

The law and order orientation There is orientation toward authority, fixed rules, and the maintenance of social order. Right behavior consists of doing one's duty, showing respect for authority, and maintaining the given social order for its own sake

POSTCONVENTIONAL OR PRINCIPLED LEVEL

At this level, there is a clear effort to define moral values and principles which have validity and application apart from the authority of the groups or persons holding these principles and apart from the individual's own identification with these groups This level again has two stages, which are as follows

STAGE 5

The social-contract legalistic orientation, generally with utilitarian overtones Right action tends to be defined in terms of general individual rights and standards which have been critically examined and agreed upon by the whole society There is a clear awareness of the relativism of personal values and opinions and a corresponding emphasis upon procedural rules for reaching consensus Aside from what is constitutionally and democratically agreed upon, the right is a matter of personal "values" and "opinion" The result is an emphasis upon the possibility of changing law in terms of rational considerations of social utility (rather than freezing it in terms of stage 4 "law and order") Outside the legal realm, free agreement and contract is the binding element of obligations

STAGE 6

The universal ethical principle orientation Right is defined by the decision of conscience in accord with self-chosen ethical principles appealing to logical comprehensiveness, universality, and consistency These principles are abstract and ethical (the Golden Rule, the categorical imperative), they are not concrete moral rules like the Ten Commandments Instead, these are universal principles of justice, of the reciprocity and equality of human rights, and of respect for the dignity of human beings as individual persons

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