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ABSTRACT

A grade twelve instructional design unit on population is described in this curriculum plan. The purpose of the unit, approximately six weeks in length, is to provide students with basic knowledge about population dynamics and decision-making, process, and value analysis skills using approaches of social sciences. Emphasis is upon helping the individual to understand the effects of his behavior on himself and others. The plan document presents: background information on the center; procedures for developing instructional materials; the unit purpose and goals, and possible multidisciplinary and future-oriented topics; two assessment instruments (appended) constructed to measure students' population related knowledge and attitudes (the results indicating that although students are concerned they lack basic knowledge about population); instructional objectives; and the matching of objectives with four instructional techniques, cast into an "instructional flow" that can serve as a framework for development of the unit. (SJM)

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INDIANA UNIVERSITY POPULATION EDUCATION PROJECT

A PLAN FOR AN INSTRUCTION UNIT ON POPULATION DYNAMICS

FINAL REPORT NOVEMBER 1971

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FINAL REPORT

A PLAN FOR AN INSTRUCTIONAL UNIT ON POPULATION DYNAMICS

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and
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November, 1971

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd.)

TABLES AND FIGURES

OVERVIEW

In February The Population Council awarded a small grant to the Indiana University Laboratory for Educational Development and to the Indiana University Social Studies Development Center. The purpose of this grant was to aid Howard Mehlinger, Director of the Social Studies Development Center, in establishing a Population Education Project within the Center. The mission of this project, directed by Jerry L. Brown, the author of this report, was to formulate and eventually produce an instructional unit on population for use in existing high school social studies courses, especially those dealing with contemporary social issues.

Although neither development nor trial of classroom materials could take place within the time frame and budget limitations imposed by the grant, it was possible to establish the project within the Center and to initiate and complete a series of activities fundamental to and part of the process of systematic curriculum development:

1. Determination of what population educators, subject matter experts, teachers, and students think students should know about population;

2. Evaluation of the population-related knowledge and attitudes of twelfth-grade students;

3. Specification of operationally stated instructional objectives appropriate for a twelfth-grade social studies unit on population; and

4. Preparation of a plan, or formulation statement, to guide the development of the population unit.

The results of these activities are contained in this document. Chapters I, II, and III provide the reader with background information,

reviewing the Center's beliefs about social science education, its interest in instruction about population, and its development process. Chapter IV pertains to the first activity listed above. In it can be found the results of a literature search and a series of discussions with subject matter experts addressing the question of what students should know about population. In the fifth chapter, the results of a needs assessment of the population-related knowledge and attitudes of twelfth-grade students are presented. The sixth chapter contains a listing of operationally stated instructional objectives spanning three functional areas: population dynamics, social science process skills, and value analysis and decision-making skills. In chapter seven, the chapter that pertains to the fourth activity in the list above, the objectives are matched with one of four instructional techniques and are cast into an "instructional flow" that can serve as the framework for the development of the instructional unit itself.

CHAPTER I

INTRODUCTION

The United States has a population of approximately 207 million people. Is it overpopulated? Does it have more people than it can sustain at a high standard of living? Will it have more people in the next generation than it should have? Each day questions like these provoke more controversy.

Thirty years ago demographers thought Western Europe and the United States were facing the problem of underpopulation. Western European population was drifting downward in size. In the United States concern was being expressed that in the 1970's the size of the population would stabilize or begin to decrease. Policies designed to stimulate fertility had already been started in several European countries. Others were about to embark on pronatalist policies. In the United States there was some talk about population problems and the need for a population policy, but only a few were speaking. The National Resources Committee (which was to become the National Resources Planning Board) was studying the implications of population changes and, in a typically American fashion, was preparing a report. Again in a typically American way,[1] a few social scientists and a few concerned educators began writing of the need to teach students about population dynamics and about the implications of population change on their lives. In 1942 Kenneth J. Rehage, a University of Chicago educator,

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[1]Among population educators Sloan Wayland is perhaps the most aware of the phenomenon by which Americans make social problems educational problems. See, for example, Wayland's paper, Issues and Problems in Introducing Population Education. March, 1971 (mimeo).

wrote in Social Education of a population unit he had designed for use in high school social studies courses.[2] The next year an expanded version of Rehage's article appeared in a pamphlet with an excellent paper by Frank Lorimore and Frederick Osborn on why population should be included in the secondary social studies curriculum.[3] But population did not get into the curriculum, and shortly thereafter the baby boom began.

Since Earth Day and the outpouring of concern for environmental matters, a new interest has been sparked in instruction about population. Unfortunately, there is a tendency to accept simple conceptions and to seek simple solutions. Many of the ecologically oriented materials now beginning to find their way into the classroom neglect the social implications of population change and ignore the value questions inherent in decisions affecting demographic processes. Many of these materials show a strong bias, reflecting the point of view of special interest groups, e.g., crisis biologists, family planners, sex educators.

Paul Ehrlich, for example, is featured in the New York Times Educational Division filmstrip on the "population explosion." He is quoted on the cover of the 27 April, 1971, issue of Scholastic Magazine and he is mentioned an additional time in the magazine. Eight and one-half of the nine pages devoted to population reflect his views. The remaining

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[2]Kenneth J. Rehage, "A Unit on the Population of the United States." Social Education, November, 1942, pp. 313-14.

[3]Frank Lorimore and Frederick Osborn, "Population: Analysis," Problems in American Life: Unit 13. Washington, National Council on Social Studies, 1943, pp. 49-64.

half page, of which a third is devoted to the banner, "Another View," presents the less apocalytic view of Presidential Advisor Hendrich S. Houthakker.

Another leading crisis biologist, Garrett Hardin, is featured in the BSCS film, Tragedy of the Commons.[4] This film begins with a dramatization of the overpopulation of the commons, then stops while students discuss the "issues." Next it depicts overpopulation in America. Although "discussion breaks" occur, the message is clear: overpopulation is the cause of many social and environmental problems and corrective action is needed. That this corrective action may produce controversy is hinted at by two vignettes -- one of a country girl explaining why she likes the city and one of a black man (presumably a militant) saying that overpopulation is not a Black problem.

To the staff of the Indiana University Social Studies Development Center, an institution founded in 1968 with the purpose of improving instruction about man and society, materials like these seem to obscure rather than clarify. We at the Center believe it is important that students study about population as objectively as possible, using the approaches of social science. We believe that students should be provided with basic knowledge about population dynamics and the decision-making skills necessary for evaluating policies affecting population. In short, it is the Center's belief that students should be intelligent consumers

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[4]This film is available from King Screens Productions (320 Aurora Avenue North, Seattle, Washington 98109). It is based upon the article which appeared in the 13 December, 1968, issue of Science, Vol. 162, pp. 1243-48.

of policies affecting population related variables.[5] Motivated by this belief as well as a desire to improve instruction on contemporary social problems in high school social studies classes, and encouraged by the growing support for population education, the Center in the fall of 1970 began a series of activities designed to provide students with access to unbiased instructional materials on population dynamics. The result of these activities, as well as their background, will be reviewed in this document. First, a little history.

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[5]This goal is similar to one mentioned by Lorimore and Osborn over twenty-five years ago. They said:

> The question as to whether or not the United States should adopt a population policy is perhaps less important than questions as to what sort of policy and what sort of measures we will adopt if conditions in this country do eventually lead to public action in this field. An intelligent understanding of population problems among secondary school pupils in the United States can do much to insure a wise consideration of these issues (p. 37).

CHAPTER II

IN THE BEGINNING

As the problems caused by mankind's extraordinary population changes have become evident, an increasing number of organizations and individuals have grown interested in providing individuals and families with basic knowledge about population dynamics, the implications of population changes on the individual and the group, and the means by which population pressures can be reduced (e.g., contraception, family limitation). Providing knowledge of this sort, as distinct from providing direct services such as contraceptives, has become known as "population education." Although discussion of population education has often centered upon providing people in other countries with population knowledge,[6] interest has grown in providing the American public, especially the school age public, with a basic understanding of population dynamics and population issues. This has led population educators and organizations formerly oriented toward developing countries (e.g., the Population Council and the Population Reference Bureau) or direct services (e.g., Planned Parenthood) to become concerned with the quantity and quality of instruction on population in American schools.

Last year the Carolina Population Center, Planned Parenthood of Maryland, and the Population Reference Bureau sponsored the first teacher workshop on population education. In May, 1970, the Population Council

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[6]Stephen Viederman, "Population Education in the Developing World." Intercultural Education, Vol. 1, No. 8, New York: Education & World Affairs, pp. 1-2.

held a meeting in New York. That summer, as well as the summer of 1971, the National Science Foundation supported several institutes designed to help teachers understand environmental problems and population dynamics. In April, 1971, the Carolina Population Center held a two-day meeting with deans of schools of education, members of state departments of education and representatives of various population-related organizations. In June, 1971, the Baltimore School System held a teacher workshop on population and urban problems for inner-city teachers. In that month the Foreign Policy Association released the latest of its series of pamphlets on population.[7] In July, 1971, the Institute for the Study of Health and Society released its Sourcebook for Teachers in Environment-Population (STEP). About this time the University of Delaware Population Curriculum Study, a project sponsored in part by the Population Council, held a summer workshop for teachers aimed at producing lesson plans for teaching population-environmental concepts.

This fall (1971) Planned Parenthood of Florida, in cooperation with the State Department of Education and a number of institutions of higher learning, is sponsoring a population-sex education program in a number of Florida schools. This fall and winter the National Science Foundation is funding a program directed at providing college teachers with basic information on environmental-population problems. Meanwhile, Joanne Binkley at the ERIC clearinghouse in Boulder is preparing a resource

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[7]Valerie K. Oppenheimer, "Population," Headline Series No. 208. Foreign Policy Association, June, 1971.

bulletin for teachers wishing to teach about population. At Indiana University George Stolnitz is preparing a pamphlet on population. Like Joanne Binkley's project, this pamphlet will be available shortly.

Given this surge of interest in instruction on population, it is surprising that little interest has been shown in producing student-use materials reflecting an unbiased approach to the study of population.[8] If, as a recent Population Bulletin relates, population experts primarily spoke to people with families in the sixties, the seventies may be a decade in which they will primarily speak to instructors without ever speaking directly to the pupils. Perhaps by the eighties students will get the message.[9]

The Indiana University Social Studies Development Center hopes to expedite the process. Last fall the Center and the Population Council began to discuss developing an instructional unit on population for use in high school social studies classes. As can be seen from examining the population education literature,[10] as well as from the activities

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[8]In the early sixties Irvin Slesnick developed an experimental unit on population for high school students. (See The American Biology Teacher, Vol. 26, No. 8, December, 1964.) More recently the Population Reference Bureau and the American Universities Field Staff (1971) have released materials on population.

[9]"Population Education: A Challenge of the Seventies" Population Bulletin, Vol. 26, No. 3. Washington: Population Reference Bureau.

[10]Ozzie G. Simmons, "Population Education: A Review of the Field." Studies in Family Planning, Vol. 52, April, 1970, pp. 1-5; Sloan Wayland, Population Education.

which preceded and succeeded the discussions, these talks represented a departure from the dissemination/infusion strategy typically recommended by those interested in population education. The Center favored development of an instructional package aimed at a specific spot in the school curriculum to provide students with an understanding of demographic processes and an appreciation of the relationship between demographic changes and their lives (and the lives of future generations). In contrast to this product-oriented approach is the curriculum-wide "infusion" strategy prevalent in the population education literature. This approach advocates judiciously infiltrating existing courses and replacing obsolete concepts with population-related concepts. To encourage this process, a number of tactics have been employed: Curriculum guides for teachers,[11] resource booklets,[12] teacher workshops,[13] and meetings of deans of schools of education and representatives of state departments of education to promote the institution of population education teacher training courses.[14]

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[11]Kathy Horsley, Diane Drigot, Lana Mangold, Mary Schroeder, Janice Wade, Sourcebook for Teachers in Environment-Population. Institute for the Study of Health and Education, Washington, D.C., July 7, 1971 (mimeo); Population Curriculum Study, Sourcebook for Population-Environment Studies. University of Delaware, 1971; O.J. Sikes, Teachers' Reference on Population Problems. Caswell Family Planning Program, Nanceyville, N.Y., 1970 (xerox).

[12]Valerie K. Oppenheimer, "Population."

[13]NSF sponsored a number of workshops this past summer, one, for example, given by Carl Huether at the University of Cincinnati.

[14]In April, 1971, an invitational conference was held by the Carolina Population Center to discuss the need for such training courses.

Useful as these activities are, they suffer from two drawbacks. The first is competition; the second is inefficiency.

It is no secret that the curriculum is crowded. Indeed, it is this fact which encourages educators to recommend multilevel infusion as a strategy. This fact, however, has not escaped the notice of other interest groups, each of whom also wants to infuse its "relevant" concepts into the curriculum. Thus environmental educators, a breed distinct from population educators, sex educators, international educators, and black educators -- to name only a few -- seek to infuse concepts from their area of interest into the curriculum. This puts school administrators in an untenable position. How are they to choose which concepts to include? Which interest shall they support? Which shall they oppose?

Administrative crises may be created by these considerations, but experience has shown that infusion just does not produce wide-scale curriculum changes. Teachers are too busy and lack sufficient specialized knowledge to transfer concepts from a pamphlet, curriculum guide, or workshop into instructional materials. Curriculum change is most likely to occur when teachers are able to use tested and validated student materials that support their objectives. This is especially true at the secondary level. Curriculum reform in the physical and biological sciences, for example, despite the demand created by Sputnik and by educational theorists such as Bruner,[15]

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[15] Jerome Bruner, The Process of Education. Cambridge, Harvard University Press, 1960.

was achieved only after the Physical Science Study Committee and the Biological Science Curriculum Study published their textbooks and created materials in physics and biology. The same is true for the social studies. This is why organizations such as the American Historical Association, the American Sociological Association, and the American Political Science Association have sought to influence the teaching of politics, sociology, and history in middle and secondary schools through the development of instructional materials. If population is to be treated in the curriculum, it must be in the materials given to the students. Either it must replace old content in existing textbooks, a traditional reform process,[16] or it must be provided in its own set of materials. If the latter choice is made, the materials must be absorbed easily into the existing course structure; the curriculum in most schools is simply too crowded for another "new" social studies course.[17]

For several years the Social Studies Development Center has been interested in reforming a course in which a unit on population would readily fit -- the twelfth-grade Problems of Democracy course. Criticized by social educators such as Lawrence Metcalf[18] and Frank Simon,[19] this course suffers from several faults.

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[16]Thomas S. Kuhn, The Structure of Scientific Revolutions. Chicago, University of Chicago Press, 1962.

[17]In the last few years courses in anthropology, economics, psychology, and sociology -- to name only a few -- have entered the curriculum. The probability of adding social demography to the list is extremely low.

[18]Lawrence E. Metcalf and Maurice P. Hunt, "Relevance and the Curriculum." Phi Delta Kappan, Vol. 51, No. 7, March, 1970, pp. 358-61.

[19]Frank Simon, A Reconstructive Approach to Problem-Solving in the Social Studies. Calgary, Alberta, University of Calgary Bookstore, 1970.

1. The course tends to be chauvinistic and ethnocentric. Many situations conceived as "American Problems" are, in fact, global or planetary difficulties requiring solutions of mankind.

2. Insufficient attention has been paid to utilizing social studies data and modes of analyses.

3. Although normative questions are treated regularly, value analysis is not pursued systematically, and empirical and normative propositions are often hopelessly confused.

4. Existing "problems" courses do little to help students move from empirical generalizations and normative propositions to a consideration of alternative policies built upon decision-making strategies in which both facts and values are salient.

To replace the traditional approach and to rid the "problems" course of its faults, Metcalf has suggested an approach that, fortunately, is most appropriate for the study of population. This approach consists of asking four basic questions designed to help the student build toward future planning:

1. What kind of society now exists, and what are the dominant trends within it?

2. What kind of society is likely to emerge in the near future, let us say by the year 2000, if present trends continue?

3. What kind of society is preferable, given one's values?

4. If the likely and prognosticated society is different from the society that one prefers, what can the individual alone, or as a member of groups, do toward eliminating the discrepancy between prognostication and preference, between expectation and desire?[20]

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[20]Metcalf and Hunt, "Relevance and the Curriculum," p. 360.

Believing that several movements had converged -- renewed interest in population, demand for reforming the "problems" course,[21] development of an instructional approach suited to population matters and incorporating concepts and methods from the social sciences[22] -- the Center applied for a grant from the Population Council. With this grant the Center proposed to establish a Population Education Project and to begin the development of an instructional unit on population.[23] The Population Council approved the Center's request and work began on the population unit in February, 1971.

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[21]As an indication of the accuracy of the Center's perception, Prentice-Hall has just released a new "problems" series, Inquiry into Crucial American Problems. Population is not one of the subjects discussed. This is an interesting commentary on population educators' impact on social studies educators.

[22]It is discouraging to note in how few ways today's social studies classes differ from those in 1943. Consider, for example, this complaint by Lorimore and Osborn: "All too often the secondary-school pupil gets the impression...that social studies are 'just talk' about matters that everyone, regardless of his knowledge, is equally well qualified to discuss." "Population: Analysis," p. 16.

[23]Another function of the unit might be serving as a model for an entire series of units reflecting a social scientific-future oriented approach to vital social problems such as war and racism. These units, like the population unit, could be used separately within existing social studies courses or strung together to form an entire course. The population unit could be the beginning of a completely new "problems" course.

CHAPTER III

SSDC DEVELOPMENT PROCESS

Various procedures can be used for developing instructional materials. The Center uses a set of procedures that are oriented toward the production of instructional materials for whose instructional effectiveness the Center is willing to be held accountable. As shown in Figure 1, there are seven stages in the process. All but the last are connected by a feedback line. This represents the empirical orientation of the process and its emphasis upon developmental testing. This testing provides the developer with student performance data on measures assessing the effectiveness of the instruction being developed and provides him with the opportunity of improving the instruction during the development process. This contrasts to the traditional approach where evaluation occurs after the product is finished and where revision must await a new edition.

The first stage (I) in the development involves defining the general purposes and goals. These serve to direct the project and tentatively determine content areas to be covered and instructional objectives. The instructional objectives, in turn, provide the basis for developing a series of test items and attitude indices. These are administered in the second stage (II) to students found to have the characteristics the instruction requires. From analyzing students' performances on these measures, the developer can determine the degree to which they already possess the skill, cognitions, and attitudes implied by the product's goals. With this knowledge the developer can revise the goals and topics so that the learner is not required to relearn what he already knows.

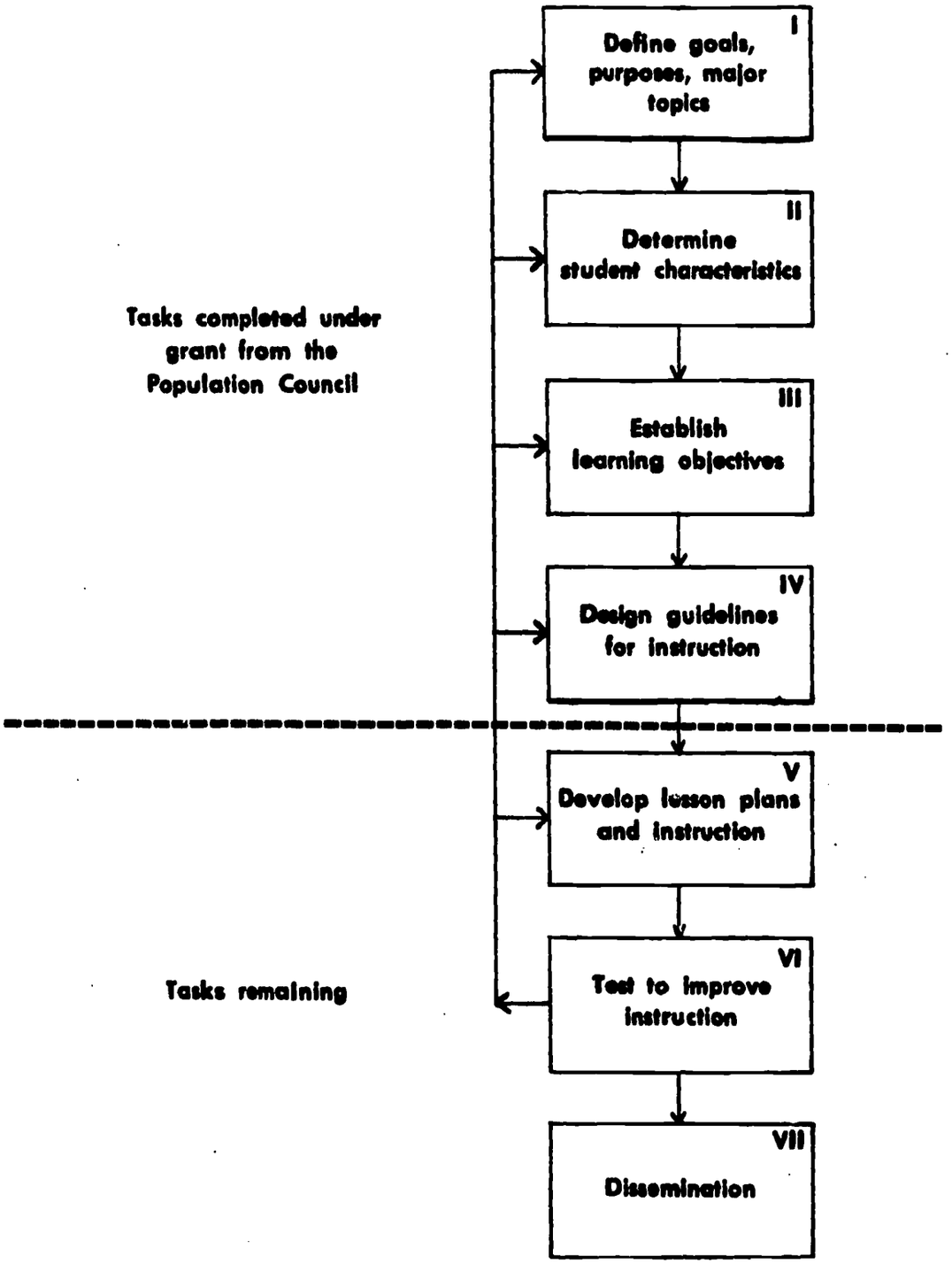

FIGURE 1. Social Studies Development Center Development Process

After determining what the students' needs are, the developer establishes in stage III the set of objectives which students will be required to master by the end of instruction. Stated in operational (i.e., behavioral) terms so they may be evaluated, these objectives represent the minimal learning outcomes that the instruction must produce.[24]

In stage IV the developer begins considering ways in which the objectives can be sequenced and alternative methods by which students can master them. For these activities the developer will eventually form guidelines for the unit. The guidelines, in turn, provide the basis for developing both a blueprint for instruction and the instruction, itself, in stage V. In stage VI, after a series of try-outs with small groups of learners, the instruction is field tested under actual conditions in the classrooms of twenty to thirty teachers. If necessary, the product is then revised. Student performance data, administrative failures, content inadequacies, teacher feedback, etc., are used for guiding these revisions. After revision and when it is clear that use of the materials promotes mastery of the product's instructional objectives, the product is offered to the schools. Ideally this involves

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[24]"To know the principle of the demographic transition" would not be an operational objective because it is not stated in terms of observable learner behavior. "Given two line graphs, one for each of two unnamed countries and each showing the birth and death rates for that country between 1850 and 1950, the student will identify the country that has undergone a demographic transition" is an example of an operational objective. The difference in the observability of the response is the critical distinction between the two.

establishing a producer-distributor agreement with a publisher, but alternative methods are also available.[25]

As can be seen in Figure 1, four stages precede the actual development of lesson plans and instruction. The activities which comprise these four stages provide the developer with direction, knowledge about the subject matter and the learner, a set of objectives for the learner to master, and a set of guidelines for the development of instruction. Since February the staff of the Center has been engaged in a series of formulation activities. The next four chapters will discuss these activities.

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[25]The Diffusion Center recently established within the Social Studies Development Center is one alternative. This Center has links with schools throughout the nation by which products, as well as ideas, can be distributed.

CHAPTER IV

PURPOSE, GOALS, AND TOPICS

Most high school students study social problems the way their parents did. Rarely do they utilize social scientific techniques for clarifying issues. Rarely do they distinguish between normative and empirical questions. Value conflicts and processes of conflict resolution -- the controversies, competitions, and compromises that are basic to political activity -- are omitted or superficially treated.

There has been little effort in civic education to develop the skills of critical thinking and inquiry. Even less attention has been paid to helping students use these skills to prepare for the future or to participate in actions affecting the type of future that they will experience. Students have been urged to be critical thinkers and probing inquirers, and schools claim that they are preparing students for the future, but standard textbooks and methods have provided meager instruction about how to think critically or to use this ability for making responsible, future-oriented decisions. Many texts present problems in a mind-deadening, "read-regurgitate" pedagogical style that often gives the impression that the only important problems are those which endanger the national interest of the United States. For those problems the question typically posed is, "What do you think we should do about it?" That we may not be able to do anything about it is not considered. Nor are other available options systematically explored. Rather, alternatives are listed and discussed as if any alternative were comparable to any other alternative. Students are not required to support propositions about relationships. They are not asked to defend predictions about the

future on the basis of what is known about human behavior or its relationship to the physical and social environment. Not being required to establish a network of relationships, students are unable to inquire systematically into the value-implications of decisions. This in turn fosters their impression that decisions can be compartmentalized. Having no ties to either history or the future, or to other events in the environment except themselves, problems become embedded in a short-run situational context that discourages long-range planning. In this sense, both the traditional approach to problems and youth's current belief in "Doing your own thing" represent a similar view of reality. Both ignore the interrelationship of events within the environment and, because the future is considered beyond the influence of man, both reject responsibility for the effects of present actions on the future.

Yet, as is becoming increasingly evident, events are interrelated and man's actions do have spillover effects that can either increase or decrease the degrees of freedom of action that man will have in the future. Nowhere is this clearer than in the area of population. Here even the decision as to how many children one should have -- a very personal decision in our society, considered a fundamental right of an individual -- can be shown to have social implications for the society and for the options open to that society in the future. The same is true for migration. As man grows in numbers and in his ability to control the environment, the area of the private diminishes rapidly. An important consequence of this is the increasing need to evaluate one's actions in terms of their consequences, both individual and societal. Moreover, since man now has the power to project -- at least

with limited accuracy -- the type of future his actions will produce, this evaluation must be future-oriented to an unprecedented extent. To reject this proposition is to retain responsibility while abdicating control to nature. Yet nature is not always benevolent -- as some seem to think -- especially in matters dealing with population.

Nature's means of population control have never been kind. Famine, pestilence, predation, changes in climate and biological mechanisms are her controls. Even for man to maintain existence has not been easy. Many textbooks, especially those in literature courses, reflect this by considering "man's struggle against nature" to be a basic theme, although today it may be the converse. Man, however, has managed to ease the severity of nature's controls, and he has done this through technology and through cultural organization and practices. Technology has permitted man to expand the carrying capacity of his environment.[26] This has been true in the past; it may continue to be true.

The population of the world now amounts to about three and a half billion people. Barring a major population crash, the population will double in about thirty-five years. By the year 2000 the population of the United States will be about 300 million. That both the physical and social environment will be affected by this increase in numbers cannot be doubted. How it

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[26]For an interesting discussion of how Aztec cultural practices were related to the carrying capacity of their environment, see George W. Carey and Julie Schwartzberg, Teaching Population Geography, New York, Teachers College Press, 1969.

will be affected can be questioned. A number of man's options already have closed. We cannot, for example, opt for a smaller population without promoting death rather than life. But we can begin to prepare for life in this world as we think it will be, realizing that our vision is poor, and we can begin thinking and acting in a way to keep open the maximum number of options for future generations. We must ask, not, will man react to changes in his physical and social environment related to population change, but, as Lorimore and Osborn asked in 1943, how will man react? Will he react in a way that provides a high level of living and will he attempt to assure maintenance of this level for generations yet to come, assuring in the process that the future's options are many? Or will he act in such a way that will postpone the costs of his present actions to future generations, thereby restricting their options? In the 1800's Edmund Burke spoke of the responsibility owed by the present generation to those that had gone before.[27] Today we must speak of the responsibility owed those yet to come.

For this a new ethic must be derived, one which both population educators and environmental educators have sensed and hinted at. This ethic focuses on the future consequences of individual actions on the individual and the group, on this generation and succeeding generations. It is an ethic that emphasizes choice and knowledge as well as analytic skills for informed decision-making. Operationally it represents the type of problem analysis

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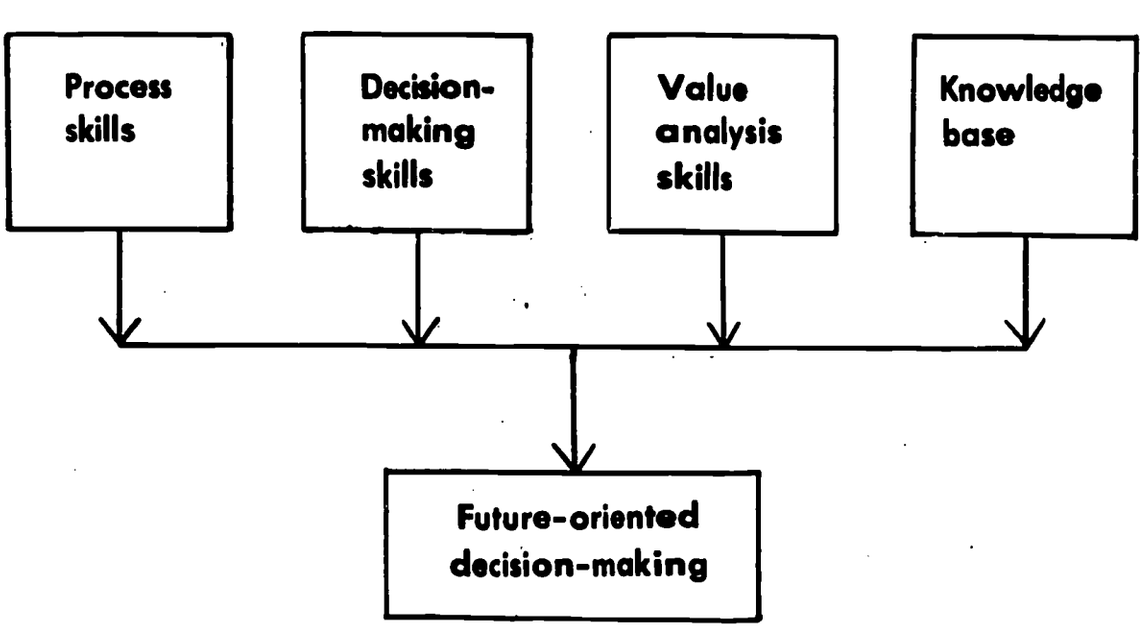
[27]Edmund Burke, Reflections on the Revolution in France. New York, Dutton, 1960.

reflected in both Metcalf's and the Center's approach to social education combining value analysis, scientific procedures, decision-making skills, and a knowledge base into a method for decision-making oriented to the future.[28]



Applied to population education, this ethic seeks to help the individual understand the consequences of his behavior on himself and others. It does this by providing him with knowledge about demographic processes and relationships and by helping him examine the implications of existing trends. It attempts to show options that are open, their consequences, and the relative

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[28]See above, page 11 for a brief discussion of this approach.

advantages and disadvantages of these. It seeks to aid the student in clarifying and evaluating his values; and, that his choices may better reflect his values, it seeks to develop his skills in inferring the value implications of various acts. Moreover, it seeks to promote exploration and experimentation with the probable consequences of holding alternative value positions. From this, hopefully, especially in population-related matters, the individual would follow his own course with full realization of its implications and with a willingness to accept responsibility for its short and long range effects.

To determine the type of population-related knowledge and skills that a student would need to implement such an ethic, the project director initiated a series of discussions with experts in population-related fields and conducted a literature search. He gathered a list of topics appropriate to a social studies "problems" course and congruent with the goal of developing a responsible, population-educated person. These topics, with a brief description of each, and in some cases a listing of possible sub-topics, are presented below. In general the list represents topics that can be treated from both individual/familial (i.e., micro) and national/human ecological (i.e., macro) perspectives. It also contains topics which can be treated from a variety of temporal and cultural perspectives. The unit itself will attempt to integrate each of these perspectives in response to the belief that population dynamics cannot be understood through compartmentalization. For the same reason a number of "biological" topics appear in the list. This compilation of topics therefore represents an attempt

to introduce a multidisciplinary, future-oriented unit into the existing social studies curriculum. Yet, because the orientation of the unit is social scientific (not biological), because it does focus on decision-making and value-analysis, and because it does deal with a significant social problem, it does not violate the composition of the social studies or the intent of the "problems" course. Should the unit be developed, it could readily be assimilated into the existing social studies curriculum.

Topics

Topic 1 Population Growth and Control in Animal Populations[29]

In populations of nonhuman species, population size is controlled by density-dependent and density-independent factors. Density-dependent factors may operate in diverse ways ranging from starvation, through predation, to social stress and aggression. Density-independent factors include climate, shortage of food (caused by drought, for example), and predation by predators with an alternative source of food. Density-dependent factors are related to the number of animals in a population. Density-independent factors are independent of the number of animals in the population.

Any natural population has the potential to increase to a level at which density-dependent factors control size. That this does not happen suggests that density-independent factors are important limiting factors. Most density-dependent controls would produce severe stress were they to act on human populations. Several models exist in nature that have implications for the effects density-dependent processes would have on human populations. These models are (1) the starvation experienced by Cactoblastis cactorium in Queensland, (2) Rodolia in California and (3) the deer on the Kaibab Plateau in Arizona, all of which experienced a population eruption similar to what human populations are experiencing today and all of which underwent a population crash as they overtaxed the carrying capacity of their environment.

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[29]This section is based upon H.G. Andrewartha, "Population Growth and Control: Animal Populations," in Population Control. Anthony Allison (ed.), Baltimore, Penguin, 1970, pp. 45-69.

Topic 2 A. Population Control in Preindustrial Societies[30]

Like animal populations human populations are controlled by density-dependent and density-independent processes. Man is unique in that he can influence the density-independent factors to a great extent through culture and technology. Factors affecting fertility can be divided into three types: (a) physiological factors (e.g., sterility, diet, length of fertile period), (b) unconscious social customs (e.g., age at marriage, separation or divorce, widowhood, remarriage), (c) conscious social factors (e.g., voluntary abstinence, contraception, abortion, infanticide). Status and prestige have elaborated human needs in even the simplest society, lessening the relationship between the desire for children and the ability to support them. Prestige, power, and, at times, status are often linked to children, especially male children. Children are economic assets and are a means of linking families and aggregating wealth. Upwardly mobile people, however, seem to have entered a system in which prestige factors are not linked to children.

B. Primitive Agricultural (Aztec Indian) Society[31]

Aztec society utilized density-independent factors (technological and social organizational control) to avoid overburdening the carrying capacity of the environment. Technologically the Aztecs developed a series of islands to expand their food supply. Human waste was used as fertilizer. Organized as a theocratic state, many religious ceremonies demanded human sacrifice. This encouraged warfare in order to gain captives to sacrifice. Since many young men who had not had a chance to procreate died either in the fighting or as sacrifices, the population size remained fairly stable. In addition, polygamy (associated with lower fertility) was practiced since there was a deficit of young men.

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[30]Based upon Burton Benedict, "Population Regulation in Primitive Societies," in Population Control. Anthony Allison (ed.), Baltimore, Penguin, 1970, pp. 165-79.

[31]This section is based upon Cary and Schwartzberg, Teaching Population Geography, pp. 6-8.

C. Agricultural-Rural Society (Ireland)[32]

When a population fails to institute density-independent control processes, it relinquishes control to density-dependent controls. Such was the case with Ireland and the famine in 1845-1849. In response to the famine, Ireland reacted with what Davis calls a "multiphasic response" (p. 42): late marriage, celibacy, migration, contraception, etc. As with primitive societies, population control does not seem to be related to fear of hunger as much as it is to status and prestige considerations.

Topic 3 Population Control in Developed and Underveloped Countries[33]

Both developed and underdeveloped countries have attempted to influence the size and rate of change in size of their populations. A variety of techniques have been used, some voluntary, some not. The type of control and the direction of the change to be produced have varied over time.

Countries that offer interesting comparisons are listed below:

Developed Countries	Underdeveloped Countries
France	China
Japan	India
Sweden	Mexico
United States	Taiwan

A. Family Planning is oriented toward fertility control. However, in most countries (developed and undeveloped) it is not viewed as a part of a population policy by their organizers. Rather it is viewed as a means of helping families successfully realize their family size and spacing goals even if these are contrary to the interests of society. In general people want more children than are required for replacement. In underdeveloped countries this is supported by the desire for male survivors, lack of perception and trust in the stability of the recent decline in mortality, economic gains for families with many children, social status. In developed countries, mobility is inversely related to

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[32]This is based upon Kingsley Davis, "The Theory of Change and Reponse in Modern Demographic History," in Social Demography. Thomas R. Ford and Gordon F. DeJong (eds.), Englewood Cliffs, N.J., Prentice-Hall, 1970, pp. 22-43.

[33]Based on Oppenheimer, "Population."

fertility as status and economic benefit are detached from children. Where mobility is not present or where roles are fixed (for example, the woman's domestic role), status factors operate to support high fertility. Recent studies indicate that some people have more children than they want. This offers the possibility of reducing fertility by providing them with the knowledge and means of preventing birth. Some, however, feel that a voluntary system, such as that reflected by the family planning movement, must be supplemented by a rigorous population policy.

B. Policy manipulations in regard to population have recently been focused on reducing population growth or on redistributing population. However, in the 1930's in the U.S., and even today in some countries, the emphasis is on promoting growth. Both then and now, society has had similar options (although the direction is different). It can attempt to manipulate structural variables, provide various incentives, or institute strict social controls (attack the "problem" technologically).

Topic 4 World Population Growth: Past and Present

The doubling time of the population has been steadily decreasing. For most of mankind's history population growth was relatively slow. Since the industrial revolution it has been moderate. Since 1950 it has been explosive. This is a unique phenomenon and not likely to continue long into the future because of the imposition of density-dependent restraint. Each increase in technology has permitted an increase in population. Because of the way in which populations grow -- through compounding -- minor changes have had a major impact on the number of people on the planet. In addition to increased resources, man has made great advances in medical technology. This has had a major impact on demographic processes, especially in developing countries, by reducing infant mortality, permitting more children to reach maturity and to bear children themselves. Because fertility has not yet declined to the level of mortality in underdeveloped countries, their populations are growing at an extremely rapid rate. This not only affects numbers but also age structure, since it means developing societies have a large number of young children to be cared for.

Topic 5 Population and the Environment

All populations depend on their environments and all affect their environments. Culture and technology are intermediating factors between the environment and human populations. Depending

upon their social organization, cultural practices, technology, etc., humans can have more or less impact on their environment. Because the human population is growing, its impact on the environment is growing. This impact is greatly multiplied by technology and cultural practices, especially in industrialized countries. Because man has the ability to adapt and to choose, he can manipulate these variables to reduce his impact, if he wishes.

Topic 6 Population Structure: Age[34]

Age is a fundamental demographic variable. In the past the aged in a society were venerated because they were exceptional. Today, because old age is common, it has lost its mystique. In the 1700's the newborn had only one chance in five of living beyond the age of sixty. Soon almost 90 percent of newborns will live to sixty. Members of different age cohorts belong to different historical periods. This often produces a different outlook on life across generations.

The distribution of a population at a given time by age and sex is an important demographic and social variable. This distribution is usually represented by a population pyramid. By analyzing a pyramid, it is possible to infer much about a society. For example, scars in the pyramid structure may offer insights to events that occurred in the past. Or, alternatively, looking to the future, bulges and indentations may offer insights into problems to be met in the future. A population with a relatively large base will probably continue to be a growing population, although the rate of growth will depend upon fertility. Similarly, a population with a relatively large base will challenge the educational system, and later, as the population ages, the medical delivery system, social security system (if there is one), and perhaps the political system in general (especially if the population becomes conservative as it ages). Since aging is usually a product of reduced fertility, efforts to reduce fertility (zero population growth) in developed and underdeveloped countries are likely to produce a number of problems associated with an aging population. As longevity increases, the population pyramid will become top-heavy. As this occurs, and if fertility rises to equal deaths (e.g., maintain stability of size in face of an increasing death rate), the dependency load of the population will increase, meaning that more young and old will have to be supported by the

[34]Based on Roland Pressat, Population. Baltimore, Penguin, 1970.

working members of the population. However, a change in the health and role of the aged, perhaps increasing their economic value to the society and reducing their conservatism, could change these circumstances.

Topic 7 Economics and Population

The relationships between population and the level of living are complex. Malthus was one of the first people to consider them, finding a disparity between potential population growth and agricultural growth (i.e., means of sustenance). On the basis of this disparity Malthus concluded that poverty would inevitably increase if man did not limit his population growth. For this Malthus recommended the institution of density-independent controls (i.e., "positive restraints") such as celibacy, delayed marriage, chastity, reduced fertility, etc. Viewing poverty from a different perspective, Marx and Engels refuted Malthus, claiming poverty was more closely related to the structure of the economic system than the size or rate of growth of the population.

Since Malthus' time, technology has allowed the maximum population to rise. But as fertility is largely determined by prestige and status factors rather than available food supply, this maximum is less than it would be if consumption was minimized.

The economics of population can be analyzed on a macro and micro level. Factors which produce costs are population growth or decline, changes in density, structure, and composition. In underdeveloped countries, growth (through natural increase) imposes heavy costs upon society, but only moderate costs relative to the benefits produced upon the individual family. The socialization of a youth (or migrant) into a society is a costly process. In stationary conditions (i.e., natural increase = 0, migration = 0), the fraction of wealth of society assigned to socialization (education, skill development, preparation for adult roles, etc.) does not involve expenses other than those for renewal of capital equipment and improvements. In growing societies, relatively more resources are required each year. For example, it is estimated that a population that grows with a rate of n requires an increase in investment of approximately n^2 just to cope with population growth and to maintain the existing level of living. Combined with this need for high investment is an age-structure that is economically unfavorable. This is true for countries with large populations as well as small since it is the rate of growth and not the size of the population

which produces the challenge to development. In some cases, however, this cost is outweighed by the benefits produced, especially when the growth rates are moderate.[35]

From the individual's standpoint, especially in many underdeveloped countries, the marginal benefits of an additional child outweigh the costs. The child is a source of labor, economic security in old age, status, and perhaps advancement through marriage, etc. Nonmobile, rural, and female members of the populations in industrialized countries also may view having more children, despite the additional costs associated with them in industrialized societies, as being better than having less children. Thus the "economics" of having children in the individual's view and society's may differ and contradict each other, especially in developing countries.

Topic 8 Population and Industrialism[36]

Prior to the industrial revolution, population growth was relatively slow because of the high mortality rate that afflicted preindustrial societies. Unable to control mortality, most societies developed familial organizations and value systems that would facilitate fertility, for example, by emphasizing early marriage, fecundity, etc.

With industrialization came a breakthrough in medical technology, especially that associated with the work of Jenner and Pasteur. Combined with growing sophistication in waste disposal and knowledge about public health, including the establishment of health departments, industrial societies were gradually able to control typhoid and cholera. These factors

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[35]There seems to be considerable disagreement between American economists and demographers and their European colleagues over the value of expanding populations in industrialized societies. Europeans (e.g., Pressat, Sauvy, and Clark) tend to find a moderate degree of demographic growth to be desirable for industrialized societies. American economists such as Spengler would disagree with this, holding that growth is not necessary for a healthy economy.

[36]Based on Oppenheimer, "Population."

slowly brought the death rate down. Then in the twentieth century tremendous breakthroughs in medical technology were made. These breakthroughs, for example, the control of malaria by DDT, did not require great changes in the standard of living, general habits of cleanliness, or educational levels and so, unlike the previous medical advances, were easily exported to unindustrialized nations. As a result, mortality control has become separated to a large extent from the processes of industrialization and urbanization. Consequently, where industrialized countries had a relatively gradual lowering in mortality with a slower, yet corresponding decrease in fertility, the rate of mortality reduction in unindustrialized countries has been so explosive that fertility levels have not had time to adjust. This has produced the "population explosion" that has grown critical since 1950. Whether or not fertility will decline with sufficient rapidity to meet the lowered level of mortality is a basic question. Since in many cases social and economic changes typically associated with lowered mortality in industrialized countries have not begun to occur and are becoming more difficult to initiate as the population grows, it is unlikely that the non-industrialized countries will experience -- or can experience -- the same type of "demographic transition" that the West experienced. Hence other models, for example, Japan, may be useful for suggesting techniques to stem population growth before density-dependent factors assume control. Growth, however, is not the only factor related to industrialization. Urbanization, technology, concentration of population, social organization and quality of life are also related. Many underdeveloped countries suffer from too many people in one place as well as too many people in general. Similar concentration problems exist in industrialized societies, leading some to suggest that megalopolises be broken up and the population redistributed. Others suggest the institution of new "design" techniques or the adoption of alternative life styles as a means of reducing the negative aspects of high density-urban living.

Topic 9 Population and the Future[37]

Predictions about the future require an understanding of the experience of the past. Scientific prediction must depend upon systematic methods for extrapolating trends. These must be justified by empirical comparisons of the estimates with actual outcomes.

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[37]See W. Bass, "The Growth of World Population," in Population Control. Anthony Allison (ed.), Baltimore, Penguin, 1970, pp. 142-50. Also, Rufus E. Miles, Jr., "Man's Population Predicament." Population Bulletin, Vol. 27, No. 2, April, 1971.

Information is limited regarding existing population trends, and knowledge of the determinants is even more limited. Most traditional forecasting techniques have not been accurate. The simplest method is to extrapolate past trends, but, unless population trends have been relatively stable for a long period, their continuance cannot be assumed. Then, too, breaks in trends are always possible. For example, a prediction about the size of the world population in 1960 made from the current growth rate in 1920 would have been seriously in error (3 billion actual vs. 2.4 billion predicted).

Demographers now use the "component" method. Separate consideration is given to the various demographic characteristics upon which the growth rate depends. The forecasts for each of these are put together in a consistent way to provide the forecast for the total. In its simplest form, such prediction requires data on the probabilities of dying by age and sex and roles of childbearing by age of mother. These can be refined into other categories from which trends can be extrapolated.

Population forecasting has not had a very successful record. Population analysts now prepare a series of projections in recognition of the nonpredictability of mortality and fertility. These projections typically are computations of how a population would change under specified assumptions without any implication about their reasonableness. Although the connotation of "favored" sometimes accompanies these projections, when this occurs they are usually produced in a high, medium, or low series reflecting what is assumed to be a reasonable set of alternatives.

Aside from trend projects, several models exist to demonstrate worldwide alternatives for the future. These reflect (1) a population crash, (2) a gradual approach to ZPG, (3) a "modified Irish curve,"(in which a series of disasters would cause a temporary decline in population and be followed by efforts to keep population down) and (4) continued growth with expansion of resources and modified value structure. For the U.S. similar models exist. An interesting additional model is that which shows population trends if the immediate goal were to maintain the present size of the U.S. population.[38] In this model birth rates

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[38]Frejka Tomas, "Reflections on the Demographic Conditions Needed to Establish a United States Stationary Population Growth." Population Studies, Vol. 22, No. 3, November, 1968.

would have to fluctuate widely for three centuries until an equilibrium was obtained. It would also require a completed family size lower than that ever recorded in history for an average family size. Americans may be moving toward stopping at two children, but there is little indication that they will settle for none or one.

These projections do not take into consideration technological changes that affect social structure. For example, continued automation, biological predetermination of sex -- or perhaps complete generation of a fetus -- synthetic organs, and transplantation have implications for population growth and structure as well as for the values and social organizations of society. Nor have "science fiction" alternatives been considered. Given the current rate of technological advance, today's assumptions about the life-support capability of the natural and human ecological systems may seem naive by 2100 A.D. Unlikely as some of the alternatives are, students should be exposed to them, lest they err for lack of imagination.

Topic 10 Population Geography[39]

Population distribution cannot easily be separated from the concept of population density. Present population differences (especially in European cultures) more closely reflect the comparative economic potentialities of areas than at any time in world history. Since man is gregarious, world population shows some degree of clustering. The relationship between people and land is usually expressed in a simple arithmetic ratio which divides total population by total area. This gives the population density of an area. It is, however, a superficial representation of the real pressure of a population upon the resource base. It fails to take into account the inconstancy of both the total population

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[39]Based upon Glenn T. Trewartha, "A Case for Population Geography," in Population Geography: A Reader. George J. Demko, Harold M. Rose, and George A. Schnell (eds.), New York, McGraw-Hill, 1970, pp. 5-26. Nathan Keyfitz, "The Numbers & Distribution of Mankind," in Environment. William W. Murdoch (ed.), Stanford, Connecticut, Sinauer Assoc., 1971, pp. 31-52. Commission on Population Growth and the American Future, Population and the American Future.

(representing men of greatly contrasting cultures and stages of economic development as if their demands were equivalent) and the various capacities of different environments for supporting human life and satisfying human wants. In primitive, closed societies, it may be possible to arrive at the carrying capacity of the land. But in highly complex, dynamic societies this has not yet proved possible.

In developed countries approximately half the population lives in rural regions and small town areas. In less developed countries four-fifths is rural and small town. But the trend everywhere is toward urbanization. In the U.S. over two-thirds of the population is concentrated in metropolitan areas. More than three-fourths of U.S. growth occurred in these areas, with suburbs accounting for most of it, during the 1960's. The farm population continued to decrease, another indication of the freeing of industrial man from traditional restraints on mobility, and about one-half of the nation's three thousand counties lost population. The coastal regions continued to attract people (although for California the attraction seems to be fading).

Although growth is concentrated in metropolitan areas in the U.S., many of the nation's largest cities have lost populations -- generally becoming increasingly ethnic in the process. It is the suburbs and intermediate size metropolitan areas that have grown in the last decade. Most of this growth (70%) is the result of natural increase rather than migration from the country. For the U.S., questions about growth and distribution are correlated. The same is becoming true in underdeveloped countries as the population clusters in urban areas.

Topic 11 Population and Resources

A. Food[40]

Food supply traditionally has been considered a primary limit on the size of the human population. Much attention has been devoted to increasing available food supplies throughout history. This continues today, the product being the so-called Green Revolution. In considering food supplies, a number of questions must be asked. Can sufficient food be produced over time to keep pace with a growing population? Can this be distributed? If it is, will people perceive what they are being offered to eat as food? What effects will this have on the natural and human ecosystems?

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[40]Based on Oppenheimer, "Population."

In the mid-1960's food production and population growth in nonindustrialized countries barely managed to keep abreast, with population growth gaining a slight edge. By the early 1960's, Latin America, Africa, and Asia were importing 18 million tons of grain. A few years later this figure doubled as underdeveloped nations became increasingly dependent upon the U.S. and Canada for grain. In many cases this discouraged underdeveloped countries from investing in agricultural production rather than industrial development. As this occurred the ability of the U.S. to keep feeding the expanding world population began to be challenged. The U.S. Department of Agriculture, for example, estimated that by 1984 the U.S. would no longer be able to keep up with worldwide food deficits caused by population growth. By the late 1960's, however, this view began to fade as food technologists developed new strains which they hoped would help increase agricultural productivity in developing countries. But many of these agricultural breakthroughs require production techniques, such as heavy fertilization, that ecologists claim endanger the environment and, over the long run, destroy the food producing capability of the soil. In this sense these new grains may not be more than temporary solutions to the hunger problem.

But assuming that ecological hazards can be avoided, the techniques must be disseminated and implemented, and their product, food, distributed and eaten. Traditionally agricultural diffusion has been a slow process, but this, too, is beginning to change. Mexico, for example, has been a ready adopter. In Asia over 40 million acres were planted with new seeds in 1970. Yet there are many obstacles to adoption. Many countries lack the facilities needed to produce fertilizer. Water resources are often lacking. Transportation systems are required. Nonexistent capital for seeds, fertilizer, and machinery is needed. For these things economic development is required. The Green Revolution cannot be a substitute for more general development.

B. Mineral Resources[41]

To be used, resources must be perceived. Technology must exist for recovering them or extracting them, capital must exist for producing the technology, and making them available must be economically feasible. It is estimated that the U.S. currently consumes about

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[41] Based upon Preston Cloud, "Mineral Resources in Fact and Fancy," in Environment. William W. Murdoch (ed.), pp. 71-88

40 to 50 percent of the world's resources. As other countries develop and as the size of the population grows, larger demand upon resources will increase. With existing technology it is unlikely that this demand can be met. This is likely to produce resource clashes as countries conflict for scarce resources. That new frontiers can be opened to alleviate these pressures without disrupting the ecological system, for example, by recycling or by utilization of the resources of the sea, will require much research, invention, development, and skillful management. However, placing faith in technological solutions to be made in the future is a dangerous activity that may impose a severe cost upon future generations. Conservation and strict preplanning are becoming necessary for intelligent utilization of mineral resources.

C. Energy Resources[42]

The demand for energy has been steadily increasing throughout the world. Indeed of the various titles that can be attached to our age, the age of energy is certainly an appropriate alternative. Most of our energy consumption has been based upon fossil fuels. Since these are limited in nature, one's utilization pattern must be transitory. Ephemeral in the span of human history, this epoch has produced drastic ecological disruptions. Alternative sources of energy must be found. Alternatives presently foreseen include: (1) direct solar radiation, (2) water power, (3) nuclear power. Of these, nuclear power currently offers the most immediate potential for keeping up with energy demands.

These demands, however, must level off and stabilize. In the last two centuries industrial activities have been based upon exponential rates of growth or energy consumption. Throughout this time, scarcity of energy resources has been a limiting factor. With alternative sources, such as nuclear energy, which are not restrained by scarcity of resources, ecological limits serve to restrain growth. Currently, the rate of growth of nuclear power capacity (with a doubling period of two years) represents the most spectacular industrial growth phenomenon in the history of technology. It is unlikely that this rate of growth can be maintained beyond a few more tens of doubling. At some point, growth will have to level off and stabilize at a sustainable level or it must reach some culmination and decline. In either case, a revision of current social and economic thinking will be necessary.

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[42]Based upon M. King Hubbert, "Energy Resources," in Environment. William W. Murdoch (ed.), pp. 89-116.

Having identified possible topics for inclusion in the population unit, the project director was faced with the task of determining what twelfth-grade students already knew about population. If students were knowledgeable about population matters, a basic introduction to population concepts would be inappropriate. On the other hand, to assume that they were familiar with concepts such as the demographic transition and problems associated with population changes could lead the developer astray and result in a unit far beyond the capability of most students.

To avoid either overestimating or underestimating the knowledge and ability of students in the target population and to learn more about their attitudes -- in regard to population-related matters, the role and function of science and, alternative instructional techniques -- the director constructed and administered a population inventory. This inventory and the information it produced are discussed in the next chapter.

CHAPTER V

STUDENT CHARACTERISTICS

Because of their age and because they have already entered into sexual activity, high school students are often considered prime targets for information about population. Yet relatively little is known about the content or process by which precollegiate, American students acquire population-related knowledge and attitudes. What is known tends to focus upon the student's perception of ideal family size or knowledge of facts such as the size of the U.S. population and relationships between variables. Understanding of processes is ignored, as are attitudes pertaining to alternative value decisions.

Gustavus and Nam[43] asked 1,123 sixth-, ninth-, and twelfth-grade students how many children they thought constituted the ideal family for (a) the average American and (b) for themselves. The Purdue Opinion Panel (#89)[44] and a Harris Poll for Life magazine[45] asked students the same type of question. Stonch[46] administered a questionnaire to twenty-two high school students. The questionnaire asked them to agree or disagree with three propositions: (1) no responsible family should have more than two children, (2) all means of birth control should be freely available,

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[43]Susan O. Gustavus and Charles B. Nam, "The Form and Stability of Ideal Family Size Among Young People." Demography, Vol. 7, No. 1, February, 1970, pp. 43-51.

[44]Purdue University Measurement and Research Center, Lafayette, Ind., Report of Poll #89 of the Purdue Opinion Panel, "People Problems: Population, Pollution, Prejudice, Poverty, Peace." June, 1970.

[45]"A New Youth, Poll: Change, Yes...Upheaval, No." Life, January 8, 1971, Vol. 70, No. 1, pp. 22-30.

[46]David R. Stonch, The Attitudes of Teachers on the Population Explosion. Dept. of Science Education, University of Texas at Austin, n.d. (photocopy).

and (3) tax laws should be revised to discourage rather than encourage large families.[47] The students were also asked to agree or disagree with twenty-eight statements regarding population. These were later made into a population attitude index.

Several studies have examined student cognitive knowledge as well as population-related attitudes. Bachman and Van Duinen[48] reported the results of the fourth and final panel of a four-year study of a national sample of about 2200 male adolescents (of whom 71 percent were included in the last sample). The respondents, most of whom had been out of high school for about a year, were asked in the questionnaire and interview portions of the survey to respond to a number of questions about population. These questions covered a variety of topics concerned with population problems, family and marital plans, willingness to support individual and societal acts designed to retard population growth, and knowledge about contraception and sex-related terminology. The results indicated that the respondents were concerned about population growth and supported noncoercive methods of reducing growth, especially those methods requiring individual responsibility. Forty-one percent thought a two-child family desirable, although many preferred a large family. Few students, however, were able to demonstrate knowledge of the rate of growth for the U.S. population, the

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[47]The percent agreeing to each of these questions was, respectively, 82%, 100%, 59%. Mean score on the index, which was formed by scoring each of the 28 statements in a binary fashion and then summing over all, was 15.6.

[48]Jerald Bachman and Elizabeth Van Duinen, Youth Look At National Problems. Ann Arbor, Mich., Institute for Social Research, 1971.

rate at which the U.S. population is doubling, the size of world population, or the rate at which world population is doubling. Errors on these items tended to be toward overestimating the present size and the present rate of doubling for both the U.S. and world population. Wanderer, Seaver, and Wagner,[49] as in the previous studies, asked students how many children they thought were ideal for a family. Students, 86 percent (428/490) of whom were seniors in Catholic schools, were also to judge the seriousness of the population problem and to decide if the world population should grow at a lower rate, stop growing or decrease in size. Knowledge questions asked for the correct size of U.S. population, choice of the exponential curve as the general representation of population growth, and knowledge about how many children families must average to enable the population to gradually stablize (i.e., reach ZPG).

The results of this study indicate that students were concerned about population growth. Approximately 60 percent of the students thought the population explosion was a problem, 50 percent felt that the U.S. population should grow but at a slower rate than present, about 40 percent agreed it should either stop growing or decrease. On the knowledge items, about 58 percent of the students could identify the correct figure for the size of the U.S. population, about 60 percent identified the correct figure for the size of the current world population, and approximately 62 percent

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[49]M. Wanderer, R. M. Seaver and N. N. Wagner, "Preliminary Reports on Population Education Research." University of Washington School of Medicine, Division of Family Planning and Education, May, 1970. Cited in Nicholas Tavuchis, Youth and Population, New York: The Population Council, 1970 (xerox).

chose the exponential curve as the general representation of population growth. Forty-four percent chose the two-child family as the size that would result in population stabilization.

Although these studies, especially that by Bachman and Van Duinen, provide a glimpse at the population-related knowledge and attitudes of precollegiate students, they do not provide sufficient detail or breadth of coverage to guide developmental decisions. For this reason the project director developed two assessment instruments (Forms A and B of the Population Dynamics Inventory /PDI/)[50] and conducted an evaluation of the population-related knowledge and attitudes of 717 twelfth-grade students. The evaluation instruments were designed to provide the following information:

A. What do students know about population?

B. Do they perceive population changes as a problem?

C. What are their attitudes toward population control measures?

D. What are their attitudes toward population-related variables?

E. What are their attitudes toward instructional activities?

F. What type of social science process skills, especially data manipulation skills related to the study of population, do they possess?

Form A of the PDI was designed to measure outcomes relative to questions A and F above. Form B contained items pertaining to questions A through E. It also contained items pertaining to the student's demographic background (age, sex, number of siblings in his family, race, etc.). Both forms were

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[50]Copies of the two PDI forms can be found in Appendix A (Form A) and Appendix B (Form B).

tested with small groups of students before being used in the field. Both were also critiqued by subject matter experts. However, because the pressure of time was so great, they were administered before the subject matter experts' comments and criticisms could be incorporated into the inventories. For this reason the forms contain a number of inaccuracies as well as some other problems. Researchers wanting to use the forms should realize that they are "draft" quality materials and that revisions will be required.[51]

The Students

Seven hundred seventeen students in five states participated in the evaluation.[52] These students attended classes taught by twelve teachers who volunteered to participate in the study. These teachers were contacted indirectly through the use of intermediaries in each geographic region. The intermediaries were told that the project was to conduct an evaluation of the population-related knowledge and skills of twelfth-grade students enrolled in Problems of Democracy courses. The students were to be typical of those taking "problems" courses and, ideally, would represent a variety of ethnic groups.

Because the selection process was not random, it is possible that the sample of students used in this evaluation is biased and not representa-

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[51]Since the Center feels that the forms are useful research tools (as well as developmental tools), further development of the PDI is being contemplated.

[52]The states were Delaware, Indiana, Kansas, Kentucky, and Oregon.

tive of the population of "problems" students in its entirety. If there is bias, it probably can be attributed to an underrepresentation of minority students and to an overrepresentation of students being instructed by teachers who are "innovative" and "cooperators."[53]

A total of 357 students responded to Form A and a total of 360 responded to Form B. Demographic data, except for IQ scores, are available on most of the students.[54] Data regarding race and sex are presented in Table 1. Since each student was randomly assigned to either Form A or Form B of the PDI, data are given by Form.

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[53]Since these teachers represent those likely to use the unit (i.e., be early adopters), should it be produced, any bias resulting from their overrepresentation should work for, rather than against, the developer. Of the twelve teachers, some of whom were already teaching about population or had students who were exposed to population (for example, in a sociology course), only one said that she would not use the unit if it were available. The teacher felt this probably should be included in the curriculum but not as a separate unit. It should be treated in the context of discussing other "problems," such as underdeveloped countries, pollution, etc.

[54]It was not possible to obtain IQ scores for the students, although teachers were requested to provide these.

TABLE 1

Part A

Sex of Respondents to Each PDI Form.[55]

	PDI Form A	PDI Form B
Sex		
Female	54%	56%
Male	38	44
	(n=338)	(n=360)

Part B

Race of Respondents to each PDI Form

Race		
American Indian	1%	1%
Caucasian	80	83
Mexican-American	3	0
Negro	6	5
Other	4	11
	(n=335)	(n=358)

The PDI Forms

Because of the range of concepts, skills, and attitudes to be evaluated, the PDI was developed in two parts. Form A, as already mentioned, pertained to process skills such as graph reading, summarizing data and making inferences based upon data. Other skills measured by Form A included the ability to make inferences about the effects of changes in one demographically related variable (e.g., industrialism)

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[55]In order to complete testing in one class period students responded to either Form A or B of the PDI. The percentages above are the percent of the sample taking each inventory. Because a number of students in each group failed to respond to the question the percentages do not sum to 100 percent.

with another (e.g., fertility) and the ability to predict the effect of policy manipulations on demographic, social, and environmental variables. In some cases, this ability was confounded with process skills such as graph reading, but in other cases it was not. Table 2 presents a classification of the questions contained in Form A by topic assessed.

TABLE 2

Classification of Questions on PDI Form A by Population-Related Topic

Topic	Question(s)
I. Data Oriented Skills	
A. Line Graph	
1. Identification of variables	1,2,3,24
2. Interpretation	4,5,6,7,8,14,15,24,25,26,28,30,31
3. Understanding (proportions)	10
4. Summarization	11,13,27
B. Population Pyramids	
1. Interpretation	16,17
2. Understanding (proportions)	18,19,32,33,37
C. Tables	
1. Interpretation and computation	43,75,76,77
2. Comparison	44,74
3. Summarization	78
II. Population Dynamics	
A. Vital Statistics	
1. Industrial development, vital statistics, and growth	9,29,34,35,36,39,40
2. Medical technology and vital statistics	12,20

TABLE 2 (cont'd.)

B.	Age Structure	
	1. Age structure and societal events	21,38
	2. Age structure and fertility control	23
	3. Age structure and demographic processes	46
C.	Population Policy, Social and Demographic Changes	
	1. Defer marriages	56
	2. Lower death rate	41,47,50,51
	3. Lessen economic cost of additional child	
	4. Increase cost of maintaining children	48,51,57
	5. Promote domesticity/non-domesticity roles for women	49,58
	6. Lower birth rate	50
	7. Increase food supply	52,53
	8. Increase resources	54
	9. Change values	55,60
D.	Population Knowledge	
	1. Demographic effect of industrial revolution	63
	2. Population trends in U.S.	64,66,67,68,69,70
	3. Effect of family size on population	65
	4. ZPG	69,70,71
	5. Doubling time	72
	6. Cause of increase in population growth rate	73
E.	Valuing	45

Notes: Knowledge and process skills are confounded for a number of questions, making classification arbitrary. There is no question #62. Figure 1.1 and questions 1-15 are based upon the episode, "Analyzing Population Data," in Byron G. Massialas and Jack Zevin, Creative Encounters in the Classroom: Teaching and Learning Through Discovery. New York, Wiley, 1967, pp. 106-124.

) Form B contained attitude items and knowledge items. These assessed attitudes regarding population, scientific inquiry and instructional methods. A classification of Form B's items by topic is presented in Table 3.[56]

TABLE 3

Classification of Questions on PDI Form B by Topic

Topic	Question(s)
I. Student Characteristics	
A. Number of siblings	1
B. Sex	2
C. Race	3
D. Grade	103
II. Study Methods	
A. Style	6,29,32,33,36,44,48
B. Preferred duration of unit	5
C. Media	7,9,27,30
D. Miscellaneous	34,35,37
III. Knowledge-Related Items	
A. Historical events and population	93,100
1. Worldwide trends	72
2. Domestic trends	67,94
B. Components of natural increase	95
C. Demographic transition	96,97

[56]Data analysis indicated that Form B contained at least three Guttman-type indices. These are not shown in the table but will be discussed later.

TABLE 3 (cont'd.)

	D. ZPG	68,70,71,90
	E. Inferences	92,98,99
IV.	Problem Perception	
	A. Population as a problem	4,28,41,45,46
	B. Relation between population and the environment	17,22,69
	C. Cost of environmental destruction	14
	D. General state of affairs	38
	E. U.S. overpopulated	81
V.	Family	
	A. Need for family	49
	B. Value of small family	23
	C. Value of large family	13
	D. Ideal size	
	E. Preferred size	
	F. Best age to marry	
	1. female	50
	2. male	51
VI.	Economic Radicalism	12,21
VII.	Focus of Responsibility	
	A. Individual	11
	B. Family	24
	C. Species	12, 19
VIII.	Motivation for Children	42,43
IX.	Spillover Effects	20,31

TABLE 3 (cont'd.)

X. Population Policy	
A. Domestic	
1. Voluntary - facilitative	61,62,64,66
2. Incentive	26,101,102
3. Coercive	15,25,59,63,74
B. In Foreign Affairs	60,65,73,75,77,82,83,88,89
C. In Foreign Countries	
1. Voluntary	84,86,87
2. Incentive	85
3. Coercive	76,77,80
XI. Nature of Science	52-58

Constructing the Inventories

Construction of the PDI forms began in March, approximately one month into the period covered by the grant. The inventories were administered in late April and early May. Because of the short interval between funding, development, and administration, the forms are primitive, representing the project director's seminal thoughts about the skills and attitudes relevant to a population unit.

Development of the forms began with the director asking, "What do students have to know to be intelligent consumers of population policy?" From this the staff constructed a crude component structure representing the type of social demographic knowledge and auxiliary skills that students would be expected to possess after studying the unit. This structure is presented in Figure 2. Using the component structure as a guideline, the developers constructed a pool of cognitive and affective items. These were

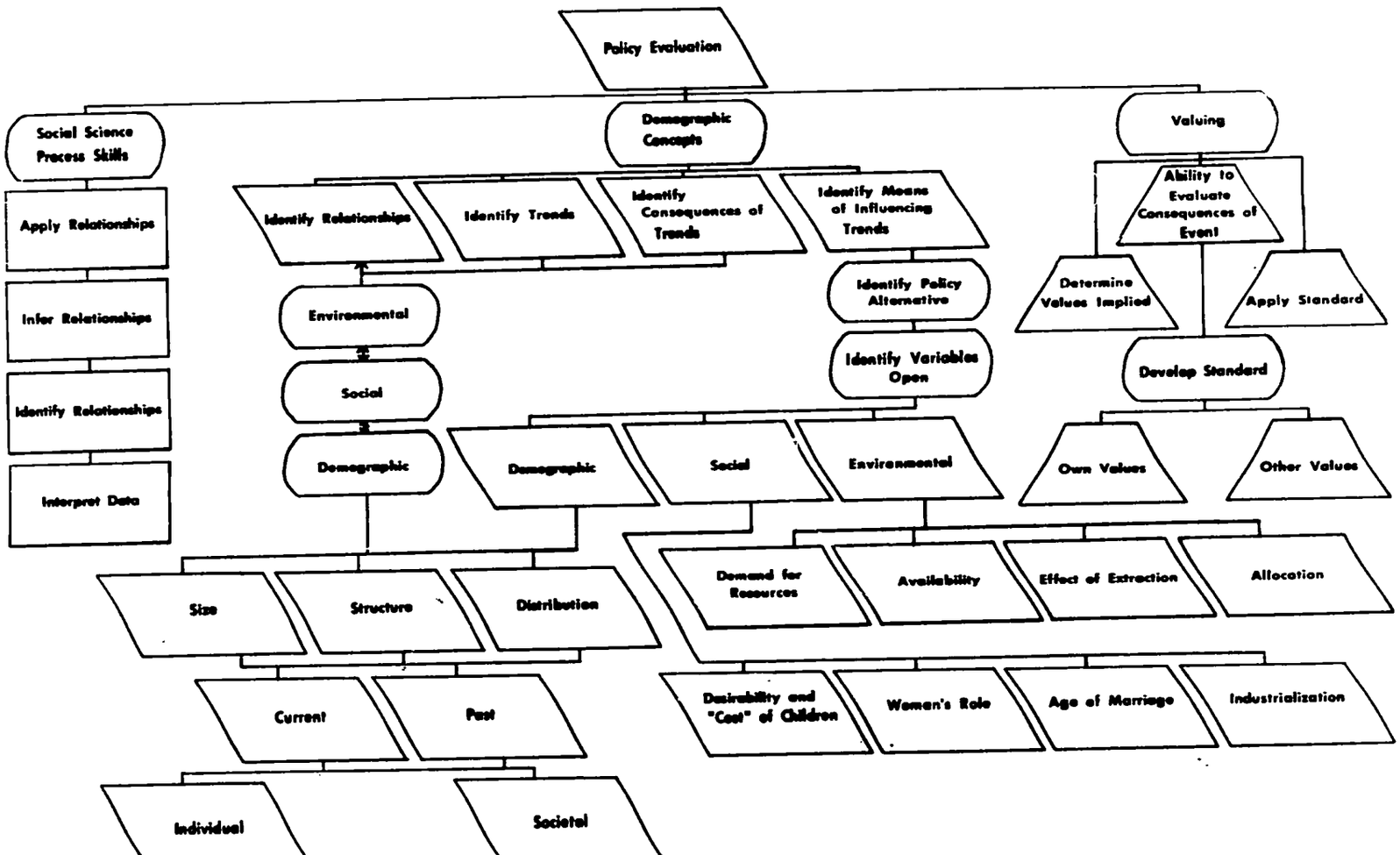

FIGURE 2. Component Structure for PDI Inventory

informally tested on a small group of students and revised. From this pool the PDI Inventory was constructed. This was given to subject matter experts for critiquing and was again administered to a few students. However, because of time pressure, it was impossible to incorporate subject matter experts' recommendations into the Inventory.[57] For this reason the Inventory, especially Form A, contains a number of inaccuracies which should be corrected if the PDI is to be used again.

Most items for the forms were written by the project staff. For Form A, items 1-18 were based upon a discovery lesson developed by Byron Massialas and Jack Zevin.[58] For Form B, item 8 was based upon an item used by the American Institute of Public Opinion.[59] Items 14,17,18,22,42,45-47 were based upon statements made in Ehrlich and Ehrlich, Population Resources Environment.[60] Item 40 was based upon an item asked by the Institut fur Demoskopie Allensbach #225.[61]

The items for each form were typed on stencils and reproduced by a mimeograph process. The question booklets for Form A and Form B were then numbered with an identification code. Machine readable answer sheets were correspondingly coded and inserted into the appropriate question booklets.

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[57] These criticisms can be found in Appendix C.

[58] Massialas and Zevin, Creative Encounters.

[59] The item used by AIPO is, "What do you think is the ideal number of children for a family to have." See Philip K. Hastings, Population Control: A Bibliography of Survey Data: 1938-1970. Williamstown, Mass., The Roper Public Opinion Research Center, 1971.

[60] Paul R. and Anne H. Ehrlich, Population Resources Environment, San Francisco, Freeman, 1970.

[61] Institut fur Demoskopie Allensbach #225, July, 1953, cited in Hastings, Population Control, p. II-7.

The booklets for Forms A and B were then randomly intermixed and sorted into bundles of thirty-six, eighteen of Form A and eighteen of Form B. Each teacher participating in the evaluation was then sent one bundle of forms for each class taught.

Administration

Each PDI form was designed to be completed in fifty minutes.[62] Since testing time was restricted to one class period, each student in the evaluation was randomly given either Form A or Form B. The forms were administered under testing conditions with the classroom teacher proctoring. After the administration, the teacher grouped the response sheets by classroom and returned them to the Center for processing.

Processing

After being returned the response sheets were edited and sorted by form, within each class. The response sheets for each form were then optically scanned and the responses for each person read onto IBM cards. These were edited and processed using a variety of computer programs, some original and some packaged (e.g., Biomed, Statistical Package for the Social Sciences). Although the results of the data analysis can be reported in a variety of ways, for simplicity they will be reported in terms of the six basic questions they were supposed to answer.

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[62]Although students had been able to complete the forms in fifty minutes during pilot trials, several teachers reported that their classes were unable to finish Form A in the time allotted.

What Do Students Know About Population?

Both Forms A and B contain items assessing knowledge about population and the ability to make inferences based upon this knowledge.[63] Taken as a whole, the items were designed to measure student attainment on these points:

a. Knowledge of the major demographic characteristics of the American population

b. Knowledge of historical trends and influences

c. Knowledge of the components of population growth and contraction (i.e., birth, death, and migration)

d. Ability to define the meaning of the demographic transition

e. Ability to utilize the principle of the demographic transition for developing explanations and making projections, given a set of facts about a country

f. Ability to make inferences about the effects of individual and societal actions, including the development of specific policy alternatives, on demographic variables

g. Ability to make inferences about the effect of changes in demographic variables, such as rate of growth, distribution of structure on specific individual and societal variables, including other demographic variables

h. Ability to discuss demographic and social implications of ZPG.

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[63]Most of Form A's knowledge items appear toward the end of the question booklet. Because of the high noncompletion rate for Form A, many students did not have an opportunity to answer these items. Therefore, only the knowledge items for Form B are considered. Items assessing ability to make inferences appear on both forms, with Form A containing the majority of items. When percents are given, they refer to the percent of respondents on Form A or Form B who replied to the particular question.

Analyzing student performance, it becomes evident that most students lack much factual knowledge about population dynamics. This ranges from ignorance on obtuse questions, such as how many people are being added to the U.S. population each year, (Q. 67, Form B, 12 percent correct) to more basic ones, such as the meaning of the demographic transition (Q. 96, Form B; 5 percent correct).[64] Familiarity with historical trends and influences is poor. Thirty-two percent of the students (Q. 100, Form B) indicated the "population explosion" caused man's first large increase in population. Less than 10 percent of the students rejected the proposition that underdeveloped countries would experience a demographic transition experienced by the Western industrial nations (Q. 97, Form B). Only 7 percent of the students (Q. 93, Form B) were able to correctly identify China, France, and Japan as being countries that have engaged in some form of population control. Approximately 28 percent of the students rejected the possibility that two or more of the countries had engaged in some form of population control.

Asked to identify the components of population growth when given death rate and the rate of natural increase, 59 percent of the students correctly responded that insufficient information was given for determining immigration rate (Q. 15, Form B). Only 24 percent, however, were able to relate population growth to birth and death rates using graphs (Q. 14, Form A).

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[64]Question 72 (Forms A and B) asked about doubling time. Students on both Forms responded that time had increased. Rather than being in error, this probably reflects difficulty in reading the question.

Although a person may have difficulty in verbalizing a concept or principle, he may be able to use it. Form A of the PDI contained a number of items designed to assess the student's ability to apply the principle of demographic transition. Question 34 (Form A), for example, attempted to elicit the inverse relationship between industrial development and birth rate (fertility) that is characteristic of the transition: of the two plausible answers, "Country B" and "insufficient information," "Country B" being the better answer, only 40 percent of the students chose either alternative (10 and 30 percent respectively). Most students (50 percent) selected the country with the lowest level of industrial development as the country with the lowest birth rate.[65] Question 9 (Form A) also attempted to assess the student's understanding of the relationship between industrialization and long term changes in birth and death rates. This question presented the student with three graphs, each showing trends in birth and death rates for a different country. The student was then required to associate a high birth rate (over 40) and a rapidly declining death rate with lack of industrial development. Approximately 48 percent of the students indicated the question could not be answered. Twenty-seven percent opted for a direct association and chose the country with the lowest birth and death rates for being the least industrialized. Only 14 percent correctly answered the question.

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[65]This response is part of a pattern of responses made by students when interpreting graphs. Students, especially when they do not understand a concept, assume a positive correlation between the height of the graph and whatever is asked for in the question. See Question 6 (Form A) or Question 9, alternative C (Form A).

In regard to student ability to make inferences about the effect of individual and societal actions on demographic variables, students again did poorly. Question 9, for example, asked the students to judge which of three countries probably had the longest history of advanced medical care. To answer the question the student had to examine death rates for three countries over time. The inference that was to be made was that one country with the lowest average death rate over time and the least variability was the one with the longest history of good medical care. Of the three alternatives the first and the third could be seriously considered as correct, the second (India) could be readily discarded. Yet 34 percent of the students selected the second alternative. This compares to 31 percent who correctly chose the third alternative, 10 percent who chose the first, and 18 percent who chose "insufficient information."

Question 41 (Form A) is probably the most direct question asked the students. Here, students are given three policies and are asked to identify which, if any, would encourage an increase in the rate of population growth. The three policies are to (I) expand educational opportunities beyond high school, (II) provide free hospitalization, (III) give welfare families enough money to adequately support all their children. Students were restricted in the alternatives they could choose. The alternatives and the percent selecting each are given below:

a)	I only	7%
b)	I and II	11
c)	I and III	10
d)	II and III[66]	55
e)	None of the above	11

[66]Considered correct.

In addition to question 41, students were asked a series of less direct questions designed to assess their ability to infer the effect of individual and societal actions on demographic variables. Questions 42 to 64 (Form A), for example, ask the students to determine what effect, if any, a series of events has on the size or rate of growth of the population of a fictitious tribe, the Nimi, that lives on two small islands about 500 miles apart.[67] The type of events students respond to range from increased death control to religious conversion. The consequences of some events are readily inferred. In some cases no inference is possible.

Two questions (Q. 47 and Q. 61) pertain to death control through medical advances. Forty-one percent of the students correctly identified the effect of an antimalaria program and 50 percent identified the consequences of improved medical care for infants. Thirty-four percent of the students were able to predict the demographic consequences of a change in values regarding the desirability of death (Q. 59).

Questions 49 and 58 asked students to predict the demographic effects that changes in domesticity roles for women would have on a population. For question 49, 12 percent of the students answered that increased domesticity would be positively associated with fertility. For question 58, 18 percent correctly associated a lowering of fertility with lessening domesticity.

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[67]The dropout rate began to increase at this point as students ran out of time.

Two questions (Q. 52 and Q. 53) pertain to the effects produced by increases in food resources. However, in question 53, the resource is not perceived as such by the community. For question 53, 46 percent of the students correctly answered that increases in unperceived food resources would have little effect on population. For question 52, where the expansion was perceived, 30 percent of the students responded that it probably would stimulate population growth.

Question 50 sought the effect that the introduction of birth control devices would have on the population. Since it was not possible to ascertain whether or not the Nimi would use the devices, their effect could not be inferred. Therefore, the answer to question 50 was "insufficient information." Eight percent of the students chose this response. Most assumed that the Nimi would use the devices (Q. 50, 52 percent). Question 60 considered the effect that conflict between tribal medicine men and Western doctors would have on the effectiveness of a population control program. As with question 50, insufficient information was given to determine what effect this conflict would have on the program. Only 13 percent of the students, however, chose this response. Asked what effect teenage marriages would have on population, 53 percent correctly chose the alternative indicating that it would facilitate growth.

The desire to have children is often treated in economic terms. This leads to suggestions to increase the "cost" of children, for example, by establishing antinatalist taxes. Question 57 sought to see if students could apply this concept to the Nimi. Here, the Nimi were taxed by having

to work three days a month for each child they had. Thirty-three percent of the students correctly identified the disincentive aspect of the policy.

Population changes are related to many individual, societal, and demographic variables. Form A contained several items designed to assess student understanding of the effects produced by demographic changes. Questions 21 and 22 (Form A) asked students to project the probable effects of different age structures on demographic and societal variables. For question 21, 53 percent correctly identified the country likely to have the largest relative increase in the size of its population over the next sixty years. For question 22, 34 percent correctly inferred that country B, the country having the larger proportion of young people (nine years and below), would have a classroom shortage in 1980, other things being equal. For question 46 (Form A), 37 percent of the students were able to perceive the relationship between the proportion of women of child-bearing age in a population and the number of children likely to be born in that population.

Zero population growth has become an increasingly popular subject for discussion, gaining much publicity and support. The PDI Form B contained several questions designed to measure student understanding of ZPG. In regard to the average number of children required to produce ZPG, 48 percent of the respondents selected two children as being the average number required. However, because the question (Q. 68, Form B) asked how many would be required for an <u>immediate</u> halt, it is evident that students have heard the message "stop at two" but have not entirely understood its

demographic implications.[68] Question 71 (Form B) further demonstrates this fact. Asking how many years would be required to produce ZPG if families averaged two children, only 14 percent of the students correctly identified sixty years as being the amount of time required. Almost 26 percent selected five years or less as being required. The remaining 50 percent were almost evenly distributed between the fifteen-years alternative and the thirty-years alternative.

Two questions asked students to speculate about the consequences that an immediate halt in population growth would have on life in the year 2000. Question 90 (Form B) asked students to choose among the following alternatives:

I. There probably would be more living space than today.

II. It probably would be more politically conservative than it is today.

III. It probably would be less consumption-oriented than it is today.

Student responses were limited to the choices below. The figures beside each alternative indicate the percent of students selecting that alternative:

a)	I only	31%
b)	II only[69]	10
c)	III only	14
d)	II and III	14
e)	None of the above	22
	No response	9

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[68]Forty-two percent of the students chose either zero or one child, the range considered necessary to yield immediate ZPG.

[69]Considered the correct answer. See Roland Pressat, Population.

Question 91 (Form B) asked for the probable effect that ZPG would have on the opportunity for job advancement in the year 2000. Percent responding to each alternative are shown below:

a)	No effect	8%
b)	There would be more opportunity for advancement than now	50
c)	There would be less opportunity for advancement than now[70]	7
d)	It would depend on the individual	26
	No response	9

Although this question is highly speculative, it has been written "declining growth rates in GNP, partially brought about by a slower rate of [population] growth, would increase problems of employment and income redistribution."[71] Given this proposition it is interesting to note that 50 percent of the students selected alternative "b." It is also interesting that 26 percent of the sample chose alternative "d," placing responsibility for success on the individual rather than on structural variables.

Summarizing student knowledge, it tends to be low in every area assessed. Students do not know facts, trends, or relationships. They can infer, however, with some degree of success the effects of policy manipulations. Most students seem to be aware of the ZPG emphasis on the two-child family, but few, aside from associating this with zero growth, are familiar with the demographic implications. Judging from the response patterns, it would seem that students fail to realize that life in a world of ZPG would offer a number of challenges that must be overcome if people are to voluntarily restrict their fertility.

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[70] Considered the best response.

[71] Population Reference Bureau, Population Bulletin, Vol. XXVI, No. 2, April, 1970, p. 20.

Do Students Perceive Population Changes as a Problem?

Form B contained a number of items, including a Guttman-type index, assessing student perception of population problems. If students were deeply concerned over population questions, one would expect them to be consistent in their response patterns. Since students were not consistent in reponding to the "problem" items, it would appear that in most cases they were responding to the item rather than to an underlying perception of a population problem. Questions 17 and 22 (Form B) illustrate this well. Question 17 asked students to agree or disagree with the proposition (27 percent disagreed). Question 22 asked students to consider the proposition that the U.S. environmental crisis is largely the result of how people like to live rather than the size of the population. About 54 percent agreed with this item (24 percent disagreed). If students were consistent, they should have agreed with one question and should have disagreed with the other. This would produce a large negative correlation coefficient between the two items. The actual correlation coefficient is -0.15 ($N=353$, $p<.002$), indicating a small amount of consistency.[72]

Comparing population problems to other problems, students were asked (Q. 4, Form A) to indicate which of the problems below they thought presented the greatest challenge to the U.S.:

a)	Air and water pollution	31%
b)	The Vietnam War	25
c)	Hunger and poverty	13
d)	Population growth	26
e)	Overconsumption	4

[72]Bachman and Van Duinen also discovered that at least 15 percent of their sample of young men agreed with diametrically opposite statements (p. 69).

Only 26 percent indicated that population growth was the greatest challenge from among those listed. This compares to approximately 28 percent considering population growth to be an extremely important problem in the Youth in Transition Study by Bachman and Van Duinen.[73]

A number of items (Qs. 41,45,46,47) asked students to respond to statements about the effect of population growth on various aspects of life in the United States. The students were surprisingly negative in their evaluation of the consequences of demographic growth. Sixty-seven percent, for example, disagreed that population increases were good for economic growth in countries such as the U.S. (Q. 41). Fifty percent agreed population growth made it harder for the government to function (Q. 45). Sixty-five percent rejected the proposition that people in the United States could be certain of having a high standard of living even if the population were two or three times as large as it currently is (Q. 46). Fifty-four percent agreed that the United States is overpopulated. (Q. 81).

What Are Student Attitudes Toward Population Control Measures?

Form B contained a number of items assessing student attitudes toward population control measures in this country and in India. From these items it was possible to construct three Guttman-type indices.

The first index pertains to willingness to support population control measures of varying severity and coercion in the United States.[74] The

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[73]Bachman and Van Duinen, "Youth Look..."

[74]The Coefficient of Reproducibility for this index equals 0.92. The Coefficient of Scalability equals 0.58.

range of alternatives in order of severity are:

(Q. 64) The government should set up clinics to give birth control information to married women.

(Q. 102) The government should give people who adopt children a special break on their income tax.

(Q. 101) Some people suggest that our government should stop paying families on welfare any money if they have more than one or two children. Do you agree with this?

(Q. 25) It should be illegal for families to have children without first getting permission from the government.

(Q. 59) The government should put birth control medicine in the drinking water so that people can't have babies without getting permission.

The items were scored in a binary manner so that agreement with an item was scored as one point and disagreement as zero points. There being five questions, scores ranged from zero to five, with high scores representing coerciveness and low representing voluntarism. Scores on this index were obtained for 313 students. The mean score was 1.10 with a standard deviation of 0.90.

The second index asked students to respond to a similar but more severe set of items pertaining to population control in India.[75] The items contained in the index are presented below:

(Q. 86) The Indian government should give free birth control devices to people who want to use them.

(Q. 79) The Indian government should sterilize all men who have more than two children.

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[75]The Coefficient of Reproducibility on this index was 0.97. The Coefficient of Scalability equalled 0.75.

(Q. 76) To help reduce the size of its population the government of India should put birth control medicine in its public drinking water.

(Q. 80) Some people have suggested the Indian government begin issuing permits to families who want children. Any child born without the government's permission would be killed. Do you agree with this idea?

As with the other index, agreement with an item was scored as one point; disagreement received zero points. The number of agreements were summed, yielding the index score. Possible scores ranged from zero to four, with a high score representing a willingness to support more coerciveness than a low score. The mean score on this index was 0.62 with a standard deviation of 0.69 (N=338). As before, the students reject coercive measures in favor of voluntaristic measures.

This tendency for supporting noncoercive measures, those, for example, in which the individual takes primary responsibility for family limitation or in which the government serves as a "facilitator," can be seen by examining individual items.[76] For example, approximately 76 percent of the students (Q. 66, Form B, N=360) agreed that the government should give free birth control devices to people who want them. Eighty-two percent agreed with this statement when applied to the Indian government (Q. 86, Form B). The correlation between the two questions was 0.66. Sixty-four percent of the students (Q. 62, Form B) agreed that the U.S. government should make it easier to have abortions. Sixty-four percent also agreed that the Indian government should make abortions easier to obtain (Q. 84, Form B). The correlation between these two items was 0.68. Besides

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[76]Bachman and Van Duinen found a similar tendency in their study. Their respondents similarly favored voluntary measures with the focus upon individual responsibility.

facilitating population control (e.g., family planning and limitation), government may take a more direct role. For example, it may attempt to encourage people to reduce fertility (change geographic location, etc.) through advertisements or incentives. It may also use direct coercion, varying the degree of severity. Of the students responding to Form B, 66 percent were willing to permit the U.S. government to pay for radio and television commercials promoting smaller families (Q. 61). For India, this percentage was 57 (Q. 87); the correlation between the two items was 0.50. Direct incentives were not as strongly supported. This is especially true in regard to "negative" incentives. Only 27 percent of the students, for example, agreed that the government should pay people for not having babies (Q. 63).[77] Twenty-seven percent supported the proposition that welfare payments should be cut off for families having more than one or two children (Q. 101). Fifty-three percent, however, were willing to support the "positive" incentive of giving people who adopt a special break on their income tax (Q. 102).[78] On highly coercive aspects, for example, putting birth control medicine in the public drinking water (Q. 59), only 4 percent agreed that the government should

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[77]Thirty-two percent supported this proposition for the Indian government (Q. 85). The correlation between the two items was 0.60.

[78]It is interesting that France once found that such "positive" measures to be more effective than "negative" ones in stimulating fertility. See Pressat, Population.

do this. Almost 71 percent of the students strongly disagreed.[79] Making it illegal to have more than one or two children (Q. 65) was similarly rejected, but not as strongly. Here, 74 percent of the respondents opposed this measure -- 43 percent strongly. Almost 13 percent approved of it -- 5 percent strongly.

The third index assessed student attitudes toward the United States' involvement in the population problems in other countries. In a sense, it is a population isolation index, a high score indicating isolationism and a low score indicating involvement. The three questions comprising the index are the following (from Form B):

(Q. 75) The U.S. should not worry about population problems in other countries.

(Q. 77) Foreign countries should not listen to U.S. advice on population.

(Q. 82) The U.S. should mind its own business and not tell other countries how big or small they should be.

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[79]For a similar item regarding India (Q. 76), almost 75 percent of the students disagreed. The correlation between the U.S. item and the India item was 0.44. Although not as high as some of the previous correlations, it still indicates a relatively high level of response consistency between items. This may indicate a tendency to respond to policy matters on the basis of an underlying disposition toward various types of acts without regarding situation factors. Thus, if a person supported abortion, this would generalize across countries. Similarly, opposition would generalize across countries. If this hypothesis holds, it would have interesting implications for those actively engaged in attitude change programs. For example, by focusing attention on India and increasing support for family limitation there, they might be able to simultaneously develop support for family limitations in other countries, including the United States.

Mean score on this index (N=342) was 0.43 with 0.75 the standard deviation. Students evidently realize that population pressures in other countries have implications for Americans as well as for people in developing countries.

What Are Student Population-Related Attitudes?

If a population policy promoting population stability is formulated, citizens will have to be willing to accept a small family norm. The PDI contained a number of items assessing student attitudes toward the family. Question 49 (Form B) asked a basic question: "Do you think a person needs a family to be really happy? Or do you think a person can be equally happy without being married? Surprisingly, only 48 percent of the students replied that a person needed a family. Forty-six percent said a person could be equally happy on his own.

Asked how many children were the best number for a family to have (Q. 8), 61 percent responded two or less (56 percent favored two). Three children were preferred by 29 percent of the sample, and four or more were desired by 9 percent. This compares to 24 percent favoring four or more in the Youth in Transition Study, 17 percent in the Harris Poll, 11 percent in the Purdue Poll (Q. 89)[80] and 15 percent of people twenty-one to twenty-nine years of age in a Gallup Poll.[81]

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[80]These figures are taken from Bachman and Van Duinen, "Youth Look..." p. 65.

[81]George Gallup, Report of the Gallup Poll of January, 1971. American Institute of Public Opinion, February 21, 1971.

If the 37 percent who want three or more children are to voluntarily limit their fertility, they must be willing to make a sacrifice. To some degree, willingness to forego individual desires may be related to the individual's "population conscience" -- the degree to which he feels responsibile to others for his behavior. Fifty-two percent of the students rejected the proposition that the number of children a family has is strictly its own concern (Q. 16), although 59 percent did agree that a man's main responsibility in life was to his family (Q. 24). Since 65 percent agreed that loyalty must be shown mankind as well (Q. 19), knowing that family limitation promotes both individual welfare and species welfare might provide motivation for limitation.

Fertility is related to age of marriage. The earlier a person marries the more time he has available in which to have children. Students were asked to select the age they felt was best for males and females to marry (Q. 50, Q. 51). Forty-eight percent (the modal response) indicated that 22 to 24 years was the best age range for males to marry (36 percent favored 19 to 21 years old). For females, the modal response (47 percent) was also 22 to 24 years, but the average age was younger since 36 percent thought that 19 to 21 years of age was the best.

What Are Student Attitudes Regarding Instructional Techniques?

To be successful, instruction must be pedagogically sound. But it must also be interesting. Otherwise, students will not respond to it. To attempt to determine approaches that would promote high interest in instruction the students were asked to respond to a number of statements about instructional techniques.

Students were asked, for example, how they preferred to study (Q. 6, Form B), the methods they liked (Q. 7), and the approaches they preferred (Q. 10). Ninty-five percent of the students liked to study independently or in small groups. Forty-five percent said group discussions were the most effective way to learn something. Seventy-six percent said they preferred dealing with specific examples rather than generalizations. Most (75 percent) rapidly tired of studying one topic, preferring to spend less than four weeks on one subject.

How Developed Are Student Process Skills?

Many demographic concepts are best understood by examining graphs or tables of data. If students are to approach the study of population from a social scientific viewpoint, they need to understand the "language" of the social scientist and to begin thinking as a social scientist. Demography, being one of the more methodologically sophisticated of the social sciences, is an excellent subject in which to begin building data-oriented skills. To determine student ability to understand and utilize data, the PDI (Form A) contained a large number of "data processing" questions. Some of these pertained to basic skills such as graph reading. Others pertained to computational skills, and still others pertained to the ability to make inferences based upon data.

The test revealed that student skills were poor. Only 75 percent of the students could correctly identify variables on a graph (Figure 1, Form A). Often students confused changes in rates with absolute changes. For example, a decrease in the rate of natural increase (i.e., birth rate-death rate, migration = 0) would be interpreted as a net decrease in

population size. Proportions were similarly misunderstood (Q. 6). Students would assume on the basis of population pyramids, for example, that the country with the larger proportion of youths had the most youths (Q. 19). Ability to understand and summarize rate of change was also poorly developed. Only 47 percent of the students, for example, were able to correctly describe the plots for an index of fertility for three countries (Q. 27).[82]

Summary

The PDI forms indicated students were concerned about population growth both in the United States and abroad, but they had little factual information upon which to base this concern. Few knew how many people were being added to the U.S. population each year or how many years would be required to reach ZPG, assuming families immediately averaged two children. The concept of the demographic transition was poorly understood and could not be fruitfully applied to novel situations. Students were able to perform relatively well on questions asking them to judge the effect of specific individual or societal actions on population size or growth. Structural changes were less evident, with most students selecting "optimistic" alternatives.

A majority of the students indicated that two children were the best number for a family to have. Favored policy alternatives emphasized voluntarism, with the government acting in a facilitating role. Policies featuring negative incentives or coercion were not supported. This seemed to be a generalized

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[82]Most computational questions were not attempted because of time limitations. They will not, therefore, be considered here.

phenomenon, transcending national boundaries, since students reponded similarly for population control measures in India.

Processing skills were poor. A relatively large percent had difficulty in reading, interpreting, and summarizing data presented in graphical form. Population pyramids were more easily read, but their proportional aspect was misinterpreted. As with rates of change, students tended to translate relative differences into absolute differences.

In regard to instruction, students indicated a preference for methods featuring independent study and small-group discussion. Most preferred spending less than four weeks on a topic. This may mean they like to consider a variety of different topics or that they like to examine many different aspects of a single problem, not spending too much time on any one. Given their preference for specificity, the latter explanation seems more plausible.

CHAPTER VI

OBJECTIVES

In Chapter IV the purpose, goals, and topics appropriate for a social scientific, decision-making approach to population were discussed. In the last chapter, it was seen that students were concerned about population pressures, but that they lacked basic knowledge about population. The project director has attempted to develop a set of instructional objectives oriented to the needs of these students and the approach advocated in Chapter IV. These objectives are listed below. They will serve as the minimal outcomes the Center's population unit will produce. The next chapter will consider ways in which the objectives may be achieved.

As was stated previously in this paper, the objectives span several functional areas -- process skills, knowledge about demography (especially the field characterized as social demography), and value analysis. Mastering the objectives below should provide the student with sufficient knowledge and skills to operate as an intelligent consumer of population policy. Mastery also should make the student more aware of the utility of social science concepts and methodology, and it should provide him with a structured way of identifying, analyzing, and resolving value conflicts.

A. Social Science Process Objectives

1. Given a statistical chart, graph, map, or table of data, the student will be able to (a) select from a list or (b) construct a statement, describing the data presented.

2. Given a statistical chart, graph, map, table of data, or written paragraph pertaining to a specific relationship, the student will recognize inferences based upon the given data and will select from a list alternatives consistent with the given facts.

3. Given a set of events or relationships the student will be able to utilize a classification scheme and to classify the events or relationships according to a given or developed set of criteria.

4. Given a set of related variables the student will be able to describe orally or in writing the relationship between two or more variables.

5. Given an empirically testable question and a set of procedures, the student will be able to conduct a simple investigation according to the directions supplied.

6. Given section 5, the student will be able to summarize his findings, state any relationships which were uncovered, and relate his findings to the research question being asked.

7. Given data and a description of a data-gathering activity, data obtained, and a list of invalid inferences based upon the data, the student will be able to identify each inference as being valid or invalid and will either select from a list or construct an explanation as to why the particular inference is valid or invalid.

B. Population Dynamics

1. Given a series of case studies, the student will identify the natural factors controlling the size, distribution, and structure of nonhuman populations.

2. Given a series of case studies, the student will identify the population check operating in each and will classify it as "self-imposed" or "externally imposed."

3. Given a series of controls on population size and structure for human and nonhuman populations, the students will compare and contrast the relative ability of humans and nonhumans to modify these restraints. Culture and technology should be identified as distinguishing characteristics.

4. Given a list of different cultural practices the student will identify the likely effect of each on the population.

5. Given a list of technological changes (e.g., industrialization) the student will identify the likely effect on the population (e.g., long term decline in fertility).

6. Given a change in one demographic variable (e.g., fertility decreases), the student can identify related changes in other demographic variables (e.g., age of population).

7. Given the principle of the demographic transition and a series of case studies, the student can identify those demonstrating the principle.

8. Given section 7, the student can explain why non-exemplars are not considered to reflect the principle.

9. Given a population pyramid (or graph or table) pertaining to age-sex structure, fertility, rate of natural increase, etc., of a population, the student will be able to infer the characteristics of the population shown (e.g., if industrialized) and to develop hypotheses capable of explaining trends and variations in trends.

10. Given a series of case studies the student will be able to list five factors which influence a person's perception of a "population problem." These include social psychological (e.g., private space), sociopolitical, economic, and/or environmental influences.

11. Given a list of variables affecting demographic processes and a list of policy alternatives, the student will match each variable (e.g., cost of children) with the policy most directly related to it (e.g., a head tax).

12. Given a list of demographic outcomes (e.g., aging) and a list of policies (e.g., compulsory family limitation), the student will be able to match each outcome with the policy appropriate for producing that outcome.

13. Given a description of a society and a population goal (e.g., increased size), the student will name three things that could be done -- i.e., variables that could be manipulated (e.g., reduced mortality, increased fertility, increased migration) in order to achieve the goal.

14. Given the list produced above, the student will identify from a list or construct two policies that could be used to achieve the specified population goal.

15. Given section 14, the student will indicate (and explain) which is more feasible within the context of a given society.

16. Given a series of readings, the student will describe the demographic conditions of the major industrialized countries as a group and the major unindustrialized countries as a group.

17. Given a series of readings, the student will compare and contrast population problems in developed countries with those in undeveloped countries, discussing pollution, population concentration, age-structure, pressures on capital, etc.

18. Given a list of events which may occur in the future (e.g., sexual predetermination by genetic control), the student can identify the likely effect on population dynamics (e.g., reduced fertility in underdeveloped countries) and defend in terms of existing knowledge or theories (e.g., desire for a male heir discounted by perception that high mortality yields high fertility).

19. Given a list of statements, students will select those describing probable demographic futures for specified developed and underdeveloped countries.

20. Given a description of a "commons" or presented with an analogous situation, students will be able to determine the individual and group payoff matrix for cooperation and compare these.

21. Students will compare and contrast in writing (or be able to identify similarities and differences, given a list) economic-motivational factors supporting noncooperation on the commons and the desire to have children in industrialized and non-industrialized countries (e.g., benefits of children in India vs. costs to the individual and society compared to individual and societal cost/benefit in the U.S.).

22. Given sections 20 and 21, students can describe two variables that could be manipulated to change the payoff matrix for the individual or for society for each type of country (e.g., in addition to changing market value of the "commodity," the cost/benefits can be influenced by institution of controls such as penalties, head taxes, policing, etc.)

23. Given sections 20, 21, and 22, students can describe or select from a list two policy options capable of influencing each variable named above (e.g., institution of social security reduces the market value of child in India because it reduces an individual's dependence upon child for old age support).

24. Given data pertaining to present and future demographic conditions in the U.S. over the next century, students can describe what implications these trends have on the quality of life that will be possible (a) other things being equal, and/or (b) with selected changes in technology.

25. Given demographic trends, students will identify at least two factors that can modify the trends (e.g., specific policy opinions, self-imposed changes in behavior, natural disasters, etc.).

26. Given a list of policy alternatives affecting the population of the United States and a list of probable consequences, the student will be able to match each policy alternative with its probable social and demographic consequences.

27. Given a series of population goals and a list of probable social and demographic consequences, the student will be able to match each goal with its probable social and demographic consequences.

28. Given a series of goals and policy alternatives, the student will be able to match each goal with the policy alternative(s) reinforcing that goal (e.g., ZPG, subsidy for two-child family).

C. Value Analysis

1. Given a list of statements the student will classify them as normative or empirical.

2. Given a list of normative statements, the student will classify them as primarily terminal (ends-oriented) or instrumental (means-oriented).

3. Given a list of values (e.g., those on the Rokeach Value Survey[83]) the student will rank order them.

4. Given a list of values and a description of a situation, the student will rank order the values as he thinks they should apply in that situation.

5. Given sections 2 and 4, the student will compare his rankings and discuss the effect the situational context had on his rankings (i.e., reliability of ranking).

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[83]Milton Rokeach, "Long-Range Experimental Modification of Values, Attitudes, and Behavior." American Psychologist, Vol. 26, May, 1971, pp. 453-59.

6. Given a list of goals for the future, the student will identify the value implications of each.

7. Given section 6, the student will rank order the goals according to a rule (e.g., maximize equality).

8. Given a list of policy alternatives and the goal to which they are oriented, the student will be able to identify those which conflict with his set of values (e.g., given rule: maximize equality, identify policies that maximize inequality).

9. Given two sets of values and a list of population policy alternatives, the student will match each alternative with the set of values it best represents.

10. Given two or more sets of values, the student will determine if any of the sets conflict with one another, will identify those that conflict, and will describe sources and likely effects of this conflict.

11. Given a list of population policies and a goal, the student will rank them in terms of his own value hierarchy.

12. Given a number of case studies dealing with alternative futures, the student will select the future best reflecting his system of values.

13. Given a description of a country, a list of population goals, and a list of policy alternatives, the student will select a population goal and one or more policies designed to produce that goal and will defend his selection in terms of a determined value hierarchy.

14. Given a description of a person in a value conflict (either with himself or with others), the student will portray, verbally or nonverbally, the emotions he imagines the person in the conflict is experiencing.

15. Given a description of a policy or event and a list of values, the pupil will identify whether a person holding the values given would respond positively (with "approach" tendencies) or negatively (with "avoidance" tendencies) to the policy or event.

16. Given section 15, the student will portray verbally or nonverbally how he imagines the person in section 15 "feels" as he responds to the policy or event given.

17. Given a conflict between individual short-run interest and group long-run interest, the student will identify the value positions implied by alternate decisions (e.g., favoring the group vs. favoring the individual).

CHAPTER VII

UNIT GUIDELINES

The unit planned by the project requires about six weeks of instructional time in order to attain the objectives listed in the previous chapter. The unit will be structured around a textbook supplemented by a group of instructional aides comprising a learning activities package.

The textbook will be produced as a paperback. Unlike typical textbooks it will contain graphs, tables of data, copies of advertisements, and pictures. After reading a few pages of text or examining an iconic representation, the student will be required to use the information acquired to complete an exercise or solve a problem. Numerous case studies will be presented to illustrate concepts and to provide raw material for analysis. Content for these case studies will be sampled from several historical periods, from several different types of culture (e.g., agricultural, early industrial, post industrial), and from macroscopic and microscopic perspectives.

The learning activities package will contain a variety of instructional material designed to supplement the basic text. The package will contain material for both the student and the teacher to use.

Student material will consist of data bank activities, role-playing episodes, micro-investigations, and a board game. These activities form the action component of the unit. They are designed to help personalize concepts and to help the pupil understand more fully the concepts being taught. In some cases the purpose of the activities is primarily affective, for example, increasing appreciation or awareness of a problem or information gathering techniques. In other cases, for example, with the data bank

activities, it is primarily cognitive, and in others it is both. Representative activities for each of these classes are presented in Figure 3.

The inquiries and exercises will cover a wide range of activities. Many of these will be in-class activities involving the use of the data bank which will be developed as part of the unit. This data bank will contain data on a variety of countries, and it will include "soft" (descriptive) as well as "hard" (statistical) data. Through access to the data bank the student will be able to obtain information on a variety of social and demographic indicators. Use of the data bank will develop the student's process skills as well as provide him with a data source for developing and testing relationships between variables and for aiding in policy analysis. In addition to data bank activities, in-class inquiries will also permit the student to engage in discussion sessions, report preparations, and "micro-investigations" designed to teach basic concepts or to enhance the learning experience. One such micro-investigation is the first activity described in Figure 3. Another example is an investigation of the relationship between the complexity of communication systems and the number of people in a population wishing to have direct communication with one another. Here, using tinker-toy like elements to represent people in his population, the student can investigate the effect of population size on the complexity of his communication system. Other micro-investigations will focus on questions such as, When are more people better than less? (How long does it take for one person, ten people, 30 people to carry all the classroom desks into the hallway and back?) What does it mean when a population becomes older or younger? (Should you invest in a diaper service or retirement community, be a pediatrician or a

FIGURE 3

EXAMPLES OF ACTIVITIES WITH DIFFERENT ORIENTATIONS

Orientation	Activity's Objective(s)	Sample Activity
Affective	To describe the social-psychological implications of population doubling as the density of the area of activity increases in density and as the frequency of social interaction increases	Given a circle with a 10' diameter, two chairs within the circle, and two people within the circle, the number of students in the circle will double every 60 seconds for five minutes. At the end of the five minutes, students will describe what happened, how they felt as the circle got more crowded, whether a prolonged stay in the circle would be comfortable and what happened to the chairs.
Cognitive	To develop the ability to classify data according to some criterion, to make comparisons, and to establish relationships	Given ten countries in random order, five of which are industrialized and five of which are unindustrialized, and given per capita GNP and rates of population growth, the student will a. rank each country by per capita GNP b. rank each country by growth rate c. compare the rankings of each country made in a and b d. state the relationship that exists between per capita GNP and population growth.
Affective and Cognitive	A.1 To answer empirical questions using social science methodology when not required by external authority C.1 To develop the ability to construct a simple questionnaire and conduct a survey according to specified procedures C.2 To organize and interpret data C.3 To describe research findings and to establish relationships	Given a simplified set of procedures and a sample KAP survey questionnaire, drawing a sample from the school or local community, the student will conduct a simplified KAP survey.

gerontogolist?) and, related to this, What would life in a world of ZPG be like? (How long will you have to wait to get promoted?).

In addition to data bank and in-class inquiries, a number of activities outside of the classroom will be encouraged. Some students might go on photographic expeditions to demonstrate the meaning of "overcrowding." Some could conduct surveys of fertility attitudes of students in their school. Or, since dying is one way to help solve the population problem, people of various ages can be interviewed in regard to their views on death, or the possibility and implications of extending longevity, perhaps even putting death off altogether. Other inquiries might include shopping trips to determine the economic cost of getting ready for and having a baby. Discussions with new parents might indicate some of the hidden costs -- like lack of sleep -- which accompany babies. These activities then can be used to promote discussion and stimulate further inquiry. For example, after investigating the "costs" of having children, students may speculate on why people have the number they do. Or, they may begin to investigate the relationship between having large numbers of children and having high quality children. Some may even explore the "children industry."

Student materials will also include a number of role-plays and a simulation game. Role-plays will be of two types: one structured, the other unstructured. For the structured, a court case dealing with involuntary sterilization, for example, the roles will be preestablished and the students provided with sufficient information to role-play realistically. In the unstructured role-play the students will be supplied only with a theme. They will have to use their knowledge and imagination to structure the role-

play and define the situation. A dramatization of the reactions of a baby food manufacturer, a member of Zero Population Growth, a toy salesman, and a contraceptive salesman to a news report of a change in attitudes toward ideal family size exemplifies this type of unstructured role-play.

The simulation game which will be developed is tentatively called "Commons." This game is based upon Garrett Hardin's article, "The Tragedy of the Commons," which appeared in the 13 December, 1968, issue of Science. The purpose of the game is to test Hardin's proposition that rational reproductive behavior as defined by individuals and families may impose severe costs upon society and be in opposition to the best interest of the group as a whole.

The game will consist of two versions. One version will examine whether or not Hardin's proposition is valid in a nonindustrialized country such as India. The second will test the proposition in an industrialized country such as the United States. One half of the class will play one version and the other half of the class will play the second version. From comparing results and winning strategies the students can test Hardin's proposition and can develop a set of relationships which can be empirically tested or, assuming they are valid, used for analyzing policy alternatives when presented with predetermined population goals.

The teacher materials contained in the learning activities package will consist of a set of transparencies and a number of bulletin board displays. These will be augmented with several sound filmstrips and one or more audio-tape presentations. These will be coordinated with the text materials but will be usable independently. The filmstrips will be used when introducing

the unit and when discussing man's influence on natural processes. The audio-tapes will be used for presenting discussions by authorities on population-related issues (e.g., resource depletion, implications of continued technological advance, what the world of the future will be like, whether there is a population problem and whose it is, etc.). The transparencies will be used to supplement diagrams and figures in the textbook. Several lessons will be built around these, some pertaining to data processing skills, others for stimulating questions, provoking speculation, or reinforcing concepts contained in the text.

Organization of Subject Matter

The purpose of the population unit is to introduce the student to demographic processes, to help him understand the implications of demographic trends, and to explore alternative courses of action open to him as an individual and as a member of society. Using a social scientific policy-oriented approach grafted upon a human ecological model[84] the student studies both natural and human populations, gradually focusing upon the ways in which humans can modify natural restraints. This leads to questions of goals and the selection of means to achieve those goals, questions which have normative and empirical components and over which controversy exists.

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[84]An example of one such model is that found in Carey and Schwartzberg, Teaching Population Geography. This model assumes that humans operate in an open system and that, through their actions, they have the ability to increase or decrease the social and physical life-supporting capacity of their environment.

Following are the four major subunits of instruction which comprise the population unit.

1. Population Processes. In this subunit basic population processes are introduced, following a brief discussion of the "population controversy." The processes will be analyzed for both human and nonhuman populations with emphasis on the mediating effects of culture and technology within the human ecosystem. Discussion of the implications of population growth will be stimulated and the use of social science concepts and techniques for clarifying relationships and aiding in decision-making will be introduced.

2. The Human Population: Past and Present. The current demographic situation will be described and placed in historical context. A number of representative countries will be examined as well as societal practices affecting demographic variables or moderating the effect of demographic processes on the individual and on society. The role of the individual in influencing demographic change will be studied.

3. Population and the Future. Demographic trends will be extrapolated. These will be analyzed, interpreted, and contrasted to alternative demographic states. The effect of alternative individual decisions and the ultimate effect of these decisions on demographic processes, society, and the individual himself will also be explored. Questions of reliability and obstacles to "knowing" will also be considered. The differential effects of different population futures will also be examined.

4. Population Policy. Policy alternatives based upon historical examples, current practices and possible policy manipulations will be examined relative to specific population goals. These policies will be analyzed in terms of the values inherent in them, the future state implied by them and the utility and feasibility of each alternative relative to the cultural and technological restraints operating in a given society. Conflicts likely to arise over support of different alternatives, as well as reasons for this conflict, will be examined.

Instructional Techniques

The lessons in the unit will be planned to prepare students to apply skills, ideas, and information. Students repeatedly will be required to demonstrate ability to use specified ideas, skills and information to complete an exercise or solve a problem. Teaching strategies will be planned

to develop skills of critical thinking, inquiry and valuing.

Different instructional techniques and types of lessons will be employed in the unit. The type of techniques will depend upon the type of objective being pursued. For example, the use of a written instructional program which provides precise step-by-step directions is an efficient way to teach skills such as graph reading or interpreting population pyramids.

In contrast, student role-playing and interaction within the context of a systematically designed game is an appropriate way for making value controversies surface and for stimulating the production of fruitful conflict management strategies.

Four basic types of instruction will be used in the unit. These are analogous to those used in the Center's American Political Behavior course.[85] They are (1) confrontation, (2) rule-example, (3) application, and (4) value analysis. Each has been devised for different purposes and requires different instructional techniques. The following diagram (Figure 4) indicates the difference between the four categories.[86]

Confrontation lessons initiate a study of a particular topic such as whether or not a population problem exists in the United States. The role of the teacher is to lead an open-ended discussion, provoking discussion and helping to generate the desire to inquire into the topic being discussed.

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[85]Howard D. Mehlinger and John J. Patrick, American Political Behavior. Ginn, 1972.

[86]More detailed description of these can be found in John J. Patrick, American Political Behavior: A New Approach to Civic Education in Secondary Schools. Paper presented at the NCSS Midwest Regional Conference on Teaching the Social Studies, Des Moines, Iowa, March 22-23, 1971.

FIGURE 4

Categories of Instruction

I.	Confrontation	A. Focus attention B. Motivate C. Generate speculations and/or hypotheses
II.	Rule-example	A. Systematic development of ideas and/or skills B. Hypothesis testing
III.	Application	A. Require use of ideas, information and skills presented previously B. Provide clues about the extent to which instructional objectives have been attained
IV.	Value judgment-policy decision	A. Relate evaluational questions to an empirical context B. Require reasoned value judgment

Rule-example lessons provide the bases for systematic study of a topic introduced using confrontation lessons. The teacher's role now is to assist the student master particular skills, ideas, and information. The teacher is expected to help the students evaluate the adequacy of their responses to questions and exercises, and to provide the students with supplementary instruction, if that is required.

Teacher demonstrations, programmed instruction segments of the textbook, and written exposition enriched with examples and exercises, and data processing and analysis activities are among the types of activities employed in rule-example instruction. For example, an instructional program can be used to teach students to read tables of data and to make valid inferences based upon the data presented in the table. Rules or criteria for determining whether one is dealing with a normative or empirical question can also be taught in this manner. Examples of normative or empirical questions can be presented and the student can be required to discriminate between them. Similarly, the student can be taught to distinguish between population pyramids of industrialized and nonindustrialized countries.

The application category of instruction involves student use of information, ideas, and skills in a novel situation. For example, considering the last example above, after learning to discriminate between industrialized and nonindustrialized countries on the basis of their population pyramids, the student can be given the pyramid for a country he has not studied previously. Asked to make inferences about the country (e.g., its level of industrialization), the student must apply the information and skills he has acquired to a novel case. In this way he is given the opportunity to

demonstrate mastery of instructional objectives. Inability to master application lessons indicates deficiency in particular instructional objectives. Careful evaluation of inadequate student peformance may provide the teacher with clues about student learning problems that can be overcome through remedial instruction.

Instructional Flow

A series of learning experiences are outlined on the next few pages. The outline should not be considered a fullbodied scenario for the unit. It should indicate, however, how the objectives might be achieved and could serve as a skeleton for the unit when the Center enters that stage of its development process. At that time specific instructional sequences would be developed and tested. Until then, the activities listed on the following pages should be regarded as hypotheses as to how the unit's objectives might best be achieved.

REPRESENTATIVE LEARNING EXPERIENCES

Objective A	Objective B	Objective C	Lesson Type*	Textbook	Learning Activities Package
			C	I. Is there a population problem?	Filmstrip - tape: The population debate.
				A. Picture essay with excerpts from diverse sources Purpose to provoke discussion	Picture essay reinforcing text
				B. How does it affect you? Discussion prompted by visuals for example, reproductions of articles on unemployment, desired level of living (second homes), fertility attitudes, pictures of traffic jams, starving children, etc.	Pictures Micro-investigations: (a) getting something done in crowded/noncrowded environment; (b) doubling games, getting a job. Population questionnaire
1	1-4		R/E	II. Population dynamics	Doubling micro-investigation: (a) yeast experiment (b) carrying desks into hallway
				A. Introduction to basic population processes	Filmstrip on natural populations and population of primitive (preagricultural) man
				B. Population process in nature: case studies 1. bacteria 2. African elephants 3. rabbits in Australia 4. lemmings	
				C. Population process in human societies 1. the example of the Aztecs 2. the Eskimo	Micro-investigations: (a) cultural practices and the effect of demographic processes on man. Identify practices which expand/contract life-support capability of human ecosystem; (b) different organizational structures and message transmission; (c) personal space

*Note: C = Confrontation lesson
R/E = Rule-example
A = Application
VA = Value analysis

Objective A	Objective B	Objective C	Lesson Type	Textbook	Learning Activities Package
5-6	10			D. A comparison: rats vs. people	Transparency regarding model
				E. Model of human ecosystem -- making the "Bottle" bigger (or smaller). Changing the capacity of the life-support system through human activities and organization is discussed	
				F. Applying model to case study: Irish potato famine	Data bank on Ireland tracing demographic changes in the Irish population
1-2			R/E	III. Trends	
				A. Graphs of population growth from prehistoric times to present (arithmetic and log scales)	Transparency
				B. Reading the graphs, identifying discontinuities, and describing trends	
5-7	5-6		R/E	C. Forming and testing hypotheses regarding the social and demographic consequences of the agricultural revolution	
				D. Forming and testing hypotheses about the social and demographic consequences of the industrial revolution	Data bank activities on birth and death rates, GNP, rates on natural increase, fertility, infant mortality, age-sex composition, energy consumption, standard of living Transparency

Objectives A	Objectives B	Objectives C	Lesson Type	Textbook	Learning Activities Package
1-4	7-8		A	E. Graphs of birth and death rates for industrialized and nonindustrialized countries presented. Rate changes are compared. Hypotheses formed as to why rates are different. Time required for changes noted	Data bank, classifying countries by level of GNP and comparing rates of natural increase. Transparency
5			C-R/E	F. Case studies on medical revolution followed by expository lesson on exportation of medical technology. Adoption rates of medical technology compared to those of public health measures	Data bank, differential fertility in the U.S.: the Black population and the demographic transition
5-7	9		C-1	G. Consequences of exportation examined: The case of Ceylon, demographic and social changes of aid	Data bank on Ceylon
				H. Value inquiry: When is helping hurting? Quote by Ehrlich. Pictures of diseased child shown, consequences of demographic growth in nonindustrialized countries discussed. Students asked to identify values inherent in a decision to aid/not aid Ceylon, given ability to help. Class votes on whether to give aid. Discussion is generalized to consider social and technological changes in general. Ecological model is reviewed	Value questionnaire Micro-investigation: Pictures of young Indian children with make-up under eyes shown. Students given rates of infant mortality and asked to hypothesize about this. They then compare their hypotheses with a statement by an anthropologist

Objectives A	Objectives B	Objectives C	Lesson Type	Textbook	Learning Activities Package
1-4	9 16 17		A	I. Correlates of population growth in developed countries are examined using charts, graphs, and tables of data, as well as other visuals formed into a picture essay. Question of when is "bigger better raised." Case study of Australia and debate over its population	Crowding activity: Coca-Cola game Micro-investigations: (a) communication linkages (b) photo essay on crowding (c) parking problems (d) ping-pong balls "freeway" congestion, the costs of one more. Tape excerpt of advocates of population growth and limitation (e) carrying furniture.
		1-3 6	VA	IV. Population and the Future	
				A. What is your future like? Utopia building	
5-7				B. How trends are projected is discussed in an expository essay	
7	9 17 19		A	C. Data are presented on trends in developed and underdeveloped countries	
	9 17 19		A	D. Social implications of these are discussed in general	
	17 18	4 6-10 12	L/E VA	E. Data on energy consumption, resource utilization, distribution, GNP food production (etc.) are given	
	17 27	4 6 10 12	R/E VA	F. Demographic implications such as age-sex structures momentum will be analyzed using population pyramids and graphs	

Objectives A	Objectives B	Objectives C	Lesson Type	Textbook	Learning Activities Package
24 27			A	G. Some countries will be examined in detail using a case study approach -- India, Japan, Mexico, United States	
27 28	12		C VA R/E	H. Alternative demographic models for the future will be discussed and applied to case studies. The models will include: (a) the Population Crash Curve, (b) gradual approach to ZPG, (c) modified Irish Curve, and (d) immediate ZPG.	Transparency
18	12		R/E VA	I. Alternative social models for the future will also be examined factors that will be considered include alternative life-styles, technological advances, changes in social processes and structure.	Data bank on women in the labor force; relationship between occupation and fertility; Micro-investigation: "private space."
10			R/E	J. Effects of individual decisions will be explored. For example, averaging two or three children will be shown to have many social and demographic implications.	Micro-investigations: (a) different social structures and the ability to accomplish tasks (b) what makes a crowd (c) reducing environmental impact: how to be a survivor.

Objectives A	Objectives B	Objectives C	Lesson Type	Textbook	Learning Activities Package
				V. Policy Selection	
		14-20	VA	A. Selecting a goal: comparison of problems associated with a steady state population vs. increasing (or decreasing) population. A goal and model are selected after values inherent in each are clarified	Tape of population experts discussing issues
20-23			R/E	B. Problem of the "Commons" applied to population dynamics	Commons game
20-23		5	A VA	C. Implications in policy: efficacy of family planning in the U.S. and abroad	
				D. The perfect contraceptive society; data on desired family size, contraceptive technology and delivery systems in U.S. and abroad	Survey of desired family size of schoolmates compared with own desires and those of norm group
25-28		4 6-11	R/E VA	E. Beyond family planning: case studies of alternative approaches are studied. 1. Death control a. Aztecs b. 1985=Population Doomsday c. Eskimo	

Objectives A	Objectives B	Objectives C	Lesson Type	Textbook	Learning Activities Package
				E. (cont'd.) 2. Incentives a. France - before and after incentives: a case for motivation b. Japan c. India 3. Coercion a. nonprimitive b. primitive 4. Technological solutions: raising the Malthusian ceiling. Excerpts from R. Buckminster Fuller and B. F. Skinner given. Case studies on state of technology given	
26-28	6-11, 13	A, VA		F. Making a choice. Student analysis of implications of alternative modes of action and choices that were consistent with his goals and values	
	14-16	VA		G. Alternative values: conflicts with alternative values are identified and strategies for managing the conflict are developed. Moral and religious objections to population policy will be considered, as will genetic and eugenic implications. Claims from the black community and from underdeveloped areas that population control is a form of genocide will be explored.	Tape: different positions voiced Role-plays: mediating controversy -- Connecticut and the right to family planning through contraception
				H. Summary	

CHAPTER VIII

SUMMARY

The project director has planned an objective-based instructional unit for insertion in existing twelfth-grade social studies courses. The unit requires approximately six weeks of instruction. It consists of a textbook in semi-programmed format and a learning activities package that consists of the following:

(1) 1 Simulation game
(2) A set of role-plays
(3) A data bank
(4) 1 set of transparencies
(5) 3 audio-tape cassettes
(6) 2 sound filmstrips
(7) 2 sets of visuals for display on bulletin boards
(8) A set of micro-investigations and experiments (e.g., tinker-toy elements for experimenting with communication linkages)

The unit is designed to use an instructional approach which draws upon three functional areas: social science inquiry, population processes, and value inquiry and decision-making. It is designed to provide the student with basic process skills and knowledge in regard to population-related decision-making and to prepare the student for being an informed decision-maker when called upon to choose between alternative population policy proposals. In seeking to attain this goal, the unit attempts, also, to introduce new techniques and content into the existing social studies curriculum, simultaneously strengthening its social science orientation and drawing upon related disciplines for clarification and elaboration of basic concepts.

It is the director's goal to seek and obtain funding for the actual development of the unit. If this occurs, the gap in the curriculum that

Lorimore and Osborne discovered in 1943 and that Hauser rediscovered in 1962 will be at least partially closed, and social studies instruction will have taken a modest step forward.

Appendix A

POPULATION DYNAMICS INVENTORY

FORM A

EXPERIMENTAL,

REQUIRES REVISION*

* Because inventories are in developmental form, the answer keys are not included. Persons wishing to know how the forms were scored should write Population Education Project Director, Jerry L. Brown, requesting the key and giving the reason they would like the information

POPULATION DYNAMICS INVENTORY

FORM A

DIRECTIONS

A group of educators at Indiana University is working on a new high school course dealing with population dynamics. This course will eventually be used in high schools like yours. To give us a better idea about what the course should look like, we'd like to ask you some questions. This is what this inventory is all about.

Some of the questions ask for your opinion. These have no right or wrong answers. Other questions are designed to see how much you know about population dynamics. Although you probably won't know the answers to all these questions (we don't expect you to), the information that you give us will be very helpful in planning our new course. We hope you'll cooperate and try your hardest. If you think you know the answer to a question, but aren't sure, answer the question anyway. But if you're really stuck, skip the question and go on to the next one. If time permits, after you've answered all the questions you're sure of, come back to the questions that you skipped and try to answer them.

Mark all your answers with a pencil on the special answer sheet you've been given. Read each question then decide which of the answers below it is the best. Look at the answer spaces on your answer sheet. Fill in the space which has the same letter as the answer you have chosen. Be careful not to make any stray marks or to fill in more than one box. If you change your mind about an answer, erase the first mark completely.

SAMPLE

I. The name of a color is

a) red
b) dog
c) Chicago
d) cat

answer sheet

	a	b	c	d	e		a	b	c	d	e
I.	■	□	□	□	□	II.	□	□	□	□	□

II. The United States has a pollution problem

a) I agree strongly
b) I agree
c) I don't know
d) I disagree
e) I disagree strongly

You will have 40 minutes to complete the Inventory. Work rapidly but be careful that you do not make careless mistakes. Be sure you do not lose your place and mark your answers in the wrong space on the answer sheet.

PLEASE DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Questions 1-15 refer to figure 1.1

Look at figure 1.1

1. What should line X in the graph for country 3 be labeled?

   a) Rate per thousand people
   b) Year
   c) Birth rate
   d) Death rate
   e) Insufficient information

2. What should line Y in the graph for country 3 be labeled?

   a) Rate per thousand people
   b) Year
   c) Birth rate
   d) Death rate
   e) Insufficient information

3. What should "A" be labeled in the graph for country 3?

   a) Rate per thousand people
   b) Year
   c) Birth rate
   d) Death rate
   e) Insufficient information

4. What is the best interpretation for the meaning of point "Z" in the graph for country 1?

   a) In 1910 the birth rate started to increase.
   b) In 1910, 34 children were born for every 1000 people in the country.
   c) Every thousand families had an average of 34 children in 1910.
   d) People decided to have fewer children in 1910.
   e) Insufficient information.

5. If country 3 had ten thousand people in 1900, how many people died on the average that year?

   a) 15
   b) 180
   c) 200
   d) 18
   e) Insufficient information

6. What happened to the total number of people in country 3 in 1900?

   a) It increased
   b) It decreased
   c) It stayed the same
   d) Insufficient information

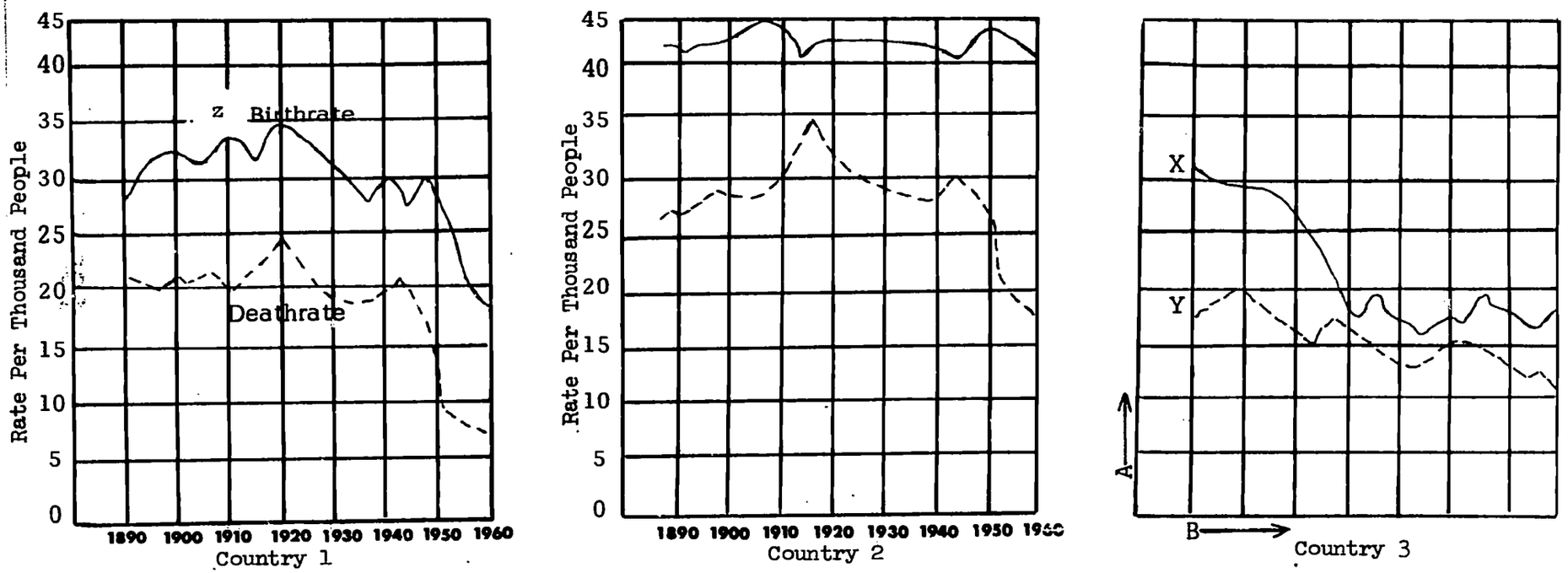


Figure 1.1

Questions 1-15 refer to this figure. To save time in answering the questions, you may want to tear this page out of the booklet.

7. Which country had the largest rate of population growth between 1920 and 1960?

a) Country 1
b) Country 2
c) Country 3
d) All the same
e) Insufficient information

8. Which country's birth rate changed the least between 1890 and 1960?

a) Country 1
b) Country 2
c) Country 3
d) All the same
e) Insufficient information

9. Which country probably has the least amount of industry?

a) Country 1
b) Country 2
c) Country 3
d) All the same
e) Insufficient information

10. Which country has the largest total population?

a) Country 1
b) Country 2
c) Country 3
d) All about the same
e) Insufficient information

11. Which statement is correct?

a) None of the countries have a rapidly growing population.
b) All of the countries have a growing population.
c) Only country 3 has a declining population.
d) All of the countries have high population growth rates.
e) None of the above.

12. Which of these countries probably has had good medical care for a long time?

a) Country 1
b) Country 2
c) Country 3
d) All about the same
e) Insufficient information

13. What would the best title for the graphs shown in figure 1.1?

a) Rate per thousand for countries 1,2, and 3.
b) Birth rates for 3 different countries.
c) Different patterns of change in birth and death rates.
d) Index of marital fertility for three different countries 1890-1960.
e) Rate of population decline for countries 1,2, and 3.

General Pattern of Population Growth for "Country X"
by 10 year Intervals

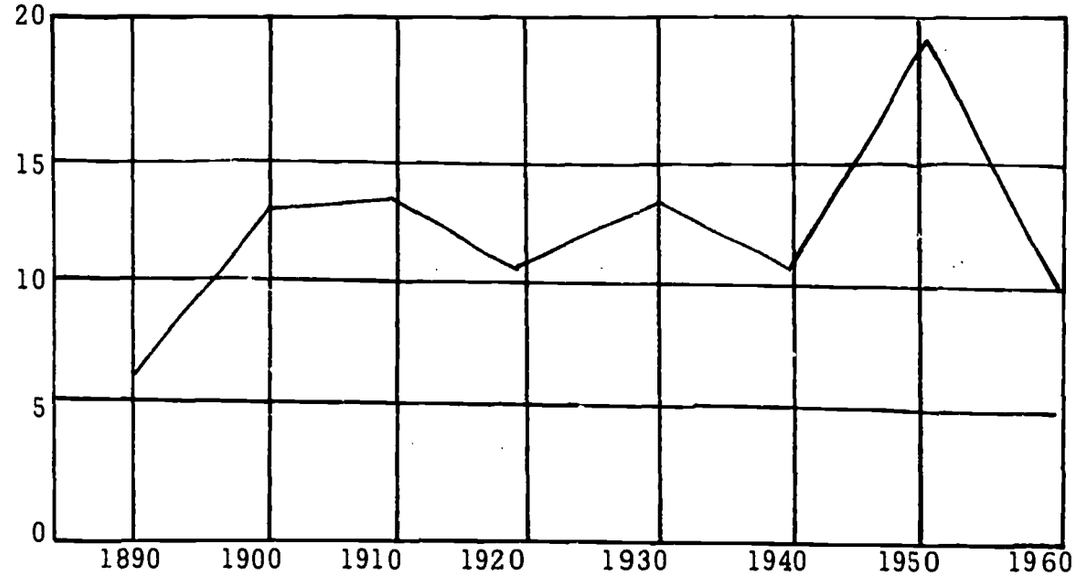


Figure 1.2

14. Look at Figure 1.2. It shows the population growth rate for "Country X". Which of the three countries in Figure 1.1 is probably Country X?

a) Country 1
b) Country 2
c) Country 3
d) None of the above
e) Insufficient information

15. What probably happened between 1940 and 1950 in Country X?

a) The birth rate increased faster than the death rate decreased.
b) The birth rate decreased faster than the death rate increased.
c) The death rate increased faster than the birth rate increased.
d) The death rate decreased faster than the birth rate decreased.
e) Insufficient information

Questions 16-23 are to be answered with reference to Figure 2.

16. Which country has a larger proportion of its population under 20 years of age?

a) A
b) B
c) A and B are about the same.
d) Can't tell from figure.

17. For country A the proportion of males between 30 and 34 is:

I. Greater than the proportion between 35 and 39
II. Smaller than the proportion of women between 30 and 34 in country B
III. The same as the proportion of women between 30 and 34.

a) I only
b) I and II
c) I and III
d) II and III
e) Insufficient information

18. Which country has the largest population?

a) A is larger
b) B is larger
c) A and B are about the same size.
d) Insufficient information

19. Which country has the largest number of people under 10?

a) A has more people under 10
b) B has more people under 10
c) A and B have about the same number of people under 10
d) Insufficient information

20. Which country provides better medical care?

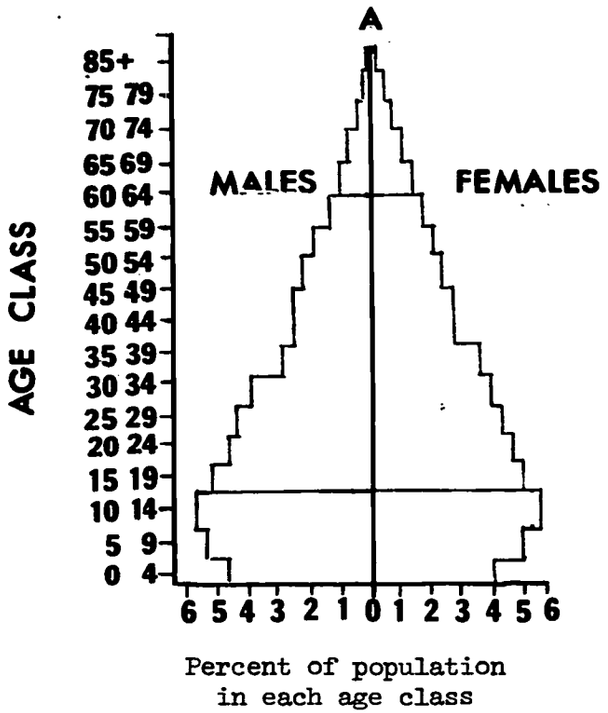
a) A
b) B
c) About the same
d) Insufficient information

21. Which country is likely to have the largest relative increase in the size of its population over the next 60 years?

a) A
b) B
c) Both the same
d) Insufficient information

22. If both countries currently have 1 classroom for each 100 children between 10 and 14 and don't build any more, which country will have a classroom shortage in 1980?

a) A
b) B
c) Both
d) Neither
e) Insufficient information



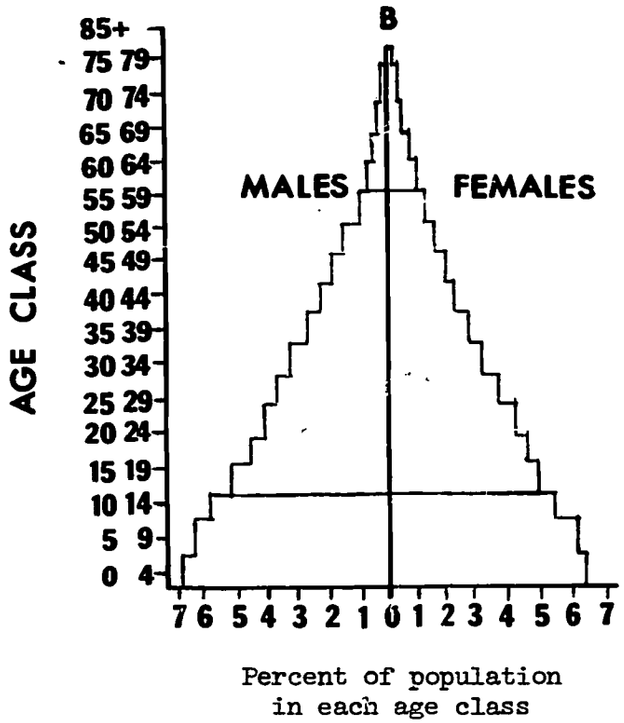


FIGURE 2

(To save time answering questions 16-23, you may tear this page out of the test booklet.)

23. Which country probably has an effective population control program operating?

a) A
b) B
c) Both
d) Neither
e) Insufficient information

III

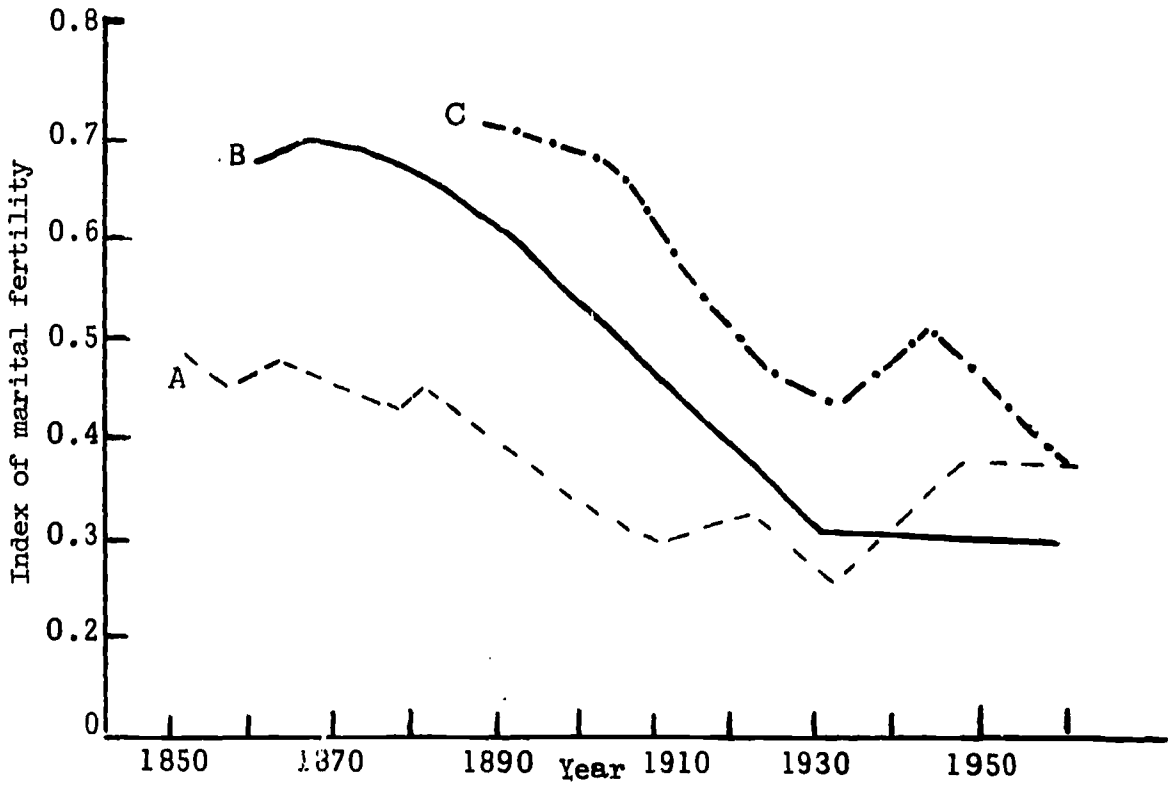


Figure 3

Questions 24-33 are to be answered with reference to Figure 3.

24. What was the first year country C began computing an index of marital fertility?

a) 1850
b) 1870
c) 1890
d) 1910
e) 1920

25. Between 1890 and 1910 which country had the greatest rate of change in its index of marital fertility?

a) A
b) B
c) C
d) Insufficient information

26. Which country had the highest index of marital fertility in 1960?

a) A
b) B
c) C
d) Insufficient information

27. What would be the best way to describe the changes in the index of marital fertility for countries A,B, and C between 1850 and 1910?

a) The value of the index steadily decreased for all 3 countries at about the same rate.
b) The value of the index steadily increased for all 3 countries at about the same rate.
c) The value of the index steadily decreased for all 3 countries but the rates were different.
d) The value of the index rapidly decreased for all 3 countries between 1850 and 1870 but then the rate of change slowed down for all 3 countries, especially A.

28. In 1935 which of these countries had the lowest value for its index of marital fertility?

a) A only
b) B only
c) C only
d) All about the same
e) Insufficient information

29. Which country probably had the highest standard of living in 1870?

a) A
b) B
c) C
d) All about the same
e) Insufficient information

30. Between 1930 and 1950 the index of marital fertility for this country remained about the same.

a) A
b) B
c) C
d) None of the above
e) Insufficient information

31. In which time period did the change in the index of marital fertility suddenly change direction for 2 or more countries?

a) 1870-1890
b) 1890-1910
c) 1910-1930
d) 1930-1950
e) Insufficient information

32. Which of these countries was the biggest in 1910?

a) A
b) B
c) C
d) All the same
e) Insufficient information

33. Which country was the smallest in 1950?

a) A
b) B
c) C
d) All the same
e) Insufficient information

IV Questions 34-40 refer to Figure 4 below.

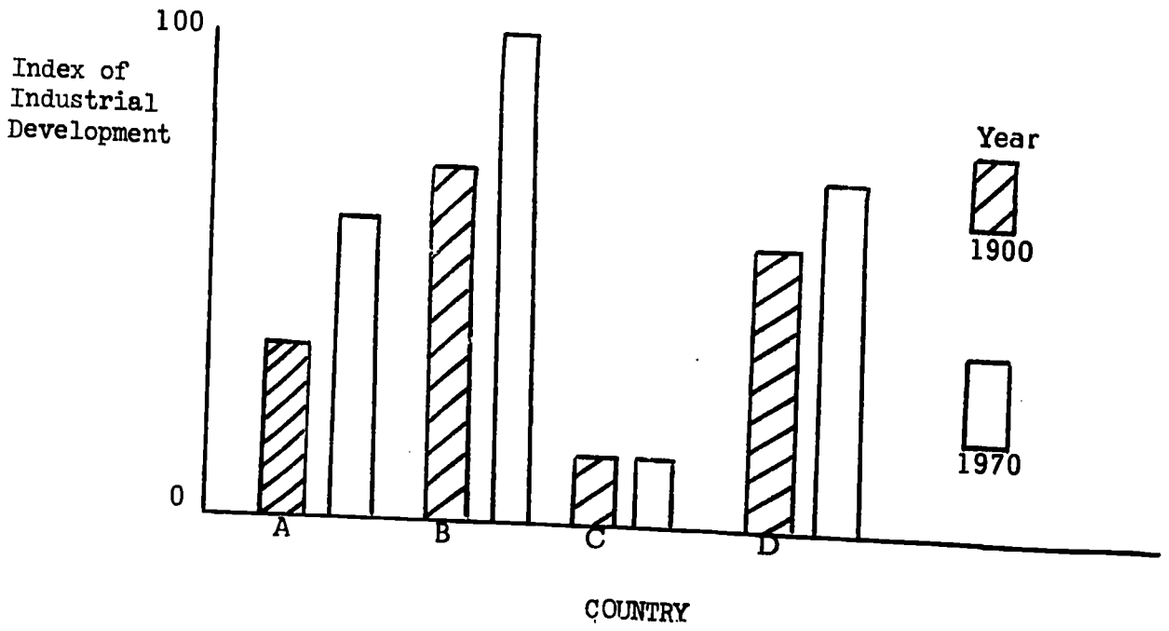


Figure 4

34. Which country probably had the lowest birth rate in 1900?

a) A
b) B
c) C
d) D
e) Insufficient information

35. Which country probably had the greatest change in its birth rate between 1900 and 1970?

a) A
b) B
c) C
d) D
e) Insufficient information

36. Which country probably had the greatest number of deaths per 1000 people in 1970?

a) A
b) B
c) C
d) D
e) Insufficient information

37. Which country had the greatest number of people in 1970?

a) A
b) B
c) C
d) D
e) Insufficient information

38. In which country are people probably made to go to work at an early age?

a) A
b) B
c) C
d) D
e) Insufficient information

39. Which country probably had the greatest number of births per 1000 people in 1970?

a) A
b) B
c) C
d) D
e) Insufficient information

40. Which country probably had the greatest rate of population growth in 1970?

a) A
b) B
c) C
d) D
e) Insufficient information

V

41. Below are three things many people want the government to do. Which policies, if any, would encourage an increase in the rate of population growth?

I) Give young men and women money to either go to college or technical school after high school graduation.

II) Provide free medical care for all hospital stays.

III) Give families on welfare enough money to take care of all their children.

a) I only
b) I and II
c) I and III
d) II and III
e) None of the above

Questions 42-61 refer to the two fictitious countries described in the paragraphs below.

Questionia and Sari are two small islands located about 500 miles apart in the Somewhere Sea. Both islands are inhabited by fruit gathering people belonging to the Nimi Tribe. These people subsist on the fruit of the Zero tree, the only edible commodity on the island (the Nimi frown on cannibalism). Generally speaking the minimum diet for the Nimi consists of two zero apples per day. Islanders must harvest and eat these apples, which grow all year round, only on the day they become ripe (they turn a bright orange when ripe) since immature zero apples are known to cause a severe illness which usually results in death. Over ripe apples are thought to do the same and so islanders don't store them.

Statistics for the two islands are in the table below. Refer to these when answering questions 42-61.

STATISTICS FOR TWO ISLANDS

Statistic	Questionia	Sari
Population 1/1/70	50,250	50,250
% Women of Childbearing Age 1/1/70	15%	30%
Birthrate*	20/1000*	40/1000*
Deathrate	15/1000	15/1000
Immigration 1/70-1/71	0	0
Usable living space (sq.ft.)	110,000	58,000
Maximum production of zero apples (ripe apples)	100,250	303,918

*Note - Birthrates are per 1000 women of childbearing age.
Deathrates are per 1000 people.

42. Assuming no new people moved to the island during the year, what was the population of Questionia on December 31,1970?

a) 50,288
b) 50,401
c) 50,501
d) 50,627
e) 51,506

Note - Correct response not provided.

43. If no new people moved to Sari during the year, what was its population on December 31,1970?

a) 50,288
b) 50,401
c) 50,501
d) 50,627
e) 51,506

Note - Correct response not provided.

44. Which island's population grew at a faster rate, Questionia or Sari?

a) Questionia grew at a faster rate.
b) Sari grew at a faster rate.
c) Neither, they grew at the same rate.
d) Insufficient information.

45. Which island had a worse population problem on December 31, 1970?

a) Sari because it was running out of room.
b) Sari because it was running out of food.
c) Questionia because it was running out of room.
d) Questionia because it was running out of food.
e) Neither had a population problem.

46. Why might you expect that Questionia and Sari would have different size populations on December 31, 1970?

a) The proportion of deaths per 1000 women of childbearing age was different for each country.
b) The proportion of people dying per 1000 was different for each of them.
c) The proportion of women bearing children was different for each of them.
d) The proportion of people surviving birth was different for each country.

On January 1, 1971 the leaders of Sardi and Questionia hired a population expert to analyze their situation. The expert, Mr. Counter, visited the islands and made the following notes in his notebook:

The Nimi: a friendly tribe that enjoys having large families. Children and teens take care of most of the hard labor, while the men gather apples, an all day task. Old people depend upon their children for all their needs, especially food. The Nimi will eat wheat when available. However, it is against their religion to eat meat or fish. Most people on the island die of Malaria. People tend to marry in their early twenties. Men spend their time building huts and apple gathering. Women take care of the home and of the children. There is no formal government and the village elders and tribal council tend to run things.

Mr. Counter then made some notes about things which could happen on the islands. Before he makes his suggestions to the Nimi he'd like some advice from you. Read each statement below, then, given your knowledge of the Nimi, judge the direct and indirect effects of each possible event. Then indicate whether the event probably would:

a) Increase the size or growth rate of the population.
b) Decrease the size or growth rate of the population.
c) Have no effect on the size or growth rate of the population.
d) Insufficient information to judge effect.

47. The U.N. pays for an anti-Malaria program on the islands and sprays them with DDT.

a
b
c
d

48. Children are made to attend school until they're 18.

a
b
c
d

49. Women are encouraged to be good mothers and do their household chores as best they can.

a
b
c
d

50. The Mango Republic gives a year's supply of birth control devices to the Nimi.

a
b
c
d

51. All people over 50 are guaranteed at least two zero apples a day by the tribal council.

a
b
c
d

52. The United States donates a billion bushels of wheat.

a
b
c
d

53. The USSR donates a billion pounds of fish.

a
b
c
d

54. A seaplane carrying passengers and cargo begins making daily trips between Sari and Questionia.

a
b
c
d

55. A missionary converts the Nimi to a new religion.

a
b
c
d

56. Posters convince the Nimi teenagers that they should marry while in their middle teens.

a
b
c
d

57. A rule is proposed by the tribal elders saying each member of a family must work 3 days a month in the community factory for each child the family has.

a
b
c
d

58. The women gather apples.

a
b
c
d

59. An advertising company is starting to convince people that those who eat immature zero apples and die go to Apple Land, where they live happily ever after.

a
b
c
d

60. Health teams from the United Nations set up birth control clinics on Questionia and Sari Natives are hired and trained to work in the clinics. The tribe's influential medicine men offer to help but are refused since they lack proper training. As a result they feel hurt and insulted.

61. Western doctors come to the islands and treat sick infants.

a
b
c
d

62. (No question)

VI. Questions 63-73 refer to your knowledge of population dynamics.

63. Historically, the size of the human population on earth remained fairly stable until what event occurred?

a) The establishment of village-farming communities.
b) The formation of cities in Europe.
c) The Industrial Revolution.
d) The beginning of the 20th Century.
e) The Population Explosion.

64. A man was going through some census reports when he noticed that one of the reports showed that 95% of the American people lived on farms or in towns of less than 2,500 people. What year was the census report probably written?

a) 1800
b) 1860
c) 1900
d) 1940
e) 1960

65. What effect does a small difference in family size have on the size of the population?

a) None
b) A small effect
c) A moderate effect
d) A large effect
e) Insufficient information

66. The U.S. population is currently growing by about

a) 100 thousand people per year.
b) 500 thousand people per year.
c) 1 million people per year.
d) 2 million people per year.
e) None of the above.

67. How many children would most families have to average to bring about an immediate halt in U.S. population growth?

a) 0
b) 1
c) 2
d) 3
e) 4

68. How does the average American compare with the average person in India in terms of contributing to pollution of the environment?

a) The Indian is much worse.
b) The Indian is somewhat worse.
c) They are about the same.
d) The American is somewhat worse.
e) The American is much worse.

69. If the U.S. population stopped growing in 1970, what effect would this have on the population in the year 2000?

a) The proportion of men between 18 and 24 would have increased greatly between 1970 and the year 2000.
b) The birth rate in the year 2000 would be substantially lower than it was in 1970.
c) The average age of the population would be older in the year 2000 than in 1970.
d) There would be more young people of child bearing age in the year 2000 than in 1970.
e) The population would be similar to that of 1970's in most of its characteristics.

70. If the number of children born per year in the U.S. averaged 2 per family, about how many year(s) would it take before our population stopped growing?

a) 1 year or less
b) 5 years
c) 15 years
d) 30 years
e) 60 years

71. Imagine that the population of the world stopped growing in 1970 and that everyone in the world had the same standard of living as the U.S. If iron production remained the same, what would happen to the price of iron?

a) It would increase sharply.
b) It would increase slightly.
c) It would stay the same.
d) It would decrease slightly.
e) It would decrease sharply.

72. The time it takes for the world's population to double has

a) remained the same for the last 100 years.
b) increased steadily in the last 100 years.
c) decreased steadily in the last 100 years.
d) increased rapidly in the last 100 years.
e) decreased rapidly in the last 100 years.

73. The dominant trend in population dynamics for the last 100 years has been

a) a rapid increase in the birth rate.
b) a rapid decrease in the birth rate.
c) a rapid increase in the death rate.
d) a rapid decrease in the death rate.
e) a rapid leveling of the birth rate.

VII

Questions 74-78 refer to the table below

Population By Location, Inside and Outside Metropolitan Areas
1950-1966 (Numbers in millions)

	POPULATION			
	NEGRO		WHITE	
	1950	1966	1950	1966
U.S.	15.0	21.5	135.2	170.8
Metropolitan Areas	8.4	14.8	80.3	109.0
Central Cities	6.5	12.1	45.5	46.4
Urban Fringe	1.9	2.7	34.8	62.5
Small cities, towns, and rural	6.7	6.7	54.8	61.8

Source: U.S. Dept. of Commerce, Bureau of the Census, BLS Report No. 332, p. 8.

Figure 5

74. Between 1950 and 1966 the total Negro Population:

a) grew at about the same rate as the white population.
b) grew at a rate slightly below that of the white population.
c) grew at a slightly higher rate than the white population.
d) grew at about twice the rate of the white population.
e) grew at a rate about three times that of the white population.

75. About what per cent of the Central City population was made up of Negroes in 1950?

a) 6%
b) 12%
c) 20%
d) 40%
e) Insufficient information

76. What percent of the Central City population was made up of Negroes in 1966?

a) 6%
b) 12%
c) 20%
d) 40%
e) Insufficient information

77. Between 1950 and 1966 the proportion of whites living in the Central City:

a) remained the same.
b) decreased slightly.
c) decreased greatly.
d) increased slightly.
e) increased greatly.

78. Which of the statements below describes the dominant population trends between 1950 and 1966?

I. The Negro population increased greatly in the Central Cities.

II. The largest proportional increase in white population was in the urban fringe areas.

III. The proportion of Negroes living in small cities and towns began to increase sharply.

a) I only
b) II only
c) III only
d) I and II
e) II and III

Questions 79-82 pertain to questions about you.

79. What grade are you in?

a) 10th
b) 11th
c) 12th

80. What is your sex?

a) male
b) female

81. What is your racial identification

a) American Indian
b) Caucasian
c) Mexican-American
d) Negro
e) Other

82. How many children are in your family besides yourself?

a) 0
b) 1
c) 2
d) 3
e) 4 or more

Appendix B

POPULATION DYNAMICS INVENTORY

FORM B

EXPERIMENTAL,

REQUIRES REVISION *

* Because inventories are in developmental form, the answer keys are not included. Persons wishing to know how the forms were scored should write Population Education Project Director, Jerry L. Brown, requesting the key and giving the reason they would like the information.

POPULATION DYNAMICS INVENTORY

FORM B

DIRECTIONS

A group of educators at Indiana University is working on a new high school course dealing with population dynamics. This course will eventually be used in high schools like yours. To give us a better idea about what the course should look like, we'd like to ask you some questions. This is what this inventory is all about.

Some of the questions ask for your opinion. These have no right or wrong answers. Other questions are designed to see how much you know about population dynamics. Although you probably won't know the answers to all these questions (we don't expect you to), the information that you give us will be very helpful in planning our new course. We hope you'll cooperate and try your hardest. If you think you know the answer to a question, but aren't sure, answer the question anyway. But if you're really stuck, skip the question and go on to the next one. If time permits, after you've answered all the questions you're sure of, come back to the questions you skipped and try to answer them.

Mark all your answers with a pencil on the special answer sheet you've been given. Read each question then decide which of the answers below it is the best. Look at the answer you have chosen. Be careful not to make any stray marks, or to fill in more than one box for any question. If you change your mind about an answer, erase the first mark completely.

SAMPLE

I. The name of a color is

a) red
b) dog
c) Chicago
e) bird

answer sheet

	a	b	c	d	e		a	b	c	d	e
I.	■	□	□	□	□	II.	□	□	□	□	□

II. The United States has a pollution problem.

a) I agree strongly
b) I agree
c) I don't know
d) I disagree
e) I disagree strongly

You will have 40 minutes to complete the Inventory. Work rapidly but be careful that you do not make careless mistakes. Be sure you do not loose your place and mark your answers in the wrong space on the answer sheet.

PLEASE DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Part I Mark your answer to each question or statement in the appropriate space on the answer sheet.

1. How many children are in your family besides yourself?

a) 0
b) 1
c) 2
d) 3
e) 4 or more

2. What is your sex?

a) male
b) female

3. What is your racial identification?

a) American Indian
b) Caucasian
c) Mexican-American
d) Negro
e) other

4. Which of the problems below would you say presents the biggest challenge to the United States today?

a) Air and water pollution
b) The Vietnam war
c) Hunger and poverty
d) Population growth
e) Over consumption

5. How long do you usually like to spend studying one topic?

a) One week or less
b) Two or three weeks
c) Four or five weeks
d) Six to seven weeks
e) More than seven weeks

6. How do you like to study?

a) By myself
b) In small groups
c) In large groups

7. What is the most effective way for you to learn something?

a) Reading a book
b) Listening to a lecture
c) Group discussion
d) Watching a movie or T.V.
e) Laboratory exercises

8. What do you think is the best number of children for a family to have?

a) 0
b) 1
c) 2
d) 3
e) 4 or more

9. I enjoy learning from instructional games and simulations.

a) agree
b) unsure
c) disagree
d) I've never played any

10. When you study something, which do you prefer?

a) Dealing with specific examples of how something affects society
b) Dealing with specific examples of how something affects you as a person
c) Dealing with generalizations about how something affects society
d) Dealing with generalizations about how something affects you

Part II For each statement decide whether you:

a -- Agree strongly
b -- Agree
c -- Don't know
d -- Disagree
e -- Disagree strongly

11. Most people think only of themselves.

a
b
c
d
e

12. Mankind's major problems cannot be handled without forming a world government.

a
b
c
d
e

13. It's nicer to have a big family than a small family.

a
b
c
d
e

14. The true costs of our environmental destruction have never been calculated.

a
b
c
d
e

15. The government should not force families to practice birth control if they don't want to.

a
b
c
d
e

16. The number of children a family has is nobody's business but that family's.

a
b
c
d
e

17. Population growth is the main cause of the U.S.'s environmental crisis.

a
b
c
d
e

18. Our pollution problems can only be solved by destroying our existing institutions.

a
b
c
d
e

19. In the space age man cannot afford to place his loyalty in just his own country. He must give it to mankind instead.

a
b
c
d
e

20. Most of our actions have little effect on anybody but ourselves.

a
b
c
d
e

21. If the technological structure of society is destroyed, man will find it almost impossible to rebuild it because of resource depletion.

a
b
c
d
e

22. The U.S. environmental crisis is largely the result of how people like to live rather than the size of the population.

a
b
c
d
e

23. A person's chances for success are higher if he comes from a small family than a large family

a
b
c
d
e

24. A man's main responsibility in life is to his family.

a
b
c
d
e

25. It should be illegal for families to have children without first getting permission from the government.

a
b
c
d
e

26. The government should pay people to stop having babies.

a
b
c
d
e

27. Class discussions are usually a waste of time.

a
b
c
d
e

28. The world would be better off if families didn't have so many children.

a
b
c
d
e

29. I'd rather study something at home than at school.

a
b
c
d
e

30. Most textbooks are pretty dull.

a
b
c
d
e

31. Most things that happened in the past have little effect on us today.

a
b
c
d
e

32. I learn more when I study with two or three friends than when I study by myself.

a
b
c
d
e

33. Grades make me work harder.

a
b
c
d
e

34. School would be better if there were less talk and more activities.

a
b
c
d
e

35. In school we waste our time talking about things that happen in other countries.

a
b
c
d
e

36. I enjoy studying on my own.

a
b
c
d
e

37. To really learn about a subject takes a lot of hard work.

a
b
c
d
e

38. Life for most people in the world is getting worse with time.

a
b
c
d
e

39. Large differences in population size result from small differences in family size.

a
b
c
d
e

40. The birth rate changes very little from year to year.

a
b
c
d
e

41. Population increases are good for economic growth in countries like the United States.

a
b
c
d
e

42. The desire to have large families has been fixed in us by billions of years of evolution.

a
b
c
d
e

43. The most important factor in population growth is people's desire to have large families.

a
b
c
d
e

44. I learn more when I make a few mistakes than when I don't make any mistakes.

a
b
c
d
e

45. Population growth has made it harder for our government to function smoothly.

a
b
c
d
e

46. People in the U.S. could be certain of having a high standard of living even if the population was 2 or 3 times as large as it is now.

a
b
c
d
e

47. Population growth will prevent many people from getting a higher standard of living.

a
b
c
d
e

48. When I study something it should be hard enough so that I make a few mistakes.

a
b
c
d
e

49. Do you think a person needs a family to be really happy? Or do you think a person can be equally happy without being married?

a) One needs a family
b) Equally happy on one's own
c) More happy on one's own

50. What would you say is the best age for a woman to marry?

a) 18 or younger
b) 19-21
c) 22-24
d) 25-27
e) 28 or older

51. What would you say is the best age for a man to marry?

a) 18 or younger
b) 19-21
c) 22-24
d) 25-27
e) 28 or older

Part III Questions 52-58 refer to the methods and aims of science.

52. The chief purpose of the science of demography is to

A. study the economic effects of population growth.
B. plan how large populations should be.
C. develop ways to limit population growth.
D. provide explanations on how human populations change.

53. If we ask a psychologist to explain why some people vary in apparent intelligence, he will most likely give his explanation in terms of

A. the necessity of people to vary in intelligence.
B. accepted scientific principles.
C. exact mathematical formulas and equations.
D. verified psychological observations and data.

54. When some of the facts in a certain area of science are <u>not</u> explained by an existing theory, scientists

A. may revise the unexplained facts so that they will fit into the theory.
B. may modify the theory so that more of the facts will be explained.
C. should discard the theory and formulate a new one immediately.
D. should show the theory to be in error in all cases.

55. In deciding whether or not a proposed theory can be accepted, scientists will probably make their decision on the basis of

A. whether or not the theory is true.
B. whether or not the theory can be expressed in mathematical form.
C. the evidence supporting the theory and their personal ideas.
D. the experimental and observational evidence available.

56. The general aim of science is to

A. verify what has already been discovered about the physical world.
B. explain natural phenomena in terms of principles and theories.
C. discover, collect, and classify facts about animate and inanimate nature.
D. provide the people of the world with the means for leading better lives.

57. Of the following, which is the best statement about scientific knowledge?

A. Scientific knowledge is a systematic collection of facts.
B. Data and ideas from the past contribute to today's scientific knowledge.
C. Each generation starts anew to build up its own scientific knowledge.
D. Statements are not accepted as scientific knowledge unless they are absolutely true.

58. Which of the following is the best description of a scientific law?

A. It is an exact report of the observations of scientists.
B. It is a generalized statement of relationships among natural phenomena.
C. It is a theoretical explanation of a natural phenomenon.
D. It is enforced by nature and cannot be violated.

Part IV

Some people have suggested that our government take a more active role in controlling the rate of population growth both in the United States and in other countries. Below are some things which people say the government should do. For each statement decide whether you:

a) Agree strongly
b) Agree
c) Don't know
d) Disagree
e) Disagree strongly

59. Put birth control medicine in the drinking water so that people can't have babies without getting permission.

a
b
c
d
e

60. Make foreign countries like India start birth control programs in order to qualify for foreign aid.

a
b
c
d
e

61. Pay for radio and T.V. commercials encouraging people to have smaller families.

a
b
c
d
e

62. Make it easier for women to have abortions.

a
b
c
d
e

63. Pay people for not having children.

a
b
c
d
e

64. Set up clinics to give birth control information to married women.

a
b
c
d
e

65. Make it illegal to have more than one or two children.

a
b
c
d
e

66. The government should give free birth control devices to people who want to use them.

a
b
c
d
e

Part V. Questions 67-72 refer to your knowledge about how populations change.

67. The U.S. population is currently growing by about

a) 100 thousand people per year.
b) 500 thousand people per year.
c) 1 million people per year.
d) 2 million people per year.
e) None of the above.

68. How many children would most families have to average to bring about an immediate halt in U.S. population growth?

a) 0
b) 1
c) 2
d) 3
e) 4

69. How does the average American compare with the average person in India in terms of contributing to pollution of the environment?

a) The Indian is much worse.
b) The Indian is somewhat worse.
c) They are about the same.
d) The American is somewhat worse.
e) The American is much worse.

70. If the U.S. population stopped growing in 1970, what effect would this have on the population in the year 2000?

a) The proportion of men between 18 and 24 would have increased greatly between 1970 and the year 2000.
b) The birth rate in the year 2000 would be substantially lower than it was in 1970.
c) The average age of the population would be older in the year 2000 than in 1970.
d) There would be more young people of child bearing age in the year 2000 than in 1970.
e) The population would be similar to that of 1970 in most of its characteristics.

71. If the number of children born per year in the U.S. averaged 2 per family, about how many year(s) would it take before our population stopped growing?

a) 1 year or less
b) 5 years
c) 15 years
d) 30 years
e) 60 years

72. The time it takes for the world's population to double has

a) remained the same for the last 100 years.
b) increased steadily in the last 100 years.
c) decreased steadily in the last 100 years.
d) increased rapidly in the last 100 years.
e) decreased rapidly in the last 100 years.

Part VI. For each statement decide if you:

a) Agree strongly
b) Agree
c) Don't know
d) Disagree
e) Disagree strongly

73. If the government of India asked our help in limiting their population growth - through controlling family size - the United States should not help them.

a
b
c
d
e

74. To help reduce the size of population growth in the U.S., the government should stop spending its money on cancer research.

a
b
c
d
e

75. The U.S. should not worry about population problems in other countries.

a
b
c
d
e

76. To help reduce the size of its population the government of India should put birth control medicine in its public drinking water.

a
b
c
d
e

77. Foreign countries should not listen to U.S. advice on population.

a
b
c
d
e

78. Sending food to help feed starving people in India probably does more harm than good.

a
b
c
d
e

79. The Indian government should sterilize all men who have more than two children.

a
b
c
d
e

80. Some people have suggested the Indian government begin issuing permits to families who want children. Any child born without the government's permission would be killed. Do you agree with this idea?

a
b
c
d
e

81. Like India, the United States is over-populated.

a
b
c
d
e

82. The U.S. should mind its own business and not tell other countries how big or small they should be.

a
b
c
d
e

83. Instead of storing surplus food in warehouses, the U.S. should be helping to feed starving people throughout the world.

a
b
c
d
e

84. The Indian government should make it easier for women to have abortions.

a
b
c
d
e

85. The Indian government should pay people not to have babies.

a
b
c
d
e

86. The Indian government should give free birth control devices to people who want to use them.

a
b
c
d
e

87. The Indian government should pay for radio and T.V. commercials encouraging people to have small families.

a
b
c
d
e

88. Before the U.S. gives any country foreign aid, it should make that country take whatever steps are necessary to reduce its population growth rate.

a
b
c
d
e

89. Until the U.S. reduces its population growth rate, foreign countries probably won't take its advice.

a
b
c
d
e

Part VII. Questions 90-100 refer to your knowledge of population dynamics.

90. If the U.S. population stopped growing today what effect would this have on the U.S. population in the year 2000?

I. There probably would be more living space than there is today.
II. It probably would be more politically conservative than it is today.
III. It probably would be less consumption oriented than it is today.

a) I only.
b) II only.
c) III only.
d) II and III
e) None of the above.

91. What effect would an immediate halt in population growth have on opportunities for job advancement in the year 2000?

a) No effect
b) There would be more opportunity for advancement than now.
c) There would be less opportunity for advancement than now.
d) It would depend on the individual.

92. After World War II a "babyboom" produced a rapid change in size in the U.S. population. In the 1960's this "boom" was reflected in:

I. Classroom shortages.
II. Increasing proportion of people living in urban areas.
III. The appearance of a youth culture.

a) I and II.
b) I and III.
c) II and III.
d) I, II,and III.
e) None of the above.

93. Historically, which of the countries below have engaged in some form of population control?

I. China.
II. France.
III. Japan.

a) I and II.
b) I and III.
c) II and III.
d) I, II and III.
e) None of the above.

94. The United States is characterized by:

I. A very rapid rate of population growth.
II. A concentration of a large percentage of the population in a small amount of space.
III. A steadily increasing birth rate.

a) I and II.
b) I and III.
c) II and III.
d) I, II,and III.
e) None of the above.

95. If the death rate for a country is 30 deaths per thousand and the rate of natural increase is 12 people per thousand, what is the immigration rate for the country?

a) 12 people per thousand.
b) 18 people per thousand.
c) 42 people per thousand.
d) Insufficient information.

96. Industrialization in Europe and North America led to a demographic transition. This means that:

a) Birth rates declined, then death rates declined.
b) Birth rates declined after death rates declined.
c) Birth rates and death rates changed independently.
d) Birth rates increased as death rates declined.
e) None of the above.

97. Countries currently undergoing industrialization:

a) Are experiencing a "demographic transition" similar to that experienced by Europe and North America.
b) Have not yet experienced a "demographic transition" like that experienced by Europe and North America.
c) Will not experience a "demographic transition" similar to that experienced by Europe and North America.
d) Insufficient information.

98. Which of the countries below probably has the largest proportion of consumers relative to producers?

a) United States.
b) Great Britain.
c) Spain.
d) Japan.
e) India.

99. Reducing the rate of population growth in Japan resulted in:

I. An increase in economic growth.
II. A rise in the average wage paid.
III. A surplus in the number of apartments available.

a) I only.
b) II only.
c) III only.
d) I and II.
e) I and III.

100. The earth's first large increase in the size of its human population occurred as a result of:

a) The development of the spear.
b) The development of agriculture.
c) The Industrial Revolution.
d) The Green Revolution.
e) The Population Explosion.

101. Some people suggest that our government should stop paying families on welfare any money if they have more than 1 or 2 children. Do you agree with this?

a) Agree strongly.
b) Agree.
c) Don't know.
d) Disagree.
e) Disagree strongly.

102. The government should give people who adopt children a special break on their income tax.

a) Agree strongly.
b) Agree.
c) Don't know.
d) Disagree.
e) Disagree strongly.

103. What grade are you currently in?

a) 10th.
b) 11th.
c) 12th.

104. Do you think you've learned anything about population as a result of answering this questionnaire?

a) I learned a great deal about population.
b) I learned a little bit about population.
c) I didn't learn anything at all about population.
d) I am not sure.

Appendix C

Summary of
Comments By Population Experts
Regarding The Population Dynamics Inventory (Form A&B)

Critic #1
Form A: Figures and graphs are drawn poorly and should be revised.

Q. 6.	Ambiguous although Natural Increase is usually greater than outmigration
Q. 7.	Question would be confusing if student inferred population growth as Births + Inmigration - (deaths + outmigration)
Q. 9.	Drop last alternative
Q. 11.	Same as 7. Perhaps should ask about migration instead.
Q. 12.	Rewrite - so reads "Which of these countries probably had the best medical care between..."
Q. 13	Alternative C worded poorly
Figure 1.2	Axis requires label
Q. 15	Rewrite so reads "What described what happened...best?" May want to add a question or two about natural increase and its relationship to growth.
Figure 2	Difficult to read. May want to ask social studies to infer when family planning started or to ask to make inferences which explain why different countries have differently shaped pyramids.
Q. 17	Difficult to answer given figure
Q. 20	Needs a "probably"
Q. 22	"...which country <u>is likely to</u>"
Q. 23	Change "population control" to "family planning program."
Q. 26	Intersection hard to determine
Q. 28	D - change to "A & B the Same"
Figure 4	Meaningless index

Critic #1
Form A:

Q. 36	Change e to convey thought that the death rate is not related to industrialization
Q. 42-61	Idea is good, but table should be changed to reduce time needed for computations.
Q. 42	Correct answer doesn't appear. Should be rewritten.
Q. 43	Same as Q. 42
Q. 44	Density figures are not plausible
Q. 46	If change table this Q should also be changed.
Q. 49	Domesticity role needs to be made clearer
Q. 50	Unclear
Q. 51	Old age benefit concept needs to be made clearer
Q. 52	Change U.S. to fictitious country
Q. 53	Change USSR to fictitious country
Q. 58	Unpaid agriculture doesn't reduce fertility. Change women to children.
Q. 63	Unclear
Q. 65	Unclear
Q. 67	Ambiguous. More of an emphasis on replacement might be worth while. A question about the relationship between population and pollution would also be worth while.
Q. 69	Too technical
Q. 70	May want to simplify wording
Q. 72	Wording confusing

Critic #2
Form A:

Q. 5	Graph should be redrawn more clearly.
Q. 12	Since you include the word 'probably', I agree with the correct answer.
Q. 14, 15	Figure 1.2 should have some statement of unit meaning for Y axis.
Q. 14	I would select "E" for this question, since Figure 1.1 includes no information on migration. Again, the inclusion of the word "probably" may have some impact on the choice of response "A". In that case, I might note that Country 1 seems likely, but it isn't exactly right (e.g., 1950 -- should be about 15 as I read it.
Q. 16	The diagrams should be redrawn; hard to see the differences.
Q. 17	Same as Q. 16.
Q. 18	Correct answer is D.
Q. 19	Same as Q. 18
Q. 23	Possibly ambiguous -- I agree that correct answer is E, but I wouldn't rule out selection A, because of the "probably" in the statement; the justification would rest on assuming that the program had been put into effect in the recent past.
Q. 25.	I agree with the answer, but Figure 3 might be redrawn.
Q. 26	I would have chosen "C" -- chart isn't clear.
Q. 29	I agree with the answer, but the inclusion of 'probably' in the statement might argue for B.
Q. 34	Same issue as Q. 29.
Q. 36	Same issue as Q. 29.
Q. 39	In view of the last few notes, it is difficult to see the reasoning behind the choice of "C".

Questions 42-46 Below are some rough calculations which yield answers different from those considered correct by the key. The major issue I see is the definition of the birthrate as "per 1000 women of childbearing age," rather than simply to the entire population (e.g., per 1000 population). This means that the calculation of the number of births in a year proceeds by first calculating the number of women of childbearing age, and then applying the above rate to that figure; this yields a very small number of births, in comparison with the number of births which would have resulted had you used a birthrate per 1000 population.

My second comment is that the question might be phrased in such a way as to simplify calculations; in its present version, the question penalizes those who are either inept or poorly motivated in arithmetic skills, rather than those who are not knowledgeable in demography.

Question 42 (Questionia).

Pop. on Dec. 31, 1970 = Pop. 1/1/70 + births - deaths

Births = (15% of 50,250) x (20/1000)

Births = (7,537.5) x (.02)

Births = 150.75

Deaths = (50,250) x (15/1000)

Deaths = 753.750

Pop. on Dec. 31, 1970 = 50,250 + 151 - 754

= 49,647

Question 43 (Sari).

Pop. on Dec. 31, 1970 = Pop. 1/1/70 + births - deaths

Births = (30% of 50,250) x (40/1000)

Births = (15,075) x (.04)

Births = 603

Question 43 (Sari)

Deaths = (50,250) x (15/1000)

Deaths = 753.750

Pop. on Dec. 31, 1970 = 50,250 + 603 - 754

= 50,099

Q. 49 I would choose C or (most likely) D.

Q. 50 Answer is D, not E but there is a possibility of C, I would think.

Q. 51 I don't see the logic of B -- I would choose D.

Q. 52 A may be correct, but D looks good.

Q. 54 I'd choose either C or D.

Q. 55 Correct answer is D.

Q. 57 I'd choose D.

Q. 58 I'd choose D.

Q. 60 Correct answer is D.

Question 62 is missing.

Critic #3

I have looked over the dynamics materials you left for me the other day and find I have little to offer at the moment. Perhaps it is relevant that some of the questions and approaches at the "knowledge" level did not seem to me clearly to relate to the goals you were expressing at lunch, while the attitudes questions came through more clearly. Thus, the former questions seemed sometimes to risk focusing too specifically on ability to read graphs for comparative details. In one or two cases, as in Question 73, there isn't any obvious answer; on age distribution effects of ZPG, in Question 69, the knowledge elicited would seem well beyond the scope of a general audience.

But these are relative details. My main point would be that it would be useful to try to impart a sense of the excitement surrounding population matters today. I believe you can with your approach tell us a good deal about this at the knowledge level, in addition to attitudes.

Appendix D
FORM A

Percentage answering each alternative

Question	A	B	C	D	E	Blank
1	5.60	1.96	75.63	5.88	10.36	2
2	1.68	3.64	5.60	77.03	11.76	1
3	81.51	4.76	1.68	1.40	10.08	2
4	14.29	47.90	8.12	7.00	22.13	2
5	7.84	7.28	28.57	9.24	45.66	5
6	23.53	46.22	9.52	12.61	7.00	4
7	8.40	72.83	8.68	2.52	6.16	5
8	8.96	70.03	15.97	2.24	1.96	3
9	5.04	13.73	27.17	4.76	47.90	5
10	4.20	63.31	3.36	3.92	24.09	4
11	26.89	19.33	17.09	5.60	28.01	11
12	10.36	34.17	31.37	4.20	18.21	6
13	5.04	6.72	68.91	7.00	10.36	7
14	24.09	38.38	12.32	16.25	6.72	8
15	45.66	6.72	8.40	22.41	15.41	5
16	12.61	59.66	17.65	7.00	1.40	6
17	26.61	14.57	41.46	8.68	5.60	11
18	5.88	48.74	12.61	26.61	5.04	4
19	9.80	65.83	6.72	14.01	2.80	3
20	12.61	26.33	7.56	45.94	6.72	3

Question	A	B	C	D	E	Blank
21	12.89	51.22	7.84	20.45	3.64	7
22	9.80	34.45	24.93	5.32	24.09	5
23	51.26	13.73	5.60	10.64	17.37	5
24	10.08	3.08	79.27	3.36	3.36	3
25	9.24	71.71	11.20	5.04	1.68	4
26	15.97	7.28	38.66	33.05	3.36	6
27	24.93	6.44	46.78	15.41	2.24	15
28	46.50	26.89	8.12	7.56	8.12	10
29	19.33	28.01	8.68	3.64	37.82	9
30	3.36	80.11	2.80	4.48	7.00	8
31	6.72	11.48	9.52	66.95	3.36	7
32	8.68	5.88	40.90	4.20	38.10	8
33	7.00	38.66	10.64	1.96	39.22	9
34	5.32	10.36	49.58	1.96	29.69	11
35	32.49	30.53	3.08	2.52	27.45	14
36	4.76	13.45	27.45	7.00	41.74	20
37	1.40	49.30	8.12	2.52	33.61	18
38	4.20	22.97	24.93	2.80	39.50	20
39	11.20	33.33	8.40	5.04	36.41	20
40	12.04	36.41	7.84	6.44	31.09	22

Form A

Question	A	B	C	D	E	Blank
41	7.28	10.64	9.80	54.62	11.20	24
42	27.45	12.04	20.45	12.61	8.40	69
43	17.09	14.01	10.64	14.01	23.53	75
44	7.28	56.02	9.80	6.72	4.48	57
45	31.37	11.20	8.40	15.13	15.41	67
46	7.00	10.92	37.25	13.45	11.76	71
47	40.90	14.85	10.92	11.20	3.08	69
48	8.12	22.41	33.05	10.64	4.20	78
49	11.76	7.00	45.38	12.04	3.08	75
50	5.32	52.10	10.36	7.56	3.92	75
51	23.81	10.08	29.13	11.48	3.64	79
52	38.66	5.88	16.81	11.76	3.64	84
53	10.64	5.60	46.22	10.36	3.08	87
54	20.45	8.12	24.37	17.09	5.32	89
55	14.57	7.56	22.69	23.53	5.88	93
56	52.66	7.28	5.60	5.32	2.80	95
57	5.60	32.77	19.33	12.32	3.92	94
58	8.12	18.77	30.53	11.48	5.04	94
59	3.36	34.17	15.69	14.57	5.32	97
60	13.73	20.45	19.61	13.45	3.36	106

Question	A	B	C	D	E	Blank
61	49.58	8.96	6.44	4.20	1.68	105
62	0.00	0.00	0.00	.56	1.12	352
63	7.28	7.56	21.85	11.48	22.97	104
64	28.85	19.61	13.73	3.64	3.36	111
65	6.44	10.92	16.53	18.21	17.37	110
66	12.61	14.01	10.92	10.36	15.41	132
67	14.85	10.36	36.69	3.92	1.12	119
68	9.52	6.44	8.40	8.68	31.65	127
69	3.08	15.69	29.13	4.20	8.96	140
70	10.08	9.24	11.20	18.21	12.61	139
71	16.81	8.68	11.76	11.76	8.96	151
72	3.36	14.29	7.84	21.01	11.48	151
73	30.25	6.72	7.00	10.08	3.08	154
74	9.24	18.77	12.89	8.40	1.68	176
75	19.61	13.45	6.72	3.36	5.04	186
76	6.16	20.17	10.64	3.64	5.88	192
77	3.92	6.16	5.60	24.93	5.60	193
78	8.12	10.64	7.56	12.61	4.20	204
79	1.96	14.01	34.45	2.52	.28	168
80	38.38	54.34	1.68	.56	0.00	19

Question	A	B	C	D	E	Blank
81	1.40	79.55	2.80	6.16	3.64	22
82	5.32	9.24	11.76	8.68	12.04	188

Form A

FORM B

Percentage answering each AH

Question	A	B	C	D	E	Blank
1	4.44	19.17	22.22	22.22	31.94	0
2	43.89	55.83	.28	0.00	0.00	0
3	1.11	82.50	0.00	5.28	10.56	2
4	31.11	25.00	12.50	25.83	4.44	4
5	25.83	50.00	14.44	3.06	5.56	4
6	53.61	41.67	3.89	.28	0.00	2
7	17.22	12.50	45.56	13.06	10.83	3
8	1.94	4.44	55.56	29.17	8.61	1
9	55.56	25.56	6.94	10.83	.28	3
10	35.00	37.50	16.39	9.72	.28	4
11	6.94	49.17	11.94	29.72	2.22	0
12	12.78	20.83	20.28	34.72	11.39	0
13	5.83	19.44	21.94	31.94	20.83	0
14	20.28	24.44	42.22	10.28	2.22	2
15	23.06	33.89	12.78	18.33	11.67	1
16	16.67	23.06	7.78	31.11	21.39	0
17	17.22	35.28	18.61	21.94	6.39	2
18	2.50	6.11	16.67	51.11	22.78	3
19	25.00	40.28	17.50	11.94	4.17	4
20	1.67	14.17	6.11	45.83	31.39	3

Question	A	B	C	D	E	Blank
21	7.78	24.72	45.83	16.94	3.61	4
22	13.89	40.28	20.28	19.72	3.89	7
23	7.78	20.56	31.11	27.22	12.78	2
24	18.33	41.11	10.83	24.17	5.00	2
25	4.44	3.33	5.00	27.50	59.72	0
26	5.56	19.72	16.39	28.06	29.44	3
27	2.78	8.06	6.11	46.94	35.56	2
28	21.39	39.72	15.83	14.44	8.06	2
29	15.28	27.78	10.83	36.39	9.44	1
30	34.72	44.44	1.94	15.56	3.06	1
31	3.06	7.50	7.78	47.50	33.33	3
32	11.39	26.94	10.28	37.22	13.33	3
33	17.78	37.50	4.44	21.94	18.06	1
34	15.56	36.11	23.89	19.17	3.89	5
35	5.00	11.67	8.33	58.61	16.11	1
36	21.94	48.06	5.56	18.61	5.00	3
37	22.78	44.17	5.56	23.89	3.33	1
38	15.83	36.39	24.72	20.28	2.50	1
39	11.67	32.78	44.17	8.06	1.39	7
40	2.22	6.94	19.44	48.61	22.22	2

Question	A	B	C	D	E	Blank
41	1.67	9.17	21.67	42.78	24.44	1
42	5.83	20.56	31.67	31.11	10.00	3
43	8.61	36.39	16.67	30.00	7.78	2
44	28.61	54.44	5.83	8.06	2.22	3
45	10.00	40.83	28.06	16.67	3.89	2
46	2.22	5.83	26.11	40.83	24.17	3
47	17.78	53.06	15. 28	10.28	3.06	2
48	7.78	43.06	12.78	30.28	5.28	3
49	47.78	45.83	2.78	.56	0.00	11
50	1.94	36.11	48.33	11.11	1.11	5
51	.83	12.50	46.67	32.78	5.83	5
52	27.22	4.17	30.28	20.83	.83	60
53	19.72	11.94	2.78	61.67	.56	12
54	8.33	65.28	15.00	7.78	.56	11
55	10.00	3.06	24.44	58.89	.83	10
56	5.00	17.22	33.61	39.17	.83	15
57	38.61	33.89	9.72	14.17	.56	11
58	22.50	16.39	31.11	24.44	1.67	14
59	1.94	1.94	3.89	20.56	70.83	3
60	11.39	31.11	15.28	22.78	18.06	5

Question	A	B	C	D	E	Blank
61	20.28	46.39	11.39	13.89	7.22	3
62	30.28	34.17	7.78	11.67	14.44	6
63	8.06	19.44	16.39	32.78	22.50	3
64	47.78	43.06	4.17	1.67	2.22	4
65	5.00	7.50	11.67	31.39	43.06	5
66	31.94	43.61	11.11	6.94	4.72	6
67	20.56	17.78	18.61	12.22	18.89	43
68	17.50	24.44	47.78	4.44	3.61	8
69	10.28	13.61	10.56	16.67	41.94	25
70	2.50	21.67	42.50	6.39	17.22	35
71	9.44	16.39	25.56	26.39	14.17	29
72	2.50	25.28	7.78	49.44	8.33	24
73	4.44	7.78	10.56	35.00	39.72	9
74	3.61	2.50	8.33	37.50	45.56	9
75	3.89	8.06	7.22	46.67	31.11	11
76	4.17	3.61	14.17	38.61	36.39	11
77	2.22	3.61	17.78	48.89	24.72	10
78	4.17	10.56	16.11	40.56	26.11	9
79	6.39	12.22	18.61	32.50	27.22	11
80	1.11	1.94	3.89	17.22	72.78	11

Question	A	B	C	D	E	Blank
81	18.89	35.83	13.33	25.00	3.33	13
82	6.11	16.94	20.83	40.56	11.39	15
83	13.33	30.83	25.83	21.94	3.61	16
84	29.72	34.17	11.67	12.78	6.67	18
85	11.11	21.94	18.89	33.06	10.00	18
86	40.83	41.11	5.83	4.72	2.50	18
87	25.28	32.22	12.78	20.00	4.44	19
88	8.06	24.44	25.56	30.28	6.39	19
89	11.94	36.67	23.89	18.61	3.06	21
90	30.83	9.72	14.17	13.89	21.94	34
91	7.50	50.00	6.94	25.56	1.39	31
92	19.17	17.22	15.83	29.72	8.06	36
93	6.67	25.56	20.28	6.39	27.78	48
94	8.06	15.56	25.28	30.56	10.28	37
95	2.22	20.00	5.56	59.44	1.11	42
96	3.61	4.72	13.33	33.06	22.50	82
97	15.00	11.94	8.06	40.28	2.78	79
98	33.89	6.67	3.33	16.94	27.78	41
99	25.28	8.89	7.78	34.17	7.50	59
100	3.33	17.78	27.78	3.89	32.22	54

Question	A	B	C	D	E	Blank
101	8.33	18.61	20.28	29.17	11.94	42
102	15.83	37.50	14.72	17.50	3.89	38
103	2.50	25.56	60.28	.56	.83	37
104	5.83	36.11	20.28	25.83	.28	42

Appendix E

Variable Dictionary

1. Deck A Deck for PDI Form A

356 cases
3 cards per case
col. 1-39 id
col. 40-79 variables (each corresponds to question)
col. 80 card number (alphanumeric J, K, L)

Punch: A = 5, B = 4, C = 3, D = 2, E = 1.
Blank = 0 = no response
Basic Format = F1.0

Card 1

col. 01	City/State 1 = Portland 2 = Delaware 3 = Kansas 4 = Kentucky 5 = Indiana
col. 02-03	Teacher code
04	Class
05-10	Blank
11-30	Student code (alphanumeric)
31-36	Questionnaire
37-39	Original total score over all variables before revision (= garbage)
40-79	Questions 1-40 (F1.0) A = 4, B = 3, C = 2, D = 1, E = 0 Blank = NR
80	"J"

Card 2

col. 01-39	id (same as above)
40-79	Questions 41-80
80	"K"

Card 3

col. 01-39	id (same as above)
40-42	Questions 81-82
80	"L"

2. Deck B0 (Original Deck for PDI Form B)

360 cases
4 cards per case
col. 1-39 = id
col. 40-79 = variables
col. 80 = card number (alphanumeric J, K, L)

Punch: A = 4, B = 3, C = 2, D = 1, E = 0
Blank = No response

Card 1

col. 01	City/State 1 = Portland 2 = Delaware 3 = Kansas 4 = Kentucky 5 = Indiana
col. 02-03	Teacher code
04	Class
05-10	Blank
11-30	Student code (alphanumeric)
31-36	Questionnaire #
37-39	= garbage
40-79	Questions 1-40 A = 4, B = 3, C = 2, D = 1, E = 0 Blank = NR
80	"J"

Card 2

col 01-39	id
40-79	Questions 41-80
80	"K"

Card 3

col. 01-39	id
40-42	Questions 81 and 82
43-79	Blank
80	"L"

3. Deck B2 (Revised Deck for PDI Form B)

360 cases
4 cards per case
Blanks recoded zero
Responses for attitude variables recoded A = 5, B = 4, C = 3, D = 2, E = 1
Variables 15, 61, 83 reversed
Knowledge Variables 67, 68, 70, 71, 72, 90, 92, 93, 94, 95, 96, 97, 98, 99, and 100
Recoded: correct = 1
incorrect = 0
Scores for 9 additive indices reflecting 9 factors added
Card number recoded to numeric 1, 2, 3, 4

Card 1

col. 01-39	id
40-79	Questions 1-40 A = 5, B = 4, C = 3, D = 2, E = 1 except for Question 15 which is reversed
80	1

Card 2

col. 01-39	id
40-79	Questions 41-80. Questions 61 and 83 are coded in reverse. Questions 67, 68, 70, 71 and 72 are binarily coded.
80	2

Card 3

col. 01-39	id
40-63	Questions 81-104. Questions 90, 92, 93, 94, 95, 96, 97, 98, 99 and 100 are binary
64-65	Garbage
66-70	Factor index 1 = E i/n where i = questions 15, 59, 65, 76, 79, 80; and where n = number answered
71-75	Factor index 2 = (Q75 + 77 + 82)/number answered
76-79	Blank
80	3

Card 4

col. 01-39	id
40-44	Factor index 3 = (Q 66 + 84 + 86 + 87)/number answered
45-49	Factor index 4 = (Q 26 + 63 + 85)/number answered
50-54	Factor index 5 = (Q 13 + 17 + 28 + 39 + 45 + 47 + 81 + 89)/number answered

3. Deck B2 (cont'd)

Card 4 (cont'd)

col.	55-59	Factor index 6 = (Q 6 + 29 + 36)/number answered
	60-64	Factor index 7 = (Q 12 + 19 + 20 + 27 + 37 + 40 + 41 + 46)/number answered
	65-69	Factor index 8 = (Q 30 + 33)/number answered
	70-74	Factor index 9 = (Q 24 + 42 + 43 + 44)/number answered
	75-99	Blank
	80	4

Appendix F

A SELECTIVE LISTING OF
RESOURCE PERSONNEL CONTACTED BY CENTER STAFF

Lee Anderson, Department of Political Science, Northwestern University
American Political Science Association, Committee on Precollegiate Political Education

Val Arnsdorf, Department of Social Studies Education, University of Delaware

Lynton Caldwell, Department of Political Science, Indiana University

Michael Chiapetta, Department of Comparative Education, Indiana University

David L. Clark, Dean, School of Education, Indiana University

Tom Dow, Population Council

George Dowdall, Department of Sociology, Indiana University

Dean Fraser, Chairman, Department of Microbiology, Indiana University

Scot Gordon, Chairman, Department of Economics, Indiana University

Paul Handler, Department of Physics, University of Illinois, Champaign-Urbana

Harriet Hertzberg, Department of Education, Columbia University

Carl Huether, Department of Biology, University of Cincinnati

Angela Lane, Department of Sociology, Indiana University

Rufus Miles, Population Reference Bureau

Dorothy Millstone, Planned Parenthood-World Population

Robert McLaughlin, Ford Foundation

Dennis Pett, Department of Instructional Systems Technology, Indiana University

William Pulliam, Department of Social Studies Education, University of Delaware

Robert Stegner, Department of Science Education, University of Delaware

George Stolnitz, Department of Economics, Indiana University

Stephen Viederman, Population Council

Sloan Wayland, Department of Education and Sociology, Columbia University

Donald Whitehead, Department of Botany, Indiana University