INFORMATION TO USERS

This material was produced from a microfilm copy of the original document. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the original submitted.

The following explanation of techniques is provided to help you understand markings or patterns which may appear on this reproduction.

1. The sign or “target” for pages apparently lacking from the document photographed is “Missing Page(s)”. If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting thru an image and duplicating adjacent pages to insure you complete continuity.

2. When an image on the film is obliterated with a large round black mark, it is an indication that the photographer suspected that the copy may have moved during exposure and thus cause a blurred image. You will find a good image of the page in the adjacent frame.

3. When a map, drawing or chart, etc., was part of the material being photographed the photographer followed a definite method in “sectioning” the material. It is customary to begin photoing at the upper left hand corner of a large sheet and to continue photoing from left to right in equal sections with a small overlap. If necessary, sectioning is continued again — beginning below the first row and continuing on until complete.

4. The majority of users indicate that the textual content is of greatest value, however, a somewhat higher quality reproduction could be made from “photographs” if essential to the understanding of the dissertation. Silver prints of “photographs” may be ordered at additional charge by writing the Order Department, giving the catalog number, title, author and specific pages you wish reproduced.

5. PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, Michigan 48106
PARISH, Richard James, 1932-
THE DESIGN AND TESTING OF AN INSTRUCTIONAL
MODEL FOR POPULATION AND RESOURCES EDUCATION
CONCEPTS AT THE COMMUNITY COLLEGE LEVEL.

The Ohio State University, Ph.D., 1973
Education, curriculum development

University Microfilms, A XEROX Company, Ann Arbor, Michigan

THIS DISSERTATION HAS BEEN MICROFILMED EXACTLY AS RECEIVED.
THE DESIGN AND TESTING OF AN INSTRUCTIONAL MODEL FOR POPULATION AND RESOURCES EDUCATION CONCEPTS AT THE COMMUNITY COLLEGE LEVEL

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Richard James Parish, B.A., M.A.

The Ohio State University
1973

Reading Committee:
Dr. Robert E. Jewett
Dr. Paul E. Klohr
Dr. James K. Duncan

Approved by

Advisor
College of Education
ACKNOWLEDGEMENTS

I wish to acknowledge my gratitude to the following persons:

Dr. James K. Duncan for his direction in educational research design.

Dr. Paul E. Klohr for his assistance in helping me to acquire insight into some the major issues of education.

Dr. Robert E. Jewett, my major advisor, is an exemplar of the Reflective method of inquiry. His open-mindedness and willingness to examine all facets of an issue serve as a model of Dewey's Instrumentalism.

Finally my wife, Judith, who provided invaluable criticism of the various drafts of this dissertation and her cheerful acceptance of the chore of typing the manuscript.

Richard J. Parish
VITA

October 31, 1932  

B. A., Kent State University, Kent, Ohio

1958-1960  

Teacher, Northfield-Macedonia Schools, Northfield, Ohio

1960  

M. A., Kent State University, Kent, Ohio

1960-1961  

Instructor of Geography, Kent State University, Kent, Ohio

1961  

B. S. in Ed., Kent State University, Kent, Ohio

1961-1962  

Graduate Study, University of Illinois, Urbana, Illinois

1962-1963  

Assistant Professor of Geography, Edinboro State College, Edinboro, Pennsylvania

1963-1964  

Instructor of Geography, Kent State University, Kent, Ohio

1964-1965  

Teacher, Lakewood Public Schools, Lakewood, Ohio

1965-1971  

Professor of Geography, Cuyahoga Community College, Cleveland, Ohio

1972  

Graduate Study, The Ohio State University, Columbus, Ohio

1972-1973  

Professor of Geography, Cuyahoga Community College, Cleveland, Ohio

FIELDS OF STUDY

Social Studies Education  

Professor Robert E. Jewett

Foundations and Curriculum  

Professor James K. Duncan

Geography  

Professor Henry L. Hunker
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>VITA</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>I. THE NATURE OF THE STUDY</td>
<td>1</td>
</tr>
<tr>
<td>Background</td>
<td></td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td></td>
</tr>
<tr>
<td>The Nature of Environmental Education</td>
<td></td>
</tr>
<tr>
<td>Justification of the Study</td>
<td></td>
</tr>
<tr>
<td>Design of the Study</td>
<td></td>
</tr>
<tr>
<td>Limitations</td>
<td></td>
</tr>
<tr>
<td>Significance of the Study</td>
<td></td>
</tr>
<tr>
<td>Overview of the Study</td>
<td></td>
</tr>
<tr>
<td>II. REVIEW OF RELATED LITERATURE</td>
<td>23</td>
</tr>
<tr>
<td>Studies Dealing with Community College</td>
<td></td>
</tr>
<tr>
<td>Students' Reading Comprehension Levels</td>
<td></td>
</tr>
<tr>
<td>Studies Dealing with Remedial Communications Skills Courses</td>
<td></td>
</tr>
<tr>
<td>Studies that Question the Validity of Reading Tests and/or Remedial Reading Programs</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>III. DESIGN OF THE INVESTIGATION</td>
<td>50</td>
</tr>
<tr>
<td>Student Characteristics: Cuyahoga Community College, Metropolitan Campus</td>
<td></td>
</tr>
<tr>
<td>Reading Comprehension Scores and Levels of College Achievement</td>
<td></td>
</tr>
<tr>
<td>Development of a Hierarchy of Population and Resources Concepts</td>
<td></td>
</tr>
<tr>
<td>Pilot Evaluation of Test Instruments</td>
<td></td>
</tr>
<tr>
<td>Selection of Reading Material and Design of Instructional Strategies</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>IV. IMPLEMENTATION OF THE INVESTIGATION AND ANALYSIS OF RESULTS</td>
<td>86</td>
</tr>
<tr>
<td>Summary of Assignments</td>
<td></td>
</tr>
<tr>
<td>Rationale in Use of Test Instruments</td>
<td></td>
</tr>
<tr>
<td>Other than the New Reading Test, Form A</td>
<td></td>
</tr>
<tr>
<td>Test Results</td>
<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td></td>
</tr>
<tr>
<td>Correlation Analysis</td>
<td></td>
</tr>
<tr>
<td>V. SUMMARY, CONCLUSIONS AND DISCUSSION</td>
<td>114</td>
</tr>
<tr>
<td>Tests Conclusions</td>
<td></td>
</tr>
<tr>
<td>Correlation Analysis Conclusions</td>
<td></td>
</tr>
<tr>
<td>Conclusions Concerning the General Questions of the Investigation</td>
<td></td>
</tr>
<tr>
<td>General Conclusions and Recommendations</td>
<td></td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>Appendix A</td>
<td>132</td>
</tr>
<tr>
<td>Appendix B</td>
<td>137</td>
</tr>
<tr>
<td>Appendix C</td>
<td>140</td>
</tr>
<tr>
<td>Appendix D</td>
<td>143</td>
</tr>
<tr>
<td>Appendix E</td>
<td>148</td>
</tr>
<tr>
<td>Appendix F</td>
<td>158</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>160</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table                              Page
1  Relationship between Academic Ability and Activity After High School Graduation .......... 3
2  An Instructional Strategy Model .......... 19
3  Reading Comprehension Scores in Terms of Grade Level. ........................................... 61
4  Conclusions Concerning Relationship of Reading Comprehension and College Success for 100 Students Enrolled in the Associate of Arts Degree Program. ........................................... 61
5  Reading Comprehension as an Indicator of Probable College Success. .......................... 62
7  Pretest Population Concepts Knowledge Level Test. ..................................................... 69
8  Pretest Inference and Conclusions Evaluation. ................................................................. 70
9  Posttest Population Concepts Knowledge Level Test. ..................................................... 70
10 Posttest Inference and Conclusions Evaluation ................................................................. 71
11 Profile of Student Characteristics, Spring Quarter Study Population. .............................. 88
12 Knowledge Level Test: All Groups (Pretest and Posttest) ............................................ 98
13 Synthesis, Interpretation, Evaluation Test: All Groups (Pretest and Posttest) ................ 99
14 Environmental Opinions Survey: All Groups (Pretest and Posttest) ................................ 100
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Knowledge Level Test: Treatment Group II and High Reading Comprehension Students in Control Group. (Pretest and Posttest).</td>
<td>101</td>
</tr>
<tr>
<td>16</td>
<td>Knowledge Level Test: Treatment Group I and Low Reading Comprehension Students in Control Group. (Pretest and Posttest).</td>
<td>102</td>
</tr>
<tr>
<td>17</td>
<td>Synthesis, Interpretation, Evaluation Test: Treatment Group II and High Reading Comprehension Students in Control Group. (Pretest and Posttest).</td>
<td>103</td>
</tr>
<tr>
<td>18</td>
<td>Synthesis, Interpretation, Evaluation Test: Treatment Group I and Low Reading Comprehension Students in Control Group. (Pretest and Posttest).</td>
<td>104</td>
</tr>
<tr>
<td>19</td>
<td>Environmental Opinions Survey: Treatment Group II and High Reading Comprehension Students in Control Group. (Pretest and Posttest).</td>
<td>105</td>
</tr>
<tr>
<td>20</td>
<td>Environmental Opinions Survey: Treatment Group I and Low Reading Comprehension Students in Control Group. (Pretest and Posttest).</td>
<td>106</td>
</tr>
<tr>
<td>21</td>
<td>Correlation Analysis Results.</td>
<td>113</td>
</tr>
</tbody>
</table>
CHAPTER 1

BACKGROUND

One of the most rapid growth sectors of American public education is the community or junior college. The majority of these two-year institutions are comprehensive colleges in that they offer university parallel courses as well as terminal programs directed toward specific vocational ends.

The Carnegie Commission on Higher Education reported that in 1969 two-year institutions of higher education accounted for nearly 30 percent of all undergraduates and 25 percent of all students in higher education in the nation. In citing reasons for the phenomenal growth of community colleges, the Commission stated:

Among the explanations for the rapid advance of the community colleges are their open-admission policies, their geographic distribution in many states, and their usually low tuition policies. They offer more varied programs for a greater variety of students than any other segment of higher education. They provide a chance for many who are not fully committed in advance to a four-year college career to try out higher education without great risks of time or money. They appeal to students who are undecided about their future careers and unprepared to choose a field of specialization. And, last but by no means least, they provide an opportunity for continuing education to working adults seeking to upgrade their skills and training.
The Carnegie Commission in their description of the nation's community colleges noted that:

Approximately half of the students in two-year colleges are adults, ranging in age from 22 to 70 or more, with a median age of about 25. These students' objectives are predominantly professional or vocational, and in most cases they are attending college in order to qualify for a better job. About 45 percent of the students in two-year institutions are enrolled on a part-time basis. These include both college-age students who hold jobs and adults enrolled part-time in day or evening classes.

In the same study the Commission recommended that there should be "continuing evaluation studies of the experiences of these colleges, with particular reference to student achievement during the two-year educational period and their subsequent education and employment."

From an instructional view perhaps the greatest challenge is the design of curriculum and instructional strategies to serve the heterogeneous student population of a typical community college. This challenge is enlarged for the large urban publicly supported two-year college. As described by the Carnegie Commission there will be factors of diversity in the student body such as socio-economic backgrounds, racial and ethnic heritage, prior levels of academic achievement and individual educational goals.

In a study conducted by Patricia Cross the academic abilities of two-year college students were
compared with four-year college students and high school graduates who did not go to college. Using fourteen measures of ability, ranging from reading comprehension, mathematics ability, and biology to vocabulary information, creativity, and abstract reasoning, the junior college group fell between the four-year college and noncollege groups.

Table 1, derived from the results obtained from 35,000 high school seniors who took the Academic Ability Test in the Spring of 1967, supports Cross' contention that junior college students' academic ability falls between the noncollege group and the four-year college group.

<table>
<thead>
<tr>
<th>Total AAT Score</th>
<th>Noncollege</th>
<th>Junior College</th>
<th>Four-Year College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Third</td>
<td>16</td>
<td>36</td>
<td>71</td>
</tr>
<tr>
<td>Middle Third</td>
<td>35</td>
<td>39</td>
<td>23</td>
</tr>
<tr>
<td>Lowest Third</td>
<td>49</td>
<td>25</td>
<td>6</td>
</tr>
</tbody>
</table>

Quoting from an unpublished study referred to as Scope, Cross reported that students who entered four-year
colleges were much more likely to receive parental encouragement than either those who did not enter college or those who entered junior college. 7

The same Scope study is quoted to describe some of the perceptions held by high school seniors in terms of their confidence to successfully handle college work. For those high school seniors planning to enter a four-year college, 57 per cent felt that they were "definitely able" to do college work. For those seniors planning to enter junior colleges only 29 per cent felt that they were able to do college level work. Of the students planning to enter a four-year college 75 per cent thought that their teachers would rate them as "good" or "excellent" students. For those students planning to enter junior colleges only 41 per cent had the same level of confidence. 8

It would appear then that the typical junior college student is "non-traditional" when compared with his four-year college counterpart. Because of this "non-traditional" aspect it is incumbent on faculties and administrators of two-year institutions to seek means to help the two-year college student attain academic success.

The purpose of this study, therefore, will be to determine the effectiveness of varied instructional
strategies and curricular materials in the teaching of population and resources education concepts with two-year college students.

**STATEMENT OF THE PROBLEM**

Population and resources concepts, a facet of the larger topic of environmental education, have been selected as the subject matter content for the study because the writer assumes that before an informed citizenry can make intelligent decisions concerning environmental issues there must be assimilation by each individual of major demographic and resources concepts. The population and resources concepts have also been selected for the subject matter of the study because it is assumed that the majority of college students have only limited knowledge of demographic and resources principles and that such a topic would be appropriate and of significant interest to a large majority of people in this particular age group.

This study will attempt to examine the effects of matching the individual student's academic ability and what is assumed to be the appropriate instructional strategy and curricular materials for him. Five major questions will be examined in the study. They are as follows:

1. Will there be relationship between an individual student's reading comprehension level, appropriate
curricular materials as well as instructional strategy and the student's success in learning the concepts presented?

2. Will there be relationship between an individual student's reading comprehension level, appropriate curricular materials as well as instructional strategy and the student's change in attitude toward environmental management?

3. Will there be relationship between an individual student's reading comprehension level, appropriate curricular materials as well as instructional strategy and the student's ability to make warranted inferences about population changes and related impact on resources demands?

4. Will there be relationship between the open-mindedness of an individual student as measured by the Rokeach Dogmatism Scale D and his (a) success in learning the concepts presented? (b) change in attitude toward environmental management? (c) capacity to increase his ability to make warranted inferences about environmental relationships?

5. Will there be a positive relationship between an individual student's achievement of the concepts presented and his perception of the appropriateness of the curricular materials and the instructional strategy to which he was assigned?
A basic premise of the study is that population and resources concepts may be infused into existing curriculum, such as geography, social science, sociology, or biology. For those students enrolled in the investigation who are prospective teachers, the infusion approach to population and resources education should be of particular value. Hopefully these prospective teachers will be able to see that knowledge is not something that must be compartmentalized into rigid academic disciplines but rather that major concepts and generalizations of human societies should be part of all instruction. It is further assumed that environmental education in general has as its goal to create an awareness of environmental issues and that in a democratically governed society alternative courses of action will be considered intelligently and rationally before decisions are made about "solutions".

The study proposes to utilize major population and resources education concepts gleaned from a variety of sources which are discussed in Chapter III.

THE NATURE OF ENVIRONMENTAL EDUCATION

During the past decade the American public has become increasingly aware of the perils of environmental abuse. As a manifestation of the recognition that the environment should be protected, environmental protection agencies have been established at the national and some
state governmental levels. Laws have been passed to curb the amounts and nature of effluents and particulate matter allowed in streams and air respectfully. The necessity for an environmentally informed citizenry has been recognized by the national Environmental Protection Agency as well as by an increasing number of educators.

Much of the environmental awareness generated during the 1960's was due to publications by writers such as Rachel Carson, Paul Erlich, Stewart Udall, and Rene Dubos. Unfortunately in some instances the tenor of the environmental writings was such that they tended to alarm and frequently created a mood of despair for the reader. He was warned of impending catastrophes without suggestion that there could well be rationally derived alternatives. In some instances it appeared that the environmental writers employed a technique of "overkill" in their attempt to convince the public of the consequences of environmental abuse.

The impending catastrophe approach seems to suggest that there is little alternative other than to accept and implement the "solutions" of the environmental elite. One could infer from such a position taken by the environmental elite that they have little faith in the educative process to foster a climate of rational informed debate which would permit society to weigh
evidence, foresee consequences of actions, and then arrive at conclusions as to how best create an environmental equilibrium.

In contrast to the alarmist approach and the predetermined solutions set forth by a comparatively small group of environmentalists, a significant number of educators have taken the position that through the educative process society can and will make rational decisions about environmental management.

In a study recently completed by Bowman the shift in emphasis from the narrow agrarian Conservation education to the more inclusive Environmental education approach is traced. The author stated that the 1960's was a decade of movement towards what has become known as environmental education.

More and more, environmental education has come to emphasize the educational process itself; i.e., the use of the environment as a tool to achieve pedagogical results that are thought to be useful throughout an individual's lifetime.

Bowman included in her study a number of statements by environmental educators and agencies that emphasize the importance of an educational process in bringing about environmental understandings and their implications. The following statements are from Bowman's study and are used here to underscore the importance of process in environmental education.
Environmental education is defined as that part of the total educational process which attempts to convey those values, concepts and knowledge associated with the external environment. (Rillo, 1970)

Environmental Education is firmly based on economy, includes conservation principles, but goes well beyond its consideration of the total environment and man's relationship to it being centralizing upon the human endeavor. (Sherwood, 1969)

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behavior about issues concerning environmental quality. (Unesco, 1970)

Environmental education is the process of developing a citizenry that is:
1. Knowledgeable of the interrelated biophysical and social cultural environments of which man is a part;
2. Aware of the associated environmental problems and management alternatives of use in solving these problems; and
3. Motivated to work toward the maintenance and further development of diverse environments that are optimum for living. (Stapp, et.al., 1969)

The theme of the foregoing statements is the necessity for an educative process that enables individuals to view environment as a complex of interrelated phenomena. From this common theme it is readily apparent that man plays a critical part in maintaining environmental quality and that he, through a decision making
process, determines what shall be included in environment and to what ends the environment shall be directed.

An educational setting that would promulgate the goals of environmental education requires objectives that place a premium on helping students to become both informed and open-minded. By informed one would assume that there would be commonality in understandings of key environmental concepts and recognition that the meaning and hierarchal importance of concepts will change over time as insights about the total environment increase.

The consequences of environmental management decisions will have to be continuously evaluated in light of the outcomes of these decisions after implementation. One of the goals, then, of environmental education should be to help foster open-mindedness so that each member of society will accept the reality that environmental management decisions are tentative or always subject to change as new data becomes available.

Much of the pedagogical method that would help to bring about an informed, open-minded citizenry is similar to that advocated by John Dewey in works such as *Democracy and Education*¹⁶ and *The Quest for Certainty*.¹⁷

Dewey in *Democracy and Education* stated:

Expressed in terms of attitude of the individual the traits of good method are straight-forwardness, flexible intellectual
interest or open-minded will to learn, integrity of purpose and acceptance of responsibility for the consequences of one's activity including thought.¹⁸

Openness of mind means accessibility of mind to any and every consideration that will throw light upon the situation that needs to be cleared up, and that will help determine the consequences of acting this way to that.¹⁹

In the chapter entitled "The Construction of Good" in The Quest for Certainty Dewey discussing the aims of the Experimental method stated:

What is needed is intelligent examination of the consequences that are actually affected by inherited institutions and customs, in order that there may be intelligent consideration of the ways in which they are to be intentionally modified in behalf of generation of different consequences.²⁰

JUSTIFICATION OF THE STUDY

The writer's interest in this type of study is an outgrowth of instructional difficulties he has experienced and identified while teaching in a relatively large urban community college.

In attempting to develop instructional strategies to be used at the community college level, the writer categorized some of the observable features of inadequate instruction. These categories, or perhaps characteristics, have been presented to other faculty members and their comments were invited. In general, they agreed that the list was representative of instructional problems at the community college level.
A. The observable categories or characteristics are:

1. high failure rates (15% - 50%)
2. high attrition rates
   a. withdrawal from college
   b. dropping courses
3. low motivation for a significant number of students which:
   a. may be a result of anticipated failure because of previous history of academic failure
   b. may be the inability to read and communicate at a post high school level
   c. results in poor class attendance and frequently failure in the course
   d. may be a lack of challenge because they possess a learning style that is incongruent with what might be considered traditional instructional methods

B. Factors which are presumed to influence the undesirable conditions are:

1. differential rates of learning
2. large differential of entry level preparation
3. variance of motivation level at course entry
4. inability of student to discern relevance of course content to himself

C. Factors in (B) which are subject to change are:

1. to design course objectives and content so that they are applicable to student perceived needs
2. to attempt to alleviate barriers in individual student learning process
The primary reason for the proposed study is to determine if some of the conditions mentioned can be alleviated by a change in instructional method and curricular materials.

**DESIGN OF THE STUDY**

The study will be designed and partially tested during the Winter Quarter of 1973. The testing will consist of administration, to approximately 50 students, of a Population Concepts Cognitive test and a test that requires the student to make inferences and evaluate the validity of conclusions concerning the relationships between population changes and resource demands.

The tests will be subjected to analysis to determine reliability and validity of each test as a whole as well as the individual questions within each of the tests.

A reading comprehension test developed by the personnel of the Learning Center at Cuyahoga Community College will be administered to the pilot group of students. If, as is now assumed, a correlation between low reading comprehension and ability to understand the test questions is established, each test item will be subjected to a readability formula to determine the reading level required to understand the question.

Where necessary, test items will be rewritten to cast them at an appropriate vocabulary for the low reading comprehension students.
If some of the test items prove to have low reliability and/or validity as determined by the test analysis, they will be rewritten or deleted from the test instruments.

Curricular materials will be assembled and categorized, according to reading comprehension level, during the Winter Quarter. Overhead transparencies, 2x2 slides, and films will be developed to be used in conjunction with the reading materials. The basic function of these visual materials will be to help students acquire insights concerning the relationships between population changes and resource demands. It is assumed that these types of materials will be of particular value to the low reading comprehension student.

During the Spring Quarter, 1973 the curriculum investigation will be implemented and evaluated in terms of the questions posed previously in this chapter. Approximately seventy students will take part in the field investigation during the Spring Quarter, 1973. Each student at the beginning of the study will take the reading comprehension test, the revised Population Concepts test, an Environmental Opinions test, and the Rokeach Dogmatism Test, Scale D. The purpose of the Rokeach Dogmatism Test will be to determine the degree of open- or closed-mindedness
of individual students. Because it is assumed that some of the concepts in Population and Resources education are of controversial nature, the Rokeach Instrument should be useful in predicting which students are most likely to delay closure on controversial ideas.

The Environmental Opinions Instrument will help to determine, through pretest and posttest administration, whether attitudes about environmental management have been changed as a result of the instruction and readings on population and resources.

The students will be assigned to one of three groups. Group I, of approximately twenty to twenty-five students, will be designated as the Control Group. Because of scheduling constraints Group I will be one section of students who have registered for an introductory course in geography. It is assumed that there will be both high comprehension and low comprehension readers in this section. An attempt will be made to select a section for control purposes that is reasonably representative of the distribution of reading comprehension levels for students enrolled in introductory geography courses.

The Control Group will receive instructional objectives for the unit and will be assigned reading material written at the college level of comprehension. The instructor will lecture on the material using
visual presentations where such a media is applicable. Each student in the Control Group will take the battery of tests mentioned above; however, the low reading comprehension students will take the Population Concepts cognitive test written at their vocabulary level. If two levels of the Inference and Evaluation test are to be used, the low comprehension readers will take the test written at the lower comprehension level.

At the conclusion of the unit the Control students will take posttests for the Population Concepts cognitive test, the Inference and Evaluation test, and the Environmental Opinions instrument.

Group II, number of students unknown, will be assigned to a semi-independent study treatment. The basis for this assignment will be a score of 75 per cent or higher on the reading comprehension test. They will receive the same instructional objectives and will be assigned the same reading materials as the Control Group.

The members of Group II will take tests written at the college reading comprehension level.

Group III, number of students unknown, will be assigned to subgroups of five to six students each. The basis for assignment to Group III treatment will be a score of 74 per cent or lower on the reading comprehension test. They will receive the same instructional objectives as the Control Group and Group II but will be assigned
reading material written at the seventh through tenth grade comprehension levels.

The subgroups will meet with the instructor in regularly scheduled class sessions where extensive use of visual materials will be used to discuss and explain concepts.

Group III will take the same posttests as the low reading comprehension students in the Control Group.

Table 2 sets forth the proposed curricular materials and instructional strategies for each of the groups.

As stated in the Questions to be Examined, there should be a correlation between reading comprehension, instructional strategy, curricular materials and student performance if the student has been placed in the appropriate learning setting.

As a result of the foregoing one should be able to derive conclusions concerning the value of the proposed instructional approach as well as to explore the possibility of making recommendations for revision of the model to broaden its applicability to other disciplines.
### TABLE 2
AN INSTRUCTIONAL STRATEGY MODEL

<table>
<thead>
<tr>
<th>Group</th>
<th>Reading Comprehension Level</th>
<th>Curricular Materials</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>High&lt;sup&gt;a&lt;/sup&gt; and Low&lt;sup&gt;b&lt;/sup&gt;</td>
<td>I&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Class&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Group II</td>
<td>High</td>
<td>I</td>
<td>Independent&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Group III</td>
<td>Low</td>
<td>II&lt;sup&gt;f&lt;/sup&gt;</td>
<td>Class&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

---

<sup>a</sup> scored 75% or higher on the New Reading Test, Form A  
<sup>b</sup> scored 74% or below on the New Reading Test, Form A  
<sup>c</sup> 11th grade through college reading levels  
<sup>d</sup> traditional class presentation, lecture, discussion, use of visual aids and instructional objectives  
<sup>e</sup> assigned readings, meet with the instructor once a week in small groups, instructional objectives  
<sup>f</sup> 7th through 10th grade reading level  
<sup>g</sup> short lectures, recitation, discussion, extensive use of visual aids with the instructional intent of helping students to learn how to interpret graphs and charts as well as to make inferences from the data analysed, frequent diagnostic quizzes, instructional objectives
LIMITATIONS

There are some obvious limitations to a field study such as this one. Two of the limitations are the small size of the population in the study and that the design of the study is restricted to one institution. Still another limitation is the fact that only one instructor will be involved in the study. The success or failure of the experiment may hinge on variables other than instructional strategies and graded curricular materials. These uncontrolled variables would include the instructor's personality, as well as his attitude toward the nature of the learning process.

SIGNIFICANCE OF THE STUDY

In view of the limitations stated above, I would hope that if the study renders results that indicate the methodology to be successful it will be attempted by other instructors both at Cuyahoga Community College and other two-year institutions.

OVERVIEW OF THE STUDY

The study will be divided into five parts as follows:

Chapter I  Background
Chapter II  Review of Related Literature
Chapter III  Design of the Study
Chapter IV  Implementation and Analysis of Results of the Investigation
Chapter V  Conclusions and Recommendations
Chapter 1 Footnotes


2. Ibid.

3. Ibid., p. 6.

4. Ibid., p. 46.


6. Ibid., p. 12.

7. Ibid., p. 17.

8. Ibid., p. 25.


15. Ibid., pp. 28-29.


18 Dewey, Democracy and Education, p. 179.
19 Ibid., p. 175.
21 Bowman, on cit.
CHAPTER II
REVIEW OF RELATED LITERATURE

One of the major themes of the Carnegie Commission's The Open-Door College\(^1\) is support of the concept of the "open-door college for all high school graduates and otherwise qualified individuals."\(^2\) The Commission, however, recognized that in recommending an "open-door" or nonselective policy - "that for many students enrolled in the general curriculum remedial education is needed."\(^3\)

Under the section of the work entitled Remedial is the following recommendation:

There is a need for programs which encourage the student to develop at his own pace and in which his own progress rather than adherence to a set schedule becomes the criterion for success. In addition, there is a need for continual study and evaluation and for cooperative arrangements between community colleges and other educational institutions in providing this type of opportunity.\(^4\)

The Commission further recommended that there be continuing evaluation studies relative to student achievement.\(^5\) It would appear rather obvious that if community colleges are truly a unique aspect of higher education they will make a concerted effort to aid the academically handicapped student.
In support of the contention that the two-year college is based on a foundation of superior instruction, a great deal has been written concerning what the educational goals of these institutions should be. The majority of community college professional personnel seem to agree that curriculum must be flexible and responsive to the changing needs of the clientele that the colleges serve. Given the fact that community colleges purport to serve a broader spectrum of society than the traditional four-year institution it is reasonable to assume that the student body will be one of considerable heterogeneity and will in fact require an innovative curriculum.

One could further assume that a large metropolitan community college will have a more diverse student body, in terms of both academic preparation and educational goals, than the smaller, less urban oriented two-year institutions. The large metropolitan community college will in all probability mirror the diversity of the community which it serves.

Of particular concern to community college teachers and administrators is whether a curriculum can be developed and effectively evaluated for a student population that ranges from the functionally illiterate to the very academically able. This problem is one
which has perhaps received more attention in recent years than any other for the community college level.

Blocker, Plummer, and Richardson\(^6\) concur with Cross\(^7\) when they contend that community college students tend to have lower test scores and less motivation than the typical four-year college student. These authors believe that there must be a willingness to experiment in curriculum in order that students, even though academically disadvantaged, will succeed in their college work.\(^8\) Their position, and it is apparently widely accepted by those involved in community college curriculum development, is that:

> The purpose of the college would be better served if faculty members bent their energies toward the development of basically important reforms in instruction and guidance which would assist students to master college requirements and to achieve personal and intellectual competence.\(^9\)

B. Lamar Johnson, Director for the League of Innovation in Community Colleges, has described in his book, *Islands of Innovation Expanding*,\(^10\) the nature of curriculum and instructional changes taking place in some of the nation's two-year colleges. Johnson spent a year traveling to many community colleges and observing and recording the attempts that were being made to meet the educational needs of the two-year college students.
In discussing the concept of the "open-door" policy of community colleges, Johnson stated that:

It is difficult to defend the admission of all comers unless we also provide offerings and counseling adapted to the requirements of our clientele. If we fail in this, the junior college, in reality, becomes a "revolving-door" college.11

In pointing out critical areas for examination in the two-year colleges, Johnson suggested that the institutions should have facilities for "innovations in organizing and providing instruction for the heterogeneous students who are attracted to the 'open-door' e.g. developmental teaching for low-achieving students and opportunity for accelerated advancement by the highly able."12

Although the primary objective of Johnson was to describe the rationale for and characteristics of innovative practices in the nation's two-year colleges, there is very little description of the evaluative procedures used to determine the effectiveness of the innovations in question. Quite obviously the author is sympathetic towards curriculum innovation and is attempting to encourage curriculum experimentation; however, he recognizes an area of critical weakness in many of the described practices in that "there has tended to be a paucity of evaluation of these innovative practices."13
Johnson to substantiate that his concern about lack of evaluation is shared by others quotes from Kendall who suggested that one reason for the lack of evaluation is that:

The creators of experimental programs often impress one as being men of conviction who have little question about the efficacy of the changes they have introduced. They know that the courses they have developed are the best possible under existing conditions; and in the light of this assumed fact, systematic evaluations seem superfluous.14

Gleazer and Miles are also quoted by Johnson on the topics of evaluation of innovative practices. Gleazer has observed that although there is youth and potential for leadership in the area of innovation and experimentation that:

Community colleges in general have tended to stay well within the boundaries of current educational practice and procedure. Frequently described as flexible, dynamic, new, and responsive, the junior college does not often actually fit the description.15

Miles asserts that "a near-axiomatic statement is that educational innovations are almost never evaluated on a systematic basis."16

As a concluding note on the need for evaluation, Johnson quotes from Sanford who stated that:

Experimentation means not merely innovation but the designing of new programs in accordance with hypotheses, and the use of experimental controls to determine the effects of the programs.17

John Rouche has written extensively on the need for curriculum change at the community college level.
In his recent publication, *A Modest Proposal: Students Can Learn*, Rouche describes what he calls an eclectic approach to curriculum restructuring. Essentially the author is advocating a systems approach to curriculum that would emphasize self-pacing for the students. According to Rouche the systems approach would not only permit self-pacing but also allow for differing learning styles.

Like Cross, Blocker, Johnson, and others, Rouche suggests that the typical community college student is not as well prepared for college level work as his four-year institution counterpart. He states that "community college students generally learn at slower rates than four-year students, but it is unjustified to conclude that their learning capacity is less."  

Apparently Rouche, with his advocacy of an eclectic approach, accepts the Brunerian thesis when he says that: "We will soon learn how to arrange learning sequences effectively for almost any learner at any age."  

The position taken by Rouche, as well as apparently many other community college curriculum specialists, is:  

The underlying assumption of our work is that most students can indeed master what we have to teach them—given sufficient time and appropriate instruction. Indeed, it is the obligation of the college to make students successful."
Rouche, in discussing the applicability of the Mooney Instructional Model, suggests that "the key to individualization of instruction is positive reinforcement of successful learning experiences and appropriate practice throughout the learning sequence."22

As described in Chapter I a heuristic question to be examined by this study is, if provided with appropriate curricular materials, will low reading comprehension students succeed in their attempts at college studies. This question is also considered by Rouche in that he believes that if appropriate verbal materials are not provided the student will fail.

Too frequently, instruction stresses symbolic systems and almost guarantees failure for low-verbal students - a sizable portion of the community college population. For the student in our highly verbal schools it is likely that this ability to understand instruction is primarily determined by verbal ability and reading comprehension. Too often designs of innovative materials fail to consider that the underlying difficulty is deficiency in verbal skills.23

STUDIES DEALING WITH COMMUNITY COLLEGE STUDENTS’ READING COMPREHENSION LEVELS

Numerous studies have been carried out that document the assertions of Cross, Blocker, Johnson and Rouche that a large proportion of entering freshmen at community colleges do not have the requisite communication skills to successfully master college course work.
Sweiger, to determine the nature and extent of remedial reading programs at two-year colleges, sent questionnaires concerning this topic to 834 two-year institutions. From the 378 responses received the author concluded that there is a high degree of similarity in the communications remedial programs. Some of the conclusions concerning remedial program similarities were:

1. The preponderance of reading courses indicate an administrative recognition that these courses are necessary.

2. Most of the courses are designed for the student to take as a freshman to prepare him for his years ahead in college.

3. Emphasis tends to be on helping the students improve their basic skills of vocabulary and reading comprehension.

The author suggested three major areas that should be given greater attention by those responsible for remedial communications skills courses. The three areas are:

1. Instructors of reading should be concerned with the degree that the skills taught in reading are transferred to other subjects.

2. More instruction in reading should be related to specific content areas rather than taught as isolated drills provided by publishers of reading material.

3. Diagnostic testing and profile analysis on all entering freshmen should be conducted and
criteria established for identifying students needing reading instruction. In addition the college must determine what type of abilities the students must possess to be successful in courses at the college in question.

As was discussed in Chapter I the basis for assignment of students for purposes of this study will be reading comprehension score. Although the teaching of reading skills is not the objective of the investigation, it is hoped that if the students are successful in achieving the unit objectives as a result of the curricular materials/instructional strategies employed they will become motivated to increase their reading abilities.

The reading comprehension level of community college students and a comparison of these abilities has been compared to the readability of their assigned texts in studies conducted by Hagstrom and McClellan. In a paper presented by Hagstrom at the Western College Reading Association Meeting in 1971, the author, as a result of a study in which readability of assigned texts and reading comprehension levels of community college students were compared, substantiates that a significantly large proportion of this college population reads at below college level.

Three hundred fifty-nine junior college students were given a diagnostic reading test. The results of
the test were that 35.9 per cent of the students were reading at or above grade level 13; 33.5 per cent were reading at grade levels 10, 11, 12; 19.1 per cent were reading at the junior high level; and 11.4 per cent were reading below seventh grade level.

Twenty-nine texts used in sixteen courses that the 359 students were enrolled in were analyzed using the Dale-Chall formula for readability. Fourteen of the twenty-nine were more than one grade level above the reading ability of the students who used them. Five of the texts were rated at grade level 16 or graduate level and the classes in which they were used had a student average reading comprehension level of from 10.9 to 12.2 grade level.

Hagstrom suggested that his findings were in line with the results of similar research by Beldon, Hadley, and Halter in that two-thirds of the students were reading at grade levels below the text assigned to them.

A study carried out at Hillsboro Community College in Michigan and reported by McClellan, like the Hagstrom study, found a disparity between assigned textual materials and students' reading comprehension levels.

As part of the investigation 358 entering freshmen were given the Nelson-Denny Reading Test. The results from the testing were that 30.29 per cent of the students
were at or above grade placement, grade 13 and above; 33.5 per cent were slightly below grade placement, or at the senior high school level; 32.1 per cent were at the junior high school level; and 4.2 per cent were below the junior high school level.

To determine how well the textbooks used at the college matched the profile of student reading comprehension levels, twenty texts used in a variety of courses were analyzed for readability using the Dale-Chall formula. Eight of the texts were above the sixteenth grade level, and three of these texts were used in nonacademic courses. Four of the twenty texts were at grade levels 13 to 15.

The author urged that the reading comprehension levels of the students be matched with the appropriate grade level reading materials. To substantiate that reading comprehension and textual material should be closely aligned, the author quotes from Dently and Galloway who stated that the reading material must reasonably match the reading level of the reader, e.g. neither too difficult nor too easy. 32

Martin 33 reported that at the New York City Community College in the Fall of 1967 the average freshman was reading at the 12.6 level as determined by the Nelson-Denny Reading Test. However, 20 per cent of the freshmen were at or below the 10.5 grade level.
The foregoing studies are supportive of the contention that a significantly large proportion of entering freshmen at the community college level require either remedial courses in communications skills or a curriculum that attempts to individualize instructional strategy and curricular materials so that individual student's reading problems are mitigated. As has been pointed out in Chapter I it is the intent of this study to investigate whether students will be successful in a university parallel course if an individual's reading comprehension is used to determine the basis for appropriate instructional strategy and curricular materials for him.

STUDIES DEALING WITH REMEDIAL COMMUNICATIONS SKILLS COURSES

As was indicated by the survey conducted by Sweiger a large number of community colleges offer remedial reading programs. Virtually all of these programs attempt to carry out the remediation parallel to, but not necessarily in conjunction with, the regular college curriculum. Apparently it is assumed that there will be a transfer of the skills acquired by the students in the reading courses to the regular college courses.

The evidence to support the assumption of transfer of acquired reading skills is somewhat nebulous. Unfortunately few studies have established control.
and treatment groups to determine just how effective the reading programs are. In addition to the lack of use of control groups, very few of the studies where control groups are used employ any sort of sophisticated analysis to ascertain degrees of success comparing the control and experimental groups.

Typical of the results of reading programs is that reported by Blais on the Harcum Junior College remedial reading program. All incoming freshmen who scored below the 30th percentile on the Nelson-Denny Reading Test were required to enroll in the reading development program of the college.

Of 51 students enrolled and completing the program, the average vocabulary improvement was 44 per cent, comprehension increased 37 per cent, and average total improvement was 42 per cent. Eighty per cent of the students scored above the 50th percentile on the posttest. However, like similar studies no follow-up data is provided on student success when they enroll in the college’s academic courses.

Fields suggested that it is advisable to place students in a reading laboratory program when they enroll in English courses that emphasize writing skills.

His basis for the recommendation was derived from comparing the pretest and posttest scores of reading comprehension for students enrolled in an English course emphasizing writing, an English course emphasizing
reading, those were considered Control Groups, and an Experimental Group which was enrolled in the college's reading laboratory course. In the English course that emphasized writing the average increase in reading comprehension was 8 per cent. In the English course that emphasized reading there was a 33 per cent increase in reading comprehension. For the students enrolled in the reading laboratory program the increase in reading comprehension was 48 per cent.

Like the Blai study no data was provided to indicate how much transfer there was of acquired reading skills of the Experimental Group when they enrolled in the regular college academic courses.

Anderson conducted an investigation at Flint Community College that was somewhat similar in design to that of McClellan. Two hundred ninety-one students in a freshmen history class were given the Nelson-Denny Reading Test. The results indicated that 54 of the group had reading deficiencies and required remedial reading assistance.

Those students requiring remedial help in reading were assigned to individualized self-paced reading programs in the college's Reading Center. The students received assistance from reading specialists as well as from paraprofessionals. The author reported that there has been considerable success in improving the
students' reading comprehension and reading speed. However, no evidence was offered to indicate the amount of transfer of these skills when the students enrolled in courses such as the history course mentioned above.

**STUDIES THAT QUESTION THE VALIDITY OF READING TESTS AND/OR REMEDIAL READING PROGRAMS**

Although the reading comprehension of a significant proportion of the community college student body is below what is assumed necessary for success in college, there have been some questions raised concerning the validity of reading tests and the value of special remedial reading programs.

Winkley\(^{37}\) analyzed nine reading tests and concluded that most of the test instruments could not be used to determine the chief area of skill deficiency, such as vocabulary, comprehension, and rate of reading speed.

In an attempt to meet the criticisms of most reading tests raised by Winkley the New Reading Test, Form A, developed by the reading specialists of the Learning Center at Cuyahoga Community College diagnoses the individual student's specific areas of weakness. Unlike the Nelson-Denny Test, the New Reading Test is divided into the categories of reading comprehension, word recognition, spelling, phonics, main ideas, and inferences.
For the purposes of this study, the writer will use only the reading comprehension portion of the Cuyahoga Community College Reading Test.

The Florida State Department of Education carried out a study to identify the characteristics of underprepared students entering the State's junior colleges. Rather than using only a reading test, as is often the case, a battery of tests were administered to the pilot group of students.

Eight tests were administered to the pilot group. They were (1) Wechsler I.Q., (2) Blood samples, (3) Vision test, (4) Spache Diagnostic Reading, (5) Minnesota Multiphase Personality Inventory, (6) Junior College Questionaire, (7) Tri-Tone Audiometry, (8) Comparative Guidance and Placement Program.

The conclusion derived from the study was that the academically underprepared student often needs more than just remedial work in communication skills to help him become a successful college student.

The investigators suggested that many students presumed not to have the intelligence necessary for success in higher education do in fact possess such ability. It was recommended that special attempts at curriculum innovations be made for those students who are bright but for a variety of reasons are low achievers.
Losek supports the conclusions of the study carried out by the Florida State Department of Education. He has suggested that reading comprehension tests alone are not sufficient to determine the nature of remedial work necessary for the underprepared student. The author administered the Florida 12th Grade Reading Test to ninety students enrolled in a junior college remedial reading program. The test results indicated that some of the students enrolled in the program did not require remediation in communication skills. Losek suggested that emotional problems rather than inability to read were the cause of the previous poor academic records for some of these students.

After administering a battery of tests to the academically able but low achieving students of the group, the author concluded that the underprepared students are not a homogeneous group. Because of the wide range of intellectual abilities among underachieving students, he recommended that there should be remedial curriculum distinctions made for the differing ability subgroups.

A study skills project was conducted on a one quarter trial basis at Foothills College of California in 1967. Using the Nelson-Denny Reading Test and the California Phonics Survey, students requiring remedial help were identified.
Thirty students identified as requiring remedial assistance volunteered for the pilot project. They were assigned for a ten week quarter to an instructional team who were responsible for instructing the students in a block of communication skills. The courses included in the Project were English Fundamentals, Basic Reading Skills, Introduction to College, e.g. an orientation and motivation course, and Effective Study.

In evaluating the results of the pilot project, Bloesser, the Project Director concluded that:

1. When compared with a control group that was enrolled in conventional college courses, the Project pilot group did not achieve at significantly higher levels.

2. There appears to be a definite need to diagnose beyond mere identification of the underachieving student. Before remedial treatment is designed the specific components of remediation needed by each student must be identified.

3. One quarter is insufficient time to administer diagnostic tests and to carry out required remedial treatment. The author suggested that by restricting the remediation to a ten week period there resulted an inefficient allocation of scarce professional resources and this in turn created frustrations for both instructors and students.

4. A worthwhile remedial program must be carefully planned in terms of evaluating testing instruments,
locating and examining individualized multilevel instructional materials, and development of specific instructional practices.

Like Losek, Bloesser emphasized that there tends to be a wide range of abilities within a remedial group and that as a consequence an "all purpose" remedial program will not be effective.

Jansen found that there was no significant correlation between reading test scores, grades received in English courses, and overall Grade Point Average. The study was undertaken because there is a large body of literature that supports the idea that writing and reading abilities correlate significantly with cognitive abilities and school success.

Even though the author found no significant correlation in the variables mentioned above, he recommended that reading test scores be used for individualized curriculum development.

Losak in a paper presented at an annual meeting of the Educational Research Association questioned the value of remedial programs. The data for this paper was derived from a study conducted by Schenz at Miami-Dade Junior College.

Schenz in his study was testing the inherent assumption that remedial courses improve academic skills to a greater degree than conventional college courses.
For purposes of Schenz's study students scoring 22 or less on the School and College Ability Test were randomly selected and required to enroll in the college's remedial program. The Control Group for the study were those students who had scored 22 or less on the School and College Ability Test but who were permitted to enroll in conventional college courses.

The investigator's hypotheses were:

1. There will be no difference between the Experimental and Control Groups' mean Grade Point Average at the end of either the first or second term of college work.

2. There will be no difference in continuation in college for the Experimental and Control Groups as measured by the percentage of students for each group enrolled at the end of each term.

3. There will be no significant difference between the Experimental and Control Groups with respect to level of performance in regular college courses.

At the conclusion of the first semester of study both the Control Group and Experimental Group were given the Nelson-Denny Reading Test. The Experimental Group performed no better on the test than the Control Group.

In subsequent semesters there was a higher attrition rate among the Experimental Group than the Control Group. Schenz suggested that the higher attrition rate for the Experimental Group might have been due to the fact that
they floundered after leaving the sheltered atmosphere of the remedial center.

Students who had successfully completed the remedial course did not perform significantly better in Social Science courses than Control Group students.

The results of Schenz's study appear to support a recommendation of Sweiger that remediation should be carried out as much as possible within the framework of the regular college curriculum.

**SUMMARY**

There is substantial evidence that curriculum innovation is necessary to assist a large proportion of the community college student population to achieve success in college level courses. In addition there is considerable documentation to support the premise that many academically underprepared community college students require curriculum reorganization to help them master the objectives of college courses. The most common denominator of the underachieving student appears to be his lack of requisite reading skills.

Although low reading comprehension is a problem of major proportion for a large number of community college students, the studies by Bloesser, Schenz, and the Florida State Department of Education indicate that there is a wide range of academic abilities among
underachieving students and that underachievement may be due to emotional problems. Because the reasons for underachievement are varied and complex, the ideal remedial curriculum would be individualized to the extent that the underachieving student would receive remedial treatment consistent with his personal learning problems.

Many of the studies cited in this chapter have dealt with the nature of remedial reading programs and the amount of improvement in reading gained by students enrolled in such programs. Comparatively little data is offered to support the assumption that after students have successfully completed remedial reading courses they will transfer these increased skills to their work in the regular college curriculum. There appears to be a lack of objective analysis to support the proposal that the underprepared student should enroll in remedial programs. Although the evidence is somewhat limited, it would appear that remediation might best be accomplished within existing college courses rather than in specialized remedial programs.

Perhaps the key element in student's college success is not necessarily possession of a given level of communication skills, but rather the desire of individuals to succeed. Schonbeck has proposed that the major challenge to two-year college educators is motivation
of the underachieving student. Blocker\textsuperscript{45} concurred with Schonbeck when he suggested that it is imperative to define and follow educational objectives that meet the expectations of an individual for his personal development.
Chapter II Footnotes


2. Ibid., p. 2.

3. Ibid., p. 17.

4. Ibid., p. 22.

5. Ibid., p. 23.


11. Ibid., p. 8.

12. Ibid., p. 46.

13. Ibid., pp. 304-305.


27. Hagstrom, *op. cit.*


30. Irma Halfter, "Inadequate College Readers," *Journal of Developmental Reading*, I (Summer, 1958)

31. McClellan, *op. cit.*

33 Peter J. Martin, *Freshman Reading Ability: Fall 1967-Day Session, Nelson-Denny Reading Test* (New York City Community College, November, 1967)

34 Boris Blai, Jr., *Reading Improvements Associated with Harcum Development Program* (Bryn Mawr, Pennsylvania: Harcum Junior College)

35 Johnna H. Fields, *Increasing Rate of Comprehension Among Community College Students* (Community College of Allegheny County, Pennsylvania: Boyce Campus, 1971)

36 Clarence A. Anderson, *A Description of the Flint Community Junior College Reading Program, Paper presented at the North Central Reading Association Conference* (Flint, Michigan, October 31-November 1, 1969)


40 Robert Bloesser and others, *Study Skills Project, Spring, 1968, Foothill College* (Suptino, California: Foothill Junior College District, June, 1968)


CHAPTER III
DESIGN OF THE INVESTIGATION

This chapter discusses the general characteristics of the Cuyahoga Community College student body, the rationale for the investigation's design and the basis of the design itself.

The chapter is divided into five major segments. The segments are Part I: Student Characteristics; Part II: Reading Comprehension Scores and Levels of College Achievement; Part III: Development of a Hierarchy of Population and Resources Concepts; Part IV: Pilot Evaluation of Test Instruments; and Part V: Selection of Reading Material and Design of Instructional Strategies.
PART I

STUDENT CHARACTERISTICS: CUYAHOGA COMMUNITY COLLEGE, METROPOLITAN CAMPUS

High School Attended:

In the Fall Quarter, 1972, a total of 10,587 students registered at Cuyahoga Community College, Metropolitan Campus. Appendix A, Table 1 is a representative list of high schools attended by Cuyahoga Community College students. One hundred one high schools were represented (public suburban, public metropolitan, parochial) among this enrollment. Percentage distribution in these several categories was as follows: Cleveland Public Schools accounted for 45.5 per cent; Suburban schools 18.55 per cent; Parochial schools 9.5 per cent; Private schools .9 per cent. The remaining 25.5 per cent of the students came from out-of-county, out-of-state, or out of the United States. The largest segment of this latter category, 11.4 per cent came from states other than Ohio.

Of the 3213 students enrolling at Cuyahoga Community College for the first time in the Fall, 1972, a total of 1205 or 37.5 per cent came from ten high schools. Six inner-city high schools accounted for 927 or 28.9 per cent of the new students.
Age Distribution

Cuyahoga Community College, Metro students' ages range from 17 to 83. Appendix A, Table 2 contains a categorization of Cuyahoga Community College students by selected age group intervals. The largest age group for all students is 21-25. Of the freshmen 2284 or 28.7 per cent are in this category; for sophomores 1084 or 41.1 per cent are in this age group; and 3368 or 31.8 per cent of all students are in the 21-25 age group. This identifies most Metro students as young adults.

For the Fall, 1972, there was a close similarity between the smallest size age interval groups for freshmen, sophomores, and all students. Among freshmen, 17 year-old students comprised the smallest group (136 or 1.7 per cent); 18 year-old students comprised the smallest group among sophomores (13 or .5 per cent). In the all-student category, 17 year-olds were the smallest group (136 or 1.3 per cent).

Although the your adult predominates at Cuyahoga Community College-Metro, the majority of the student body is considerably older than most of the student population attending the nation's two-year institutions of higher education. A recent study of community college student characteristics by Koos concluded that the typical age range of community college students is 17-20 years. At Cuyahoga Community College-Metro 68.6
per cent of the student body is 21 years or older.

A further reflection of an older student population is that 1392 or 17.4 per cent of Cuyahoga Community College-Metro freshmen and 526 or 20 per cent of the sophomores were over 30 years of age. National statistics for enrollment in this age range in community colleges were 7 per cent for freshmen and 15 per cent for sophomores.²

Of the freshmen 148 or 1.8 per cent were 51 years of age and over while 53 or 1.8 per cent of the sophomores were in this age group. Also there were six 72 year-old freshmen (four males and two females). The oldest student at the college is 83 years of age.

**Enrollment Patterns**

There were 5427 male students and 5160 female students for a total of 10,587 freshmen and sophomore students enrolled at Cuyahoga Community College, Metropolitan Campus in the Fall, 1972. Appendix A, Table 3 is a listing of Cuyahoga Community College students according to class standings and credit hour enrollment. Of this number 3212 or 30.3 per cent were new students. The male-female distribution for new students was 1601 and 1612 respectively. Of the total student body 7947 or 75 per cent were classified as freshmen.

At the freshmen level most students registered for less than a full-time load (11 credit hours or less).
In this group there were 4716 part-time students. In the sophomore class 1459 were registered as part-time students.

By credit-hour enrollment, 2924 or 27.6 per cent of all students registered for less than half-time (1-5 credit hours). Three thousand ninety-three or 35.8 per cent of all students registered for half-time but less than full-time (6-11 credit hours). Two thousand two hundred ninety-five or 21.6 per cent of all students registered for a minimal full-time load (12-14 credit hours). The smallest group, 1575 or 14.8 per cent of all students registered for 15 or more credit hours which are the minimum number of hours per quarter needed for a student to graduate within the two-year period. This latter group is smallest at both the freshmen and sophomore levels (1130 or 14.1 per cent freshmen and 445 or 17 per cent sophomores.)

This data illustrates that only a small proportion of Cuyahoga Community College-Metro students enroll in enough credit hours to enable graduation within a two-year period. This occurrence is probably related to the fact that approximately two-thirds of the student body is 21+ years of age, which would suggest competing responsibilities such as work, family and other out-of-school obligations.
A total of 3937 students in the Fall, 1972, were enrolled in the Associate of Arts degree program. The largest segment of the student population, 6650, identified themselves as Career Technology majors in the Associate in Science program.

Attrition

One of the most distinguishing characteristics of Cuyahoga Community College is its emphasis on the "open-door" policy. This feature has great potential for broadening access to higher education for the residents of Greater Cleveland. However, for too many individuals the "open-door" has become a "revolving-door" and their expectations have too often ended in disappointment and disillusionment.

For the Fall Quarter of the academic year 1971-72, 644 students or 6 per cent of the total enrollment of 10,723 withdrew from college. Appendix A, Table 4 presents a partial breakdown of attrition at Cuyahoga Community College. The campus experienced similar rates of attrition during the Winter and Spring Quarters, 1971-72, which resulted in 573 withdrawals in the Winter Quarter and 589 withdrawals in the Spring Quarter.

During the Fall Quarter, 1971, freshmen accounted for 86.1 per cent of student attrition. During the Winter Quarter, 1972, 84 per cent of the withdrawals
were among freshmen; and during the Spring Quarter, 1972, freshmen were responsible for 85 per cent of the attrition.

The largest single group among students who withdrew were the first-quarter male students who withdrew within the first three weeks of the school year. There were 228 students in this category.

During the Fall Quarter of 1971, 64.4 per cent of the students who withdrew had a cumulative grade-point average of 2.0 or below.

During the Winter Quarter, 1972, there were 319 students with a cumulative grade-point average of below 2.0 who withdrew from college. There were 256 students with a cumulative grade-point average of 2.1 and above who withdrew.

During the Spring Quarter, 1972, there were 353 students with a cumulative grade-point average of below 2.0 who withdrew. There were 236 students with a cumulative grade-point average of 2.1 and above who withdrew during this quarter.

It is evident from the foregoing statistics that more than 50 per cent of the withdrawing students were performing below average academically.

Analysis of withdrawals clearly points up the preponderance of withdrawals at the freshmen level and particularly during the first quarter of the academic year.
Although data is readily available for students withdrawing from school, a more meaningful measure of student success, dropping of one or more courses during a quarter, is not available. Cuyahoga Community College permits a student to withdraw from a course, with no grade recorded, up to the end of the 8th week of a 10 week quarter.

Although substantiating data has not been developed, the consensus among admissions personnel, counselors, and faculty is that a very high proportion of the student body drops one or more courses from their schedule each quarter.

In all probability one of the reasons for dropping courses during a quarter would be outside conflicts, such as work schedules or home responsibilities. However, it would appear from the writer's experience that the largest proportion of students withdrawing from a course do so because of lack of motivation to complete assigned work and/or lack of academic ability.

The basis for the investigation proposed by this study is to determine whether students, given appropriate curricular materials and instructional strategies for their academic abilities, will be able to successfully complete the assigned work in an academic course.
SUMMARY

1. The Cuyahoga Community College-Metro student population represents nearly every high school in Cuyahoga County.

2. The Cleveland School District was the largest source of students for Cuyahoga Community College-Metro in the Fall, 1972.

3. The distribution of new student enrollment was similar in the Fall, 1972, to the spread among the all-student category.

4. Inner-city high schools were the largest single source of new student enrollment.

5. The campus enrollment continued to reflect a young adult population which is noticeably older than most college and university enrollments.

6. The youngest segment of the student body (17 through 19 year-olds) tended to enroll as full-time students while the remainder of the student body reflected a predominance of part-time enrollment.

7. Attrition is highest among the freshmen students and particularly those with cumulative point averages of 2.0 or below.

8. Although data on dropping one or more courses by individual students each quarter is not readily available, this phenomenon is common and is assumed to be caused by low motivation and/or lack of the necessary academic ability required in the course(s).
PART II

READING COMPREHENSION SCORES AND LEVELS OF COLLEGE ACHIEVEMENT

As discussed in Chapters I and II the student population of a typical large metropolitan community college is one of broad heterogeneity. Not only is there a wide range of educational goals and aspirations but also a wide range of academic abilities to perform at an acceptable college level of achievement.

At Cuyahoga Community College, like many other two-year colleges, a widely held premise is that most students can succeed in college courses if the students are helped to acquire the requisite communication skills. Incidentally, but of considerable importance, is the tacit assumption that acquisition of these skills will motivate the student to succeed in college courses. In other words it is assumed that academic success will lead the student to internal motivation and that he will view his academic potential in a positive manner.

Prior to this study little research had been carried out at Cuyahoga Community College to determine if there is a correlation between level of students' communication skills and college achievement as measured by cumulative grade-point averages.
In order to test the assumption that a certain minimum level of communication skills, especially reading ability, is required to successfully complete university parallel courses, the reading comprehension scores of 100 randomly selected students enrolled in the Associate of Arts degree program, were compared with their cumulative grade-point averages.

The reading test, New Reading Test, Form A, used to determine the varying levels of students reading comprehension was developed and is administered by the Learning Center personnel at Cuyahoga Community College, Metropolitan Campus. The reading score norms in terms of grade levels of comprehension were also developed by the Learning Center personnel.

The norms were established by applying Fry's Readability Graph to selected passages of materials that students are asked to read. To determine the reading comprehension level of testees, they are asked to read passages from graded reading materials and then are asked to respond to questions dealing with main idea, vocabulary, synthesis, and inferences.

Table 3 compares reading comprehension scores, obtained from the results on the New Reading Test, Form A and the equated grade reading level of students falling within given ranges of scores.
Table 3

READING COMPREHENSION SCORES IN TERMS OF GRADE LEVEL

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>00.0 - 19.9</td>
<td>5th grade and below</td>
</tr>
<tr>
<td>20.0 - 49.9</td>
<td>6th and 7th grades</td>
</tr>
<tr>
<td>50.0 - 59.9</td>
<td>7th to 9th grades</td>
</tr>
<tr>
<td>60.0 - 69.9</td>
<td>10th grade</td>
</tr>
<tr>
<td>70.0 - 74.9</td>
<td>11th grade</td>
</tr>
<tr>
<td>75.0+</td>
<td>12th grade and college</td>
</tr>
</tbody>
</table>

Table 4 was derived from a comparison of the 100 student sample reading comprehension scores and their cumulative grade-point averages.

Table 4

CONCLUSIONS CONCERNING RELATIONSHIP OF READING COMPREHENSION AND COLLEGE SUCCESS FOR 100 STUDENTS ENROLLED IN THE ASSOCIATE OF ARTS DEGREE PROGRAM

Reading Scores: 5th through 10th Grades

25 to 67.9

none achieved an A
8% achieved a B
23% achieved a C
15% achieved a D
7% achieved an F
39% received an Incomplete
8% received a W

or:

46% received from B to D
15% failed or withdrew
39% received an Incomplete
Reading Scores: 10th and 11th Grades

68.0 to 74.9
- 7% achieved an A
- 14% achieved a B
- 36% achieved a C
- 0% achieved an F
- 29% received an Incomplete
- 14% received a W

or:
- 57% succeed with a range of grade from A to D
- 14% withdrew
- 29% received an Incomplete

Reading Scores: 12th grade and college

75.0 to 87+
- 40% achieved an A
- 18% achieved a B
- 19% achieved a C
- 8% achieved a D
- 2% achieved an F
- 13% received an Incomplete
- 0% received a W

or:
- 85% succeed with a range of grade from A to D
- 2% failed
- 13% received an Incomplete

Table 5 deals with reading comprehension as a possible predictor instrument for success in academic courses.

Table 5
READING COMPREHENSION AS AN INDICATOR OF PROBABLE COLLEGE SUCCESS

<table>
<thead>
<tr>
<th>Reading Score</th>
<th>Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td>75% and above</td>
<td>41% chance of making an A</td>
</tr>
<tr>
<td></td>
<td>14% chance of making a B</td>
</tr>
<tr>
<td></td>
<td>31% chance of making a C</td>
</tr>
<tr>
<td></td>
<td>7% chance of making a D</td>
</tr>
<tr>
<td></td>
<td>5% chance of receiving an Incomplete</td>
</tr>
<tr>
<td></td>
<td>0% chance of receiving a W</td>
</tr>
</tbody>
</table>
68% and below
0% chance of making an A
10% chance of making a B
50% chance of making a C
0% chance on making a D
30% chance of receiving an Incomplete
10% chance of receiving a W

Table 6 is a presentation of the reading comprehension scores of thirty-nine students enrolled in introductory geography courses during the Winter Quarter, 1973.

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.0 - 59.9</td>
<td>10%</td>
<td>4 students</td>
</tr>
<tr>
<td>60.0 - 69.9</td>
<td>13%</td>
<td>5 students</td>
</tr>
<tr>
<td>70.0 - 74.9</td>
<td>8%</td>
<td>3 students</td>
</tr>
<tr>
<td>75.0 +</td>
<td>69%</td>
<td>27 students</td>
</tr>
</tbody>
</table>

From the results obtained in the comparison of reading scores and levels of college achievement, it would appear that communication skills are an important component in the determination of a student's college success.

An assumption of this study is that if the low reading comprehension student is provided with graded curricular materials his chances for success in academic courses will be considerably increased.

Part III is a discussion of how a hierarchy of population and resources concepts were formulated for use in this investigation.
Part III

DEVELOPMENT OF A HIERARCHY OF POPULATION AND RESOURCES CONCEPTS

The subject matter for this investigation, Population and Resources concepts, was chosen because it was assumed that such a topic would be of broad interest to college-age students. Because of the relevance of the topic to the lives of those involved in the study, it was assumed that motivation to master the conceptual material would be self-generated.

The topic was also chosen for the study because it is an integral part of geography as well as, but perhaps to a lesser degree, the other social sciences. The writer believes that the concepts and generalizations of population and resources education should be infused into existing social studies curriculum at all educational levels. For the prospective teachers enrolled in the course during the time the study was to be carried out, it would be expected that these individuals would see the value of infusion in curriculum development.

In order to determine the concepts that were to be included in the investigation, numerous works dealing with demographic and resource principles were consulted. The principle source for most of the concepts dealing with population was from publications of the Population Reference Bureau, Washington, D.C.

To assure that the concepts gleaned from the publications of the Population Reference Bureau were of
significance a number of authoritative sources dealing with population and/or resources were examined. If three or more of the references included material dealing with a concept, it was assumed that the concept was a valid one for inclusion in the proposed course of study.

The list of reference sources included both textbook type of format as well as books written for the general reading public. Those reference sources of the textbook variety that were consulted included Clark, Zelinsky, Demko, et al., Mouzon, and Hunker. The reference sources written for the general reading public that were consulted were The Commission on Population Growth and the American Future, Meadows, et al., Ward and Dubos, Hauser, Landsberg, The Committee on Resources and Man, National Academy of Sciences, and Dubos.

From the procedure described above thirty-five concepts were identified as significant for inclusion in a four-week course of study to be entitled "Population and Resources Education." The concepts were then examined in terms of their relationship to one another, particularly with respect to the impact of population changes and demand for resources. From this examination the list of concepts was reduced to twenty-six.

Copies of the list of concepts, along with a covering letter explaining the purpose of the concepts, were mailed to organizations and/or individuals who purportedly
were involved in the development of Population and Resources Education.

The mailings were sent to the Harvard Population Project, Cambridge, Massachusetts; The Population Curriculum Study of the University of Delaware, Delaware; The Columbia University Population Education Project, New York; The Carolina Population Center, Durham, North Carolina; and the Population Reference Bureau, Washington, D.C.

The covering letter requested that the concepts be evaluated as to importance and applicability for a four-week unit dealing with population and resources. Unfortunately only two replies were received from the mailings. The two replies were from the Co-Director of the Population Education Project at Columbia University and the Director of the Carolina Population Center.

In both instances it was suggested that the list of concepts appeared to be comprehensive and representative of what should be included in a course of study dealing primarily with population principles.

Appendix B is a list of the concepts selected for inclusion in the "Population and Resources" unit of study as well as the letter sent to the institutions noted above.

Part IV summarizes the development and pilot testing of the evaluation instruments developed for the investigation.
Part IV

PILOT EVALUATION OF TEST INSTRUMENTS

Test instruments were developed during the Winter Quarter, 1973 to determine the degree of student mastery of the concepts dealing with population and resources.

Since the objectives that the students were expected to master ranged from the knowledge level through the synthesis, interpretation, and evaluation levels as defined by Bloom,¹⁶ test instruments had to be developed that would encompass this range of achievement.

For purposes of convenience in determining levels of mastery, two test instruments were developed and pilot tested on two groups of students enrolled in introductory geography courses during the Winter Quarter, 1973. Test Instrument I dealt with the definitions of the twenty-six concepts on population and resources. This instrument was considered by the writer to be testing at the knowledge level of Bloom's taxonomy. Test Instrument II consisted of twenty-four conclusions dealing with the structure of the United States' population, potential changes in the structure, and the impact of population numbers on resource demand.

Each of the twenty-seven items on Test I provided the testee with five responses from which to choose in defining the concept in question. The readability level
of the test questions was analysed using the Fry Readability Graph. The test as a whole was at the college level of reading comprehension.

Test II was also analysed for readability using the Fry Readability Graph and the test as a whole had a reading comprehension level of between grades 9 and 10.

At the beginning of a unit entitled "Population and Culture" each of the students in the pilot group was administered the New Reading Test, Form A, Cuyahoga Community College; Test I, the knowledge level for population and resources concepts; and Test II, the synthesis, inference, and evaluation instrument dealing with the validity of conclusions concerning the relationships of United States' population changes and resources demand.

Reading comprehension level for each student was determined from the results of the New Reading Test. Test I and Test II were submitted for analysis to the Mermac Test Analysis Package of Cleveland State University.

The data from the test analysis is presented below for the two sections of students that made up the population of the pilot study.
Table 7
PRETEST POPULATION CONCEPTS KNOWLEDGE LEVEL TEST

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Items</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Number of Students</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Median Score</td>
<td>14.00</td>
<td>12.75</td>
</tr>
<tr>
<td>Mean</td>
<td>14.88</td>
<td>13.35</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>4.93</td>
<td>4.36</td>
</tr>
<tr>
<td>Variance</td>
<td>24.28</td>
<td>19.04</td>
</tr>
<tr>
<td>Reliability (K-R20)</td>
<td>.81</td>
<td>.75</td>
</tr>
<tr>
<td>Standard Error of Measurement</td>
<td>2.24</td>
<td>2.18</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>8-23</td>
<td>5-21</td>
</tr>
</tbody>
</table>

From the test analysis it was quite apparent that the test had high reliability and the discrimination and difficulty levels of most of the test items were within the acceptable range of .3 to .8. For those test items that were not functioning within the appropriate difficulty and discrimination levels, as indicated by the point biserial correlation, decisions regarding rewriting or deleting the items from the test were deferred until the posttest results would be available.

The second pretest instrument administered to the pilot group was the Inference and Conclusions Evaluation Test. Test analysis for the two groups taking the test resulted in the following:
Table 8
PRETEST INFECTION AND CONCLUSIONS EVALUATION

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Items</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Number of Students</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Median Score</td>
<td>13.55</td>
<td>13.50</td>
</tr>
<tr>
<td>Mean</td>
<td>13.66</td>
<td>13.347</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.89</td>
<td>2.932</td>
</tr>
<tr>
<td>Variance</td>
<td>8.37</td>
<td>8.600</td>
</tr>
<tr>
<td>Reliability (K-R20)</td>
<td>.70</td>
<td>.68</td>
</tr>
<tr>
<td>Standard Error of Measurement</td>
<td>1.60</td>
<td>1.66</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>9-19</td>
<td>8-19</td>
</tr>
</tbody>
</table>

Like the Knowledge level test the reliability of the Inference and Conclusions Evaluation test was within an acceptable range. The discrimination and difficulty levels were from .3 to .9.

At the conclusion of the "Population and Culture" unit the pilot group of students was again administered the Knowledge level and Inference and Conclusions Evaluation tests. The results from these tests are presented in Tables 9 and 10.

Table 9
POSTTEST POPULATION CONCEPTS KNOWLEDGE LEVEL TEST

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Items</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Number of Students</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Median Score</td>
<td>18.00</td>
<td>17.50</td>
</tr>
<tr>
<td>Mean</td>
<td>17.33</td>
<td>16.71</td>
</tr>
</tbody>
</table>
The posttest results for both tests were compared with reading comprehension scores to determine if there was a statistically significant correlation between the two. For the Knowledge Level Test there was a significant correlation, at the .05 confidence level between individual students' reading comprehension score and their posttest scores. There was not a statistically significant correlation between individual students' posttest scores on the Inference and Conclusions Evaluation Test and reading comprehension scores.
On the basis of the results of the correlation between reading score and posttest achievement on the Knowledge Level Test, this Investigator decided that the Knowledge Level Test should be written at two reading levels, a 7th to 9th grade level and a college level. These two test levels would allow for virtually all of the range of reading comprehension scores of those enrolled in the pilot study and by inference those who would be enrolled during the Spring Quarter investigation.

It was decided that the Inference and Conclusions Evaluation Test would not be rewritten for the varying reading comprehension levels of the students in the pilot study. The rationale for not rewriting the test was based on the fact that the original test was written at a 9th to 10th grade reading level. Also there was not a significant statistical correlation between students' reading scores and posttest scores on the Inference and Conclusions Evaluation Test. Finally the decision not to rewrite the test was dictated by the fact that, given a standard error of measurement of 2 on the test, there was no improvement for the classes as a whole when comparing the pretest and posttest scores.

This Investigator assumed that the lack of change from the pretest and posttest scores was a result of
failure in the instructional format to emphasize the importance of evaluating conclusions about relationships between population and resources.

Part V
SELECTION OF READING MATERIAL AND DESIGN OF INSTRUCTIONAL STRATEGIES

The reading materials to be used by the students in the Treatment and Control Groups were selected on the basis of content as well as reading comprehension level required for mastery.

It was assumed that the reading material that was to be assigned to each of the three groups would have to meet the dual criteria of definitions of concepts and relationships between population changes and demand for resources. Ideally the student would, through his study of the assigned textual material, proceed through an intellectual process that would start with definitions of population and resources concepts. He would then advance to the stage where he would be able to make warranted inferences about the relationships between population characteristics and resources demand. Finally, he would develop the ability to evaluate the validity of probable consequences or conclusions, as set forth by others, concerning relationships between the demographic structure of a society and that society's demand for resources.
In short the student would be developing a confidence in his ability to become an informed evaluator of environmental management decisions.

Reading materials dealing with the topic were tested during the pilot study. Each student in the pilot group received reading assignments consisting of three mimeographed handouts that dealt with various aspects of population principles, population changes, and related resource implications. The handout material contained definitions of population concepts as well as graphs, charts, and tables that suggested implications of population changes and demand for specific resources such as fuel and food.

Along with the assigned reading material each student received a list of general unit objectives and the topics that the instructor would discuss during the unit's class sessions.

At the conclusion of the pilot study, the students were asked, in an informal class discussion, their perceptions of the value of the assigned readings in helping them to understand the implications of population/resource relationships.

In general those students who had scored relatively high on the reading comprehension test stated that the assigned readings were well written and informative. Those students who had scored relatively low on the
reading test either had little comment or simply suggested that there was too much assigned reading and much of it was difficult to understand.

The fact that there was a significant correlation, at the .05 level, between reading comprehension and posttest scores on the Knowledge Level Test was suggestive that the assigned reading materials were not appropriate for the low reading comprehension student.

As a result of the informal poll taken relative to the value of the reading materials and the posttest scores on the Knowledge Level Test, this Investigator concluded that: (1) suitable reading material would have to be identified for the low reading comprehension student; (2) the assigned reading material used during the pilot study could be used as a "springboard" for additional readings that would be assigned to the high reading comprehension students during the Spring Quarter, 1973 investigation; and (3) specific instructional objectives for student direction in study of the unit materials would probably be beneficial to high and low reading comprehension students alike.

The procedure used in selecting reading materials for the Spring Quarter, 1973 investigation was to identify those writings that dealt with population/resources concepts and then to apply a readability formula to them.

The instrument used for determining readability was one developed by Fry. The Fry Readability Graph,
Appendix C, is a relatively rapid method of determining the grade level of written materials, from grade 3.6 through college.

The handout material used during the pilot study was analysed and determined to be at the college reading level. It was apparent, in light of the readability analysis, why the low reading comprehension students in the pilot study were dissatisfied with the assigned readings.

For purposes of the investigation to be carried out during the Spring Quarter, 1973, student assignment to either Treatment Group I or Treatment Group II was to be determined by reading comprehension scores. Treatment Group I would consist of students who received scores of 74 and below on the reading comprehension test. Reading comprehension score, as was suggested in Part II of this chapter, is assumed to be a reasonably reliable predictor of ability to successfully complete college level courses.

For those students with reading scores of less than 75, or readers from the fifth through tenth grade levels, the problem was to identify written materials that were on a suitable reading level but at the same time not suggestive of sub-college conceptual standards. Unfortunately very little written material dealing with
population and resources concepts meets both of these criteria.

The only published reading material that comes relatively close to meeting the dual criteria mentioned above is a 63 page book entitled *People*\textsuperscript{17} written by staff members of the Population Reference Bureau. According to the Fry Readability Graph the reading difficulty level of the book is from grade 7 through grade 9.

Most of the concepts identified by this Investigator as significant for inclusion in the proposed unit of study are dealt with in the book. The publication, however, does not adequately cover the implications of and the impact on resources due to population changes. It was recognized that this would present a limitation that would have to be overcome if the low reading comprehension students were to be challenged to the extent that this Investigator thought they should be in a college level course.

The means of overcoming the limitations of the selected reading material would be through extensive use of visual materials in the Treatment Group I class sessions. Through use of 2x2 slides of graphs, charts, and tables dealing with population and resources concepts, the students would be assisted in deriving conclusions
concerning the relationships of population and resources requirements.

The primary source of the visual materials to be used with Treatment Group I was from the reading material that would be assigned to Treatment Group II.

The assigned readings for Treatment Group II and the Control Group would be the mimeographed handouts discussed previously and the Population Reference Bureau publication The World Population Dilemma. All of the assigned readings have a readability level of grade 12 through college.

**Instructional Strategies:**

The instructional strategies to be used for the investigation were designed to take into account assumed learning handicaps or strengths, e.g. levels of reading comprehension, of those students enrolled in the introductory geography courses.

For purpose of the investigation there would be three groups. Treatment Group I would consist of low reading comprehension students. Treatment Group II would be comprised of high reading comprehension students, and a Control Group that would have both high and low reading comprehension students.

All three of the groups were to receive identical instructional objectives and would be told that mastery
of the objectives would be required for successful completion of the unit, "Population and Resources." The unit objectives would include definitions of concepts, e.g. knowledge level on the Bloom taxonomy as well as synthesis, interpretation, and evaluation levels, the third, fourth, and fifth levels on the taxonomy. In addition to the unit instructional objectives, students would be given a list of convergent application questions, as defined by Duncan and Hough,¹⁹ to be used as the basis for essay questions for a part of the evaluative process at the conclusion of the unit.

Treatment Group I, students with reading comprehension scores of 74 and below, would meet with the instructor three times a week. Depending on the size of Treatment Group I, the group would be broken down into subgroups of no more than eight but no less than four students. Diagnostic tests would be administered at frequent intervals during the investigation to help each student within the subgroups determine his level of progress in mastery of the unit objectives.

In the Treatment Group I class sessions extensive use of visual materials would be used to help the students acquire insight into the relationships between population and resources. It would be assumed that students within Group I would require considerable
instructor assistance in interpreting the visual materials/ graphs, charts and tables. An underlying assumption for the intensive instructor guidance would be that the students would require considerable assistance to help them develop the ability to make warranted inferences and to test conclusions concerning population and resources relationships.

The basic premise of the instructional strategy described for Treatment Group I would be that the instructor by concentrating on the individual learning problems of a small number of students would be able to assist these students in overcoming their learning disabilities. As a result of their success in mastery of the unit's objectives, the students would acquire a positive attitude toward their ability to deal with concepts at increasingly sophisticated levels.

In summary of Treatment Group I design, the students assigned to this group would be assisted on a quasi-individual basis to progress through the unit objectives using reading material commensurate with their level of reading skills as well as through extensive use of visual materials. The students in this group would be given considerable help and encouragement to move through an increasingly complex thought process.

Treatment Group II, students to be assigned on the basis of individual reading comprehension scores
of 75 and above, would be on a semi-independent study basis. This group would receive the same instructional objectives and convergent application questions as Treatment Group I. The assigned reading material would be *The World Population Dilemma* and the mimeographed material used with the pilot study group in the Winter Quarter, 1973. The assigned reading material would include the same graphs, charts, and tables that were to be used in slide format with Treatment Group I.

The students assigned to Treatment Group II would meet with the instructor one hour per week in groups of no larger than eight to ten. The purpose of these meetings would be informal discussion of the material studied for the week and to exchange ideas and information as to how the assigned readings could be best utilized in mastery of the unit objectives.

It would be assumed that all of the unit objectives could be mastered from study of the assigned readings. Each subgroup in Treatment Group II would decide which objectives were to be covered for each week of the investigation and what portions of the assigned unit readings would be studied.

To determine the efficacy of the instructional strategies designed for the two Treatment Groups, a Control Group made up of both high and low reading comprehension students would be used for comparison purposes.
The Control Group would receive an instructional strategy that could be referred to as traditional. This would mean lecture-discussion using visual aids, where appropriate, to cover the unit objectives. The Control Group would meet for three class sessions a week with the instructor and would have the same assigned readings as Treatment Group II. They would also receive the same instructional objectives and convergent application questions as the two Treatment Groups.

Although all students in the Control Group, regardless of individual reading comprehension levels, were to have assigned college level readings, the low reading comprehension students would take Test I, the Knowledge Level instrument, at a readability level consistent with their reading comprehension ability. This procedure would permit a valid comparison between posttest scores for the Treatment Group I students and the low reading comprehension students of the Control Group.

The Control Group posttest results would be used as a basis of comparison with Treatment Groups I and II. The posttest results obtained from the Treatment Group I would be compared with the posttest results of the low reading comprehension students in the Control Group. Likewise the posttest results of the Treatment Group II would be compared with the posttest results of the high reading comprehension students in the Control Group.
Summary of Selection of Reading Materials and Instructional Strategies:

The analysis of the posttest results comparing the two Treatment Groups with the Control Group should result in a determination of the value of the curricular materials/instructional strategy for individual students as well as group comparisons.
Chapter III Footnotes

2. Ibid.
3. Edward Fry, "Fry's Readability Graph" Journal of Reading, XI, No. 7 (April 1968)
14. Committee on Resources and Man, Resources and Man (San Francisco: W.H. Freeman, 1969)


19 John B. Hough and Janes K. Duncan, Teaching Description and Analysis (Reading, Massachusetts: Addison-Wesley, 1970)
CHAPTER IV

IMPLEMENTATION OF THE INVESTIGATION AND ANALYSIS OF RESULTS

This chapter is a discussion of the investigation carried out during the Spring Quarter, 1973 and analysis of the results.

The questions under consideration for this investigation were:

1. Will there be relationship between an individual student's reading comprehension level, appropriate curricular materials as well as instructional strategy and the student's success in learning the concepts presented?

2. Will there be relationship between an individual student's reading comprehension level, appropriate curricular materials as well as instructional strategy and the student's change in attitude toward environmental management?

3. Will there be relationship between an individual student's reading comprehension level, appropriate curricular materials as well as instructional strategy and the student's ability to make warranted inferences about population changes and related impact on resource demands?
4. Will there be a relationship between the open-mindedness of an individual student as measured by the Rokeach Dogmatism Scale D and his (a) success in learning the concepts presented? (b) change in attitude toward environmental management? (c) capacity to increase his ability to make warranted inferences about environmental relationships?

5. Will there be a positive relationship between an individual student's achievement and his perception of the appropriateness of the curricular materials and the instructional strategy to which he was assigned?

The instructional investigation was implemented during the first four weeks of the Spring Quarter, 1973. All students who had enrolled for the introductory geography courses were included in the study.

The initial enrollment for the geography courses was seventy-two. These students were registered in four different sections with section enrollment ranging from a low of fourteen to a high of twenty-eight. According to the college catalogue the courses carried four quarter hour credits which meant that a student enrolled in a geography course should receive the equivalent of four instructional hours per week.

Table 11 (p. 88) summarizes the pertinent characteristics of the investigation's population.
<table>
<thead>
<tr>
<th>Table 11</th>
<th>PROFILE OF STUDENT CHARACTERISTICS, SPRING QUARTER STUDY POPULATION (72 STUDENTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Marital Status</td>
</tr>
<tr>
<td>2.</td>
<td>Sex</td>
</tr>
<tr>
<td>3.</td>
<td>Number of credit hours enrolled Spring Quarter</td>
</tr>
<tr>
<td>4.</td>
<td>Type of high school attended</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Number of years since high school graduation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Attended college previous to C.C.C.</td>
</tr>
<tr>
<td>7.</td>
<td>Completed required English courses (equivalent to C.C.C. requirements)</td>
</tr>
<tr>
<td>8.</td>
<td>Number of hours employed</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Plan to Transfer</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Intended Major</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>English as a second language</td>
</tr>
</tbody>
</table>

a Expressed as percentage of total population
On the first day that classes met the students were informed that they would be taking part in an instructional investigation. It was explained to them that some students would be placed in a semi-independent study section; some would be assigned to small groups of four to eight students that would meet four times a week with the instructor; and one group would receive their instruction in a conventional instructional setting. The students were not told what basis would be used for assigning them to a given instructional strategy.

During the first two class meetings of the quarter each student took a battery of five tests. The tests administered were (1) The New Reading Test, Form A; (2) The Knowledge Level Test of population and resources concepts; (3) The Synthesis, Interpretation and Evaluation test of relationships between U.S. population changes and resources needs; (4) the Rokeach Dogmatism, Scale D, instrument; and (5) the Environmental Opinions Survey instrument.

The score achieved by an individual student on the reading comprehension test was used as the basis for assignment to either Treatment Group I or Treatment Group II. One of the four sections, which contained both high and low reading comprehension students was designated the Control Group.
For the Control Group, a total of 16 students, there were six students with reading comprehension scores ranging from a low of 62 to a high of 71. This group was designated, for purposes of the study, the Control Low Comprehension readers. The remainder of the Control Group, 10 students, had a range of reading scores from 75 to 93. These students were designated the Control High Comprehension students.

For Treatment Group II, students who had scored 75 and above on the reading comprehension test, there were a total of 46 students with reading comprehension scores ranging from 75 to 96. This group was broken down into subgroups, for meeting purposes, of no more than ten students each.

For Treatment Group I, students who had scored below 75 on the reading comprehension test, there were 15 students with a range in reading comprehension scores from 59 to 71. Like Treatment Group II, Group I was subdivided into small groups, for meeting purposes, of four to six students each.

The Control Group and Treatment Group I met with the course instructor for four class hours per week. Treatment II subgroups met one class hour per week with the instructor.

Each of the groups, Control, Treatment I, and Treatment II, were given written instructional objectives
for the unit. The objectives ranged from knowledge level, e.g. definitions of concepts, to synthesis, interpretation and evaluation levels, (see Appendix D).

The students also received a list of convergent application essay type questions. Some of these questions were to be used as a part of the evaluation procedure at the conclusion of the unit. All students, regardless of group assignment, were told that mastery of unit material would be determined by tests derived from the unit's instructional objectives.

For the subgroups of Treatment Group II and the entire Control Group the college level reading materials as described in Chapter II were the curricular materials.

The subgroups of Treatment Group I were given reading material, e.g. *People*, as described in Chapter III with specific reading assignments for each week.

Summary of Assignments:

Students in Treatment Groups I and II were assigned to one of the two groups on the basis of their reading comprehension scores. The Control Group consisted of one section of sixteen students, six of whom were reading at 74 and below and ten who scored at 75 and above on the reading comprehension test. All students, regardless
of instructional strategy, received instructional objectives for the unit as well as a set of convergent application questions that were to be answered in preparation for the unit tests.

Reading materials were assigned based on reading comprehension level, except for the Control Group which had assigned to it college level reading materials regardless of the reading levels of the individual class members.

Diagram 1 depicts the group comparisons that were to be made for this investigation.

### Diagram 1
Group Comparisons for the Unit Tests

<table>
<thead>
<tr>
<th>Treatment Group II</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students Scoring 75 and above on the Reading Comprehension Test</td>
<td>High Reading Comprehension Students 75 and above</td>
</tr>
</tbody>
</table>

| Low Reading Comprehension Students 74 and below | Treatment Group I Students Scoring 74 and below on the Reading Comprehension Test |
The administering of the pretests described previously required two class periods of one hour each. Ten hours of class time were allocated to instructional purposes for the Control Group and Treatment Group I. Treatment Group II, the semi-independent strategy, was allocated three class hours for each of the subgroups.

For Treatment Group II there were four subgroups with the size of the groups varying from seven to ten students. Treatment Group I was divided into three subgroups with the smallest group consisting of four students and the largest group containing seven students. The Control Group had sixteen students.

Control Group Instructional Strategy:

The Control Group received an instructional strategy described as lecture/discussion. Concepts of the unit were discussed by the instructor in terms of definitions, interrelationships, and possible implications. The class members were encouraged to ask questions and to offer their input relative to population/resource implications.

Visual materials, e.g., 2x2 slides of graphs, charts, and diagrams, were used as a basis for lecture and discussion. The instructor raised rhetorical questions concerning the apparent relationships of data when comparing two or more graphs, charts and diagrams.
In numerous instances these questions, unanswered by the instructor, generated considerable class debate. The instructor offered his opinion only when requested to do so by the class members.

In general the instructor, e.g. this Investigator, perceived that there was considerable class interest in the topic. Even though, because of the nature of student questions, the unit instructional objectives were not covered sequentially this Investigator believed that all of the objectives were dealt with during the course of the ten hours of class instruction.

Treatment Group I Instructional Strategy:

Treatment Group I, like the Control Group, received ten hours of classroom instruction. Unlike the Control Group, however, Treatment Group I had assigned reading materials at the 7th thru 9th grade reading levels.

Much of the instruction for this group was centered on analysis and interpretation of the visual materials of graphs, charts, diagrams, and tables. The instructional strategy used was designed to help the students learn how to read graphs and charts as well as to acquire confidence in interpreting the data displayed in this form of medium.

Because of the small size of each subgroup there tended to be considerable interaction within each.
The students were willing to participate in the group discussions and aided one another in making interpretations of the significance of the data presented.

The instructional objectives were dealt with sequentially and one diagnostic quiz was administered each week for each of the subgroups. All of the questions on the diagnostic quizzes were taken directly from the instructional objectives. At the conclusion of each quiz the subgroup class members exchanged answers and made whatever corrections were necessary to individual answers.

Treatment Group II Instructional Strategy:

The subgroups of Treatment Group II met with the instructor for one class hour per week. The students in each of the four subgroups were told that they as a group should decide the order in which they should approach learning the instructional objectives as well as what reading materials should be studied for each of the weeks of the investigation. The instructor was to serve as a moderator of class discussions and to act as a resource person.

The instructor asked at the beginning of each of the weekly sessions if the class members had any specific problems or questions. For each of the three class meetings with each subgroup there were enough questions and comments from the class members
to generate a discussion of the meaning of concepts and the implications of population and resources relationships.

Rationale in Use of Test Instruments Other Than the New Reading Test, Form A:

The purpose of administering the Knowledge level and Synthesis, Interpretation, Evaluation level instruments as pretests was twofold. The pretests indicated levels of mastery of unit material for individual students prior to embarking on the unit and also were to be used to determine rate of gain by comparing pretest mastery with posttest mastery.

As was indicated in Chapter I the function of the Rokeach Dogmatism instrument was to determine the degree of open- or closed-mindedness of individual students. The Rokeach score for each student would be compared with his posttest scores on the Knowledge level, Synthesis, Interpretation and Evaluation level tests, and Environmental Opinions Survey in an attempt to ascertain whether there was a correlation between these phenomena.

The Environmental Opinions Survey, adapted from Bowman, was administered on a pre and post test basis to determine whether there would be a significant change in the individual student's outlook toward
environmental management decisions as a result of the population and resource concepts dealt with in the unit.

Tables 12 through 14 summarize the pre and post test results for the total population taking part in the investigation.

Tables 15 through 20 represent the pre and post test scores for each of the groups on the Knowledge level; Synthesis, Interpretation, and Evaluation level instruments; and the Environmental Opinions Survey.

Each of the tables contains the appropriate groups for comparison purposes.
### TABLE 12

**KNOWLEDGE LEVEL TEST: ALL GROUPS (PRETEST AND POSTTEST)**

<table>
<thead>
<tr>
<th></th>
<th>PRETEST</th>
<th>POSTTEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Items</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Number of Students</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>Median</td>
<td>16.6</td>
<td>22.6</td>
</tr>
<tr>
<td>Mean</td>
<td>16.06</td>
<td>21.40</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.468</td>
<td>3.059</td>
</tr>
<tr>
<td>Variance</td>
<td>12.028</td>
<td>9.359</td>
</tr>
<tr>
<td>Reliability (K-R 21)</td>
<td>.53</td>
<td>.67</td>
</tr>
<tr>
<td>Standard Error of</td>
<td>2.37</td>
<td>1.75</td>
</tr>
<tr>
<td>Measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of Scores</td>
<td>8-23</td>
<td>12-25</td>
</tr>
</tbody>
</table>
TABLE 13
SYNTHESIS, INTERPRETATION, EVALUATION TEST: ALL GROUPS
(PRETEST AND POSTTEST)

<table>
<thead>
<tr>
<th></th>
<th>PRETEST</th>
<th>POSTTEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Items</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Number of Students</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>Median</td>
<td>12.5</td>
<td>13.3</td>
</tr>
<tr>
<td>Mean</td>
<td>12.45</td>
<td>13.43</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.16</td>
<td>2.92</td>
</tr>
<tr>
<td>Variance</td>
<td>9.98</td>
<td>8.54</td>
</tr>
<tr>
<td>Reliability (K-R 21)</td>
<td>.40</td>
<td>.31</td>
</tr>
<tr>
<td>Standard Error of Measurement</td>
<td>2.45</td>
<td>2.42</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>7-21</td>
<td>7-20</td>
</tr>
<tr>
<td></td>
<td>PRETEST</td>
<td>POSTTEST</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>Number of Items</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Number of Students</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>Median</td>
<td>19</td>
<td>19.3</td>
</tr>
<tr>
<td>Mean</td>
<td>18.19</td>
<td>19.8</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.73</td>
<td>3.23</td>
</tr>
<tr>
<td>Variance</td>
<td>13.96</td>
<td>10.41</td>
</tr>
<tr>
<td>Reliability</td>
<td>.36</td>
<td>.15</td>
</tr>
<tr>
<td>Standard Error of Measurement</td>
<td>2.98</td>
<td>2.97</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>10-25</td>
<td>13-26</td>
</tr>
<tr>
<td></td>
<td>Treatment Group II</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Number of Items</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Number of Students</td>
<td>36</td>
<td>32&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Median</td>
<td>15.50</td>
<td>21.63</td>
</tr>
<tr>
<td>Mean</td>
<td>15.88</td>
<td>21.50</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.28</td>
<td>3.31</td>
</tr>
<tr>
<td>Variance</td>
<td>10.76</td>
<td>10.97</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>7-18</td>
<td>12-25</td>
</tr>
</tbody>
</table>

<sup>a</sup> The smaller number of students taking the posttest results from student withdrawals from the course.
<table>
<thead>
<tr>
<th></th>
<th>Treatment Group I</th>
<th>Control Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td>Pretest</td>
</tr>
<tr>
<td>Number of Items</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Number of Students</td>
<td>14</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Median</td>
<td>16.5</td>
<td>21.5</td>
<td>16</td>
</tr>
<tr>
<td>Mean</td>
<td>16.48</td>
<td>20.93</td>
<td>16.33</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.59</td>
<td>2.92</td>
<td>2.88</td>
</tr>
<tr>
<td>Variance</td>
<td>12.90</td>
<td>8.53</td>
<td>8.27</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>8-22</td>
<td>16-25</td>
<td>12-20</td>
</tr>
</tbody>
</table>
TABLE 17

SYNTHESIS, INTERPRETATION, EVALUATION TEST: TREATMENT GROUP II AND HIGH READING COMPREHENSION STUDENTS IN CONTROL GROUP. (PRETEST AND POSTTEST)

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group II</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Number of Items</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Number of Students</td>
<td>36</td>
<td>32(^a)</td>
</tr>
<tr>
<td>Median</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Mean</td>
<td>12.19</td>
<td>13.25</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.67</td>
<td>2.67</td>
</tr>
<tr>
<td>Variance</td>
<td>7.14</td>
<td>7.17</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>7-18</td>
<td>7-20</td>
</tr>
</tbody>
</table>

\(^a\) The smaller number of students taking the posttest results from student withdrawals from the course.
<table>
<thead>
<tr>
<th></th>
<th>Treatment Group I</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Number of Items</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Number of Students</td>
<td>15</td>
<td>14(^a)</td>
</tr>
<tr>
<td>Median</td>
<td>9.5</td>
<td>12</td>
</tr>
<tr>
<td>Mean</td>
<td>10.53</td>
<td>12.33</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.45</td>
<td>2.53</td>
</tr>
<tr>
<td>Variance</td>
<td>5.98</td>
<td>6.42</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>7-15</td>
<td>9-19</td>
</tr>
</tbody>
</table>

\(^a\) The smaller number of students taking the posttest results from student withdrawals from the course.
## Table 19

Environmental Opinions Survey: Treatment Group II and High Reading Comprehension Students in Control Group. (Pretest and Posttest)

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group II</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Number of Items</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Number of Students</td>
<td>41</td>
<td>32&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Median</td>
<td>18.5</td>
<td>19</td>
</tr>
<tr>
<td>Mean</td>
<td>17.87</td>
<td>19.39</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.91</td>
<td>3.39</td>
</tr>
<tr>
<td>Variance</td>
<td>15.30</td>
<td>11.49</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>10-25</td>
<td>14-26</td>
</tr>
</tbody>
</table>

<sup>a</sup> The smaller number of students taking the posttest results from student withdrawals from the course.
### TABLE 20

**ENVIRONMENTAL OPINIONS SURVEY: TREATMENT GROUP I AND LOW READING COMPREHENSION STUDENTS IN CONTROL GROUP. (PRETEST AND POSTTEST)**

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group I</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Number of Items</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Number of Students</td>
<td>15</td>
<td>14&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Median</td>
<td>17.5</td>
<td>20.5</td>
</tr>
<tr>
<td>Mean</td>
<td>18</td>
<td>20.21</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.38</td>
<td>2.83</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>11-25</td>
<td>13-25</td>
</tr>
</tbody>
</table>

<sup>a</sup> The smaller number of students taking the posttest results from student withdrawals from the course.
Test Results

Knowledge Level Test:

For Treatment Group II and the high reading comprehension students of the Control Group there was a significant gain from the pretest to the posttest. Although the posttest median of 24 for the Control Group was considerably higher than the posttest median of 21.63 for the Treatment Group, the amount of change for the two groups was approximately the same.

The posttest mean for each group, 21.5 for the Treatment Group and 22.7 for the Control Group, was not significantly different.

The pre and post test medians for Treatment Group I and the Control Group low reading comprehension students were very similar. The posttest mean for the Control Group was somewhat higher than the posttest mean for the Treatment Group but the difference between the two was not, however, statistically significant.

Synthesis, Interpretation, Evaluation Level Test:

Given the standard error for the test, there was not a significant change from pretest to posttest means and medians for Treatment Group II and the Control Group high reading comprehension students.

Although there was virtually no change from pre and post test means and medians it should be noted
that the pretest median and mean were 4 points and 3.5 points higher respectively for the Control Group.

In contrast to the comparison between Treatment Group II and the Control Group high reading comprehension students, there was greater gain by Treatment Group I than their counterparts in the Control Group.

The median for the Control Group was virtually unchanged from the pretest to the posttest; however, the mean decreased somewhat on the posttest from what it had been on the pretest.

Although the Treatment Group had a slightly lower posttest mean and median than the Control Group the rate of increase from pretest to posttest was greater than any of the other groups.

**Environmental Opinions Survey:**

A comparison of Treatment II Group's Environmental Opinions Survey Score with that of the Control Group high reading comprehension students suggests that the rate of change was approximately the same for the two groups. Both groups increased somewhat their preference toward more societal management for environmental decisions. The amount of change, however, is not statistically significant.

Treatment Group I, like Treatment Group II, increased their score in terms of favoring societal
over individual decisions as they relate to environmental decisions. The Control Group low reading comprehension students also leaned more towards societal decisions on the posttest scores than they had on the pretest but not to the same degree as the students of Treatment Group I.

Questionnaire:

One of the questions posed for examination in this investigation was that of student attitudes or perceptions in terms of the unit's instructional strategies, curricular materials, instructional objectives, and evaluation instruments.

A twenty item questionnaire was developed as an attempt to measure the attitudes of the investigation's population in terms of the four major categories cited above. The questionnaire, (see Appendix E) was divided into four parts, representing each of the major categories, and included five items for each category.

The questionnaire items were developed on a Likert Scale basis with seven possible responses for each item. For purposes of scoring the response for each item was placed in one of three categories. The lower the numerical value a student assigned to a given item the more favorable he was to that particular item. For instance if a student was asked to express his
feelings about the value of the reading materials in preparing him for the unit tests and he responded that it was valuable a numerical value of one was assigned to his response. If, however, he responded that the reading material was of little value his response was assigned a numerical value of three.

The composite scores for each of the four categories as well as a composite score for the entire questionnaire represented five of the variables in the multiple correlation analysis undertaken at the conclusion of the investigation.

**Correlation Analysis:**

In an attempt to respond to the questions raised in Chapter I a multiple correlation analysis was undertaken. The general questions to be investigated were those that dealt with individual student achievement as related to a given set of curricular materials and instructional strategy.

Other questions to be examined by the study included level of individual student achievement as compared with his degree of open- or closed-mindedness, and the student's level of achievement compared with his perception of the appropriateness of the instructional strategy to which he was assigned. The major thrust of the investigation was directed at placing the individual
student in an instructional setting where he would most likely achieve the required mastery of the unit's objectives. One of the premises of this study was that there quite likely would be a change in the individual student's attitudes as a result of the subject matter in the unit toward environmental management decisions as measured by the instrument developed by Bowman.

The correlation matrix was devised to determine the degree of interrelationships between thirteen variables for each student and the study population as a whole. The thirteen variables in the correlation analysis were: (1) reading comprehension score; (2) posttest score on the Knowledge level test; (3) the amount of change from the pretest to the posttest score on the Knowledge level test; (4) the posttest score on the Synthesis, Interpretation, Evaluation test; (5) the amount of change from the pretest score to the posttest score on the Synthesis, Interpretation, Evaluation test; (6) the Rokeach Dogmatism score; (7) the posttest Environmental Opinions score; (8) the amount of change from the pretest to the posttest scores on the Environmental Opinions Survey; (9) student evaluation of the unit reading materials; (10) student evaluation of the unit instructional strategy to which they were
assigned; (11) student evaluation of the unit's instructional objectives; (12) student evaluation of the unit tests; and (13) overall student evaluation of the unit.

Appendix F is a replica of the printout of the multiple correlation analysis. The significance levels for the investigation's population were .249 at the .05 confidence level and .323 at the .01 confidence level.

Table 21 is a listing of the variables that correlated at either the .01 or .05 confidence levels.

From the correlation analysis it is quite apparent that relatively few of the variables are correlated at the .01 or .05 significance levels. For most of the variables that are correlated with one another the relationships are those that one would expect such as posttest score on the Knowledge level test and the amount of change from the pretest score on the same test.
<table>
<thead>
<tr>
<th>Variables Correlated</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Reading Test score and:</td>
<td></td>
</tr>
<tr>
<td>(1) attitude toward unit test</td>
<td>-.29</td>
</tr>
<tr>
<td>B. Knowledge Level Test posttest score and:</td>
<td></td>
</tr>
<tr>
<td>(1) amount of knowledge change</td>
<td>.41</td>
</tr>
<tr>
<td>(2) posttest score on Synthesis, Interpretation, Evaluation test</td>
<td>.29</td>
</tr>
<tr>
<td>(3) degree of open-mindedness as measured by the Rokeach Test</td>
<td>.26</td>
</tr>
<tr>
<td>(4) Environmental Opinions posttest score</td>
<td>.35</td>
</tr>
<tr>
<td>(5) overall attitude concerning unit as determined by questionnaire response</td>
<td>-.26</td>
</tr>
<tr>
<td>C. Posttest score on the Synthesis, Interpretation, Evaluation test and:</td>
<td></td>
</tr>
<tr>
<td>(1) amount of change from the pretest score</td>
<td>.32</td>
</tr>
<tr>
<td>(2) degree of open-mindedness</td>
<td>.37</td>
</tr>
<tr>
<td>D. Environmental Opinions Posttest score and change from the pretest score</td>
<td>.32</td>
</tr>
</tbody>
</table>
CHAPTER V
SUMMARY, CONCLUSIONS AND DISCUSSION

This final chapter attempts to (1) summarize the investigation; (2) present the conclusions reached as a result of the outcomes of the investigation; (3) discuss the implication of the investigation's results; and (4) suggest recommendations for further study of the questions posed in Chapter I.

Summary of the Investigation

The major problem undertaken in this study was to attempt to match individual students with appropriate curricular materials and instructional strategy and to assess the learning achievement of the students relative to the assigned strategy. The basis for assignment of an individual student to a given instructional strategy was the student's reading comprehension level.

The subject matter used for the investigation was that of population and resources concepts. The concepts incorporated in the subject area were derived from a variety of sources such as popular writings by environmentalists as well as more technical publications. The concepts included in the study were sent for evaluation to individuals and/or institutions who were reportedly
engaged in curriculum development for population and resources education.

The curricular materials used in the investigation were derived primarily from publications of the Population Reference Bureau. The nature of the curricular materials was graded reading material and 2x2 slides of graphs, charts and tables pertaining to population principles and associated resources concepts.

For those students who were reading at or above a comprehension level deemed necessary for success in college courses, the assigned readings were at reading comprehension levels from grade 12 through college. For those students reading at a comprehension level below what was considered the minimum necessary for college success, the assigned readings were at the 7th through 9th grade reading level.

Two Treatment Groups and a Control Group, for comparison purposes, took part in the investigation. Treatment Group I was comprised of individuals reading below grade levels considered to be the necessary minimum for college success. Treatment Group II consisted of those students identified as reading at or above a level considered necessary for college success. The Control Group contained both high and low, as defined for this investigation, reading comprehension students.
The instructional strategies for each of the Treatment Groups were designed on the basis of the assumed reading abilities of the students in each group. The instructional strategy for the Control Group did not take into account the varying reading abilities of the group's members.

Evaluation instruments were employed on a pretest and posttest basis to determine change in the unit's concepts mastery for individual students. The composite means and medians for each Treatment Group were compared with the composite means and medians with the appropriate subgroup in the Control section.

A form of the Likert measuring technique (described in Chapter IV) was used in developing a questionnaire to obtain individual student's perceptions of the appropriateness of the four major categories in the investigation, e.g. curricular materials, instructional strategy, instructional objectives, and evaluation instruments.

The reading scores, posttest scores, amount of change from pretests, the Rokeach Dogmatism score, the Environmental Opinions Survey score, and evaluations of the four major categories of the investigation for each student were submitted to a multiple correlation analysis.
Conclusions from Analysis of Comparison of Group Posttest Scores

The group pretest and posttest means and medians for three tests, the Knowledge level instrument, the Synthesis, Interpretation, Evaluation test, and the Environmental Opinions Survey were compiled and evaluated for purposes of comparing the appropriate Treatment Group with their counterpart subgroup in the Control section.

The following analysis and conclusions are for each test for the total population of the investigation and for the comparable groups within the total population.

Knowledge level test: Total population
1. There was a statistically significant gain in knowledge of the definitions of population and resources concepts.
2. The posttest mean was 4.34 higher than the pretest mean or an approximate doubling of the standard error of measurement for the test.

Knowledge level test: Treatment Group II and Control high reading comprehension subgroup
1. The Control subgroup's pretest median and mean were 19 and 18.5 respectively; whereas, the Treatment Group's pretest median and mean were 15.5 and 15.88 respectively.
2. The posttest median and mean for the Control subgroup were 24 and 22.7 respectively; whereas, the Treatment
Group had a posttest median and mean of 21.63 and 21.5 respectively.

3. The Treatment Group seemed to show greater gain than the Control subgroup, 6.13 as compared with 5.0 median changes and 5.62 as compared with 4.2 mean changes. However, the difference between the two groups was not statistically significant.

Conclusions:
1. The difference between the mean posttest scores for the Treatment Group and Control subgroup, 21.5 for Treatment and 22.7 for Control, was not statistically significant based on an analysis of variance test.

2. The instructional strategies for each group appear to be equally effective in terms of student posttest knowledge of the unit's concepts.

Knowledge level test: Treatment Group I and Control low reading comprehension subgroup

1. The pretest medians and means for both groups, Treatment 16.5 and 16.48 respectively and Control 16 and 16.33 respectively were very similar.

2. The posttest medians and means for both groups also were very similar, e.g. Treatment 21.5 and 20.93 respectively and Control 22 and 22 respectively.

Conclusions:
1. Although the Control subgroup had a higher posttest mean than the Treatment Group, the difference was not statistically significant.
2. The specialized curricular material and instructional strategy for Treatment Group I cannot be considered more effective than the curricular materials and instructional strategy used with the Control Group.

Synthesis, Interpretation, Evaluation test: total population

1. There was not a statistically significant change from the pretest mean, 12.45, to the posttest mean, 13.43.
2. The higher posttest mean, compared with the pretest mean, did not exceed the standard error of measurement for the test.

Synthesis, Interpretation, Evaluation test: Treatment Group II and Control high reading comprehension subgroup

1. There was a significant difference between the groups for pretest medians and means; e.g. Treatment 12 and 12.9 respectively and Control 16 and 15.4 respectively.
2. Although the posttest median and mean for the Control Group, 16.5 and 16.3 respectively, were considerably higher than the median and mean of the Treatment Group, 13 and 13.25 respectively, neither group increased their scores to the extent of the standard error of measurement for the test.

Conclusions:

1. Neither instructional strategy proved to be effective in increasing the student's abilities to make warranted inferences and derive valid conclusions concerning
the relationships of population changes and resource demands.

2. The effect of the reading material and/or the instructional strategy might have resulted in greater student awareness of the difficulty in establishing "straight-line" relationships between population changes and resources demands. This uncertainty is perhaps reflected in the posttest scores of the two groups.

Synthesis, Interpretation, Evaluation test: Treatment Group I and Control low reading comprehension subgroup

1. The Control subgroup had higher pretest median and mean scores, 12.5 and 13.3 respectively, than the Treatment Group, 9.5 and 10.53 respectively.

2. The Treatment Group did have considerably greater gain from pretest mean to posttest mean than the Control subgroup, however, the difference was not statistically significant.

Conclusions:

1. Like Treatment Group II and the Control high reading comprehension subgroup, the posttest means of Treatment Group I and the Control low reading comprehension subgroup did not change significantly from pretest to posttest.

It appears that neither the Control Group instructional strategy nor Treatment Group I instructional
strategy was effective in increasing the students ability to make warranted inferences and derive valid conclusions concerning the relationship of population changes and resource demands.

Environmental Opinions Survey: All Groups

The total population, as well as each of the groups in the investigation, moved toward favoring more societal decision making from the pretest to the posttest means and medians. The amount of change from pretest to posttest was similar for all groups.

The shift away from individual decision making concerning environmental issues toward societal decisions may have been a result of the curricular materials, the instructional strategies, extraneous forces, or possibly all three. At any rate the amount of change was not statistically significant and one might question whether the change was not just a short run phenomenon that might be lost if the students were given the same test six months hence.

Correlation Analysis Conclusions

As was suggested in Chapter IV, relatively few of the thirteen variables in the multiple correlation analysis showed significant statistical correlation with one another. There were, however, some correlations that were of statistical significance and these will be briefly discussed in terms of conclusions.
When reading comprehension scores were compared with attitudes toward the unit tests a negative correlation of -.29 resulted. From the analysis it appears that the higher the reading comprehension score of the individual student the less satisfied he was with the unit's evaluation instruments. Although the precise reason or reasons for the dissatisfaction cannot be determined, a number of plausible explanations might be offered. They would be that the students might have thought that (1) the tests were not fairly evaluating their knowledge; (2) the tests were too difficult; (3) the tests were too easy; (4) the test questions were ambiguous.

Whatever the reason(s) for the negative relationship it is of interest to note that the low reading comprehension students did not perceive the tests in the same light as the higher reading comprehension students.

The statistically significant correlation, .29, between posttest scores on the Knowledge level test and the more difficult Synthesis, Interpretation, Evaluation test supports the suggestions of learning theorists such as Bloom\(^1\) and Gagne\(^2\) that learning proceeds from the less complex, e.g. recognition, identification, knowledge, to the more complex cognitive associations of interpretation and evaluation.

It would appear from this correlation that knowledge of concept definitions is necessary if one is to be able
to make correct inferences about the relationships of two or more concepts.

The statistically significant correlations between posttest scores with the amount of change from the pretest scores on the Knowledge level test, the Synthesis, Interpretation, Evaluation test, and the Environmental Opinions Survey are not unexpected. One could infer that those students who were motivated with regard to learning the meaning of the unit's concepts were also motivated to make application of these concepts in problem situations such as posed by the Synthesis, Interpretation, Evaluation test and the Environmental Opinions Survey.

It would appear that based on the statistically significant correlation between the posttest Knowledge level test score and the posttest Environmental Opinions Survey score that the more knowledge students have of environmental concepts the more likely they are to favor societal decisions concerning environmental management. Bowman\textsuperscript{3} derived similar conclusions from her study.

The Rokeach Dogmatism instrument was used in the investigation to determine if there would be a significant correlation between degree of open-mindedness and mastery of the unit objectives. Because some of the unit topics were of a controversial nature, e.g. birth control, it was thought that those individuals
who required early closure, e.g. closed-mindedness, might have limited success in mastering the unit objectives. From the correlation analysis it would appear that there is a significant relationship between open-mindedness and controversial objectives mastery.

It is of interest to note that the score on the Rokeach instrument and the posttest score on the Knowledge level test showed significance at the .05 level. The level of significance for score on the Rokeach instrument and the posttest score on the Synthesis, Interpretation, Evaluation test was .01. From these statistically significant correlations it might be inferred that the more open-minded a student the more likely he would be able to deal successfully with the higher levels of cognitive objectives.

Conclusions Concerning the General Questions of the Investigation

Each of the general questions posed in Chapter I sought to establish whether there would be a significant relationship between reading comprehension score and unit objectives mastery in terms of the variables such as curricular materials, instructional strategy, open-mindedness, and individual student perception of appropriateness of the instructional setting to which that student was assigned.
The general questions are discussed in terms of conclusions derived from analysis of the investigation's results.

1. Reading comprehension score when compared with the Knowledge level posttest score approaches but does not reach statistical significance. There appears then to be insufficient evidence to support the notion that individualized curricular materials and/or instructional strategies are necessary.

2. The differentiated curricular materials and instructional strategy did not appear to be of significance in student mastery of the unit concepts. As an example, the Control low reading comprehension subgroup achieved as high or higher posttest means as the Treatment I Group.

3. The amount of gain from pretest to posttest scores does not appear to be related to reading comprehension level, curricular materials, or instructional strategy.

4. The amount of change for the Environmental Opinions Survey appears to be unrelated to reading comprehension score and/or differentiated curricular materials and instructional strategies.

5. Student attitudes concerning curricular materials and instructional strategy are apparently unrelated to individual reading comprehension scores.
6. There appears to be some predictive value in the Rokeach Dogmatism scale when dealing with controversial issues.

General Conclusions and Recommendations

Because there was not a significant statistical difference between the Treatment Groups and the Control Group in amount of gain from pretest to posttest means on the Knowledge level objectives, it would seem that, given a time limitation such as was the case in this study, a well structured lecture-discussion instructional strategy containing students with a wide range of reading comprehension abilities is equally effective to that of differentiated instructional strategies for accomplishing the Knowledge level objectives.

The fact that the Control low reading comprehension subgroup achieved at levels comparable with Treatment Group I leads one to question the importance of reading comprehension scores for Knowledge level objectives. Perhaps those students who have a reading disability compensate for that deficiency by being attentive listeners. There is a strong probability that the low reading comprehension student benefits from interaction, through class discussions, with the more able reading students. If, however, the time limitation were eliminated one might raise the question of the effect of the differentiated instructional treatment for the low reading comprehension
students in mastery of the higher level cognitive objectives of synthesis, interpretation, and evaluation. The fact that Treatment Group I did make greater gain on these higher level objectives than their counterparts in the Control Group, although not statistically significant, suggests that, given sufficient time, an instructional strategy such as that used with Treatment Group I may be of value in assisting the low reading comprehension student to master the higher level cognitive objectives.

From a comparison of the amount of gain made by Treatment Group II and the Control high reading comprehension subgroup it is apparent that for those students who are reading at a high comprehension level, perhaps 85 and above on the New Reading Test, and who desire to do so, semi-independent study is a reasonable alternative to the traditional class setting of lecture-discussion. Implementation of alternative instructional strategies, such as semi-independent study, would permit an instructor to devote more attention to those students requiring additional help.

The limited gain by all groups on the Synthesis, Interpretation, Evaluation test is a puzzling phenomenon. The validity of the test itself might very well be questioned. The emphasis and direction of the curricular materials, instructional strategies and the instructor's expectations for his students might also have been conditions
influencing the nature of the learning outcomes. Had the students been permitted to evaluate the population/resources relationships in a different test format, such as essay type questions, they might have demonstrated considerable insight into these complex relationships. One also could infer that more time is necessary, than was allocated to this investigation, to develop the ability to deal successfully with the higher levels of the cognitive domain.

In a study conducted by Willson the author suggested that when teachers consciously direct their questions to students towards the higher levels of thinking on Bloom's taxonomy the students will achieve significantly higher on the advanced levels of the taxonomy. The role of the teacher in encouraging students to aspire to these levels seems, then, to be a critical factor. It may very well be that although this Investigator thought that he was guiding the students toward the more advanced cognitive levels, he in fact was not accomplishing this particular goal.

If investigations similar to this one are attempted in the future a number of points might profitable be considered in designing the study. The limited size of the investigation's population and the fact that it was not truly a random sampling raises important questions concerning the investigation's results. Also
the fact that only one teacher was involved in the study raises the obvious question concerning the influence of the teacher's personality and educational philosophy in terms of student learning outcomes. Further the curricular materials may not have been as effective for higher levels of cognitive thinking as this Investigator thought they would be.

In summary if further research along the lines of this investigation are attempted, the writer recommends that: (1) a larger population selected on a random sampling be used; (2) more than one instructor should be involved, e.g. two or more investigations should be carried out simultaneously; (3) curricular materials should be carefully evaluated to determine to what degree and how effectively they deal with the higher levels of the cognitive domain; and (4) variables other than reading comprehension should be considered when designing individualized instructional strategies.

As a general summarizing conclusion based on the results of the investigation it appears to this writer that a traditional type of instructional setting, with the additional input of explicitly stated instructional objectives and relevant visual materials is as effective an instructional strategy, when there is a time limitation as there was in this investigation, as the differentiated strategies based on individual student's reading ability.
Chapter V Footnotes

1 Bloom, op. cit.


3 Bowman, op. cit.

APPENDICES
APPENDIX A
## DISTRIBUTION OF ENROLLMENT ACCORDING TO HIGH SCHOOL LAST ATTENDED
### ALL STUDENTS

Cuyahoga Community College-Metro

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenville</td>
<td>294</td>
<td>361</td>
<td>655</td>
</tr>
<tr>
<td>East Tech</td>
<td>344</td>
<td>267</td>
<td>611</td>
</tr>
<tr>
<td>John Hay</td>
<td>176</td>
<td>417</td>
<td>593</td>
</tr>
<tr>
<td>John Adams</td>
<td>249</td>
<td>278</td>
<td>527</td>
</tr>
<tr>
<td>J.F. Kennedy</td>
<td>205</td>
<td>189</td>
<td>394</td>
</tr>
<tr>
<td>East</td>
<td>172</td>
<td>211</td>
<td>383</td>
</tr>
<tr>
<td>Cleveland Heights</td>
<td>162</td>
<td>109</td>
<td>271</td>
</tr>
<tr>
<td>West Tech</td>
<td>154</td>
<td>94</td>
<td>248</td>
</tr>
<tr>
<td>Collinwood</td>
<td>121</td>
<td>87</td>
<td>208</td>
</tr>
<tr>
<td>Cleve. Ext. (J. Hay)</td>
<td>41</td>
<td>163</td>
<td>204</td>
</tr>
<tr>
<td>Shaw</td>
<td>89</td>
<td>95</td>
<td>184</td>
</tr>
<tr>
<td>Lakewood</td>
<td>105</td>
<td>70</td>
<td>175</td>
</tr>
<tr>
<td>South</td>
<td>119</td>
<td>53</td>
<td>172</td>
</tr>
<tr>
<td>John Marshall</td>
<td>108</td>
<td>60</td>
<td>168</td>
</tr>
<tr>
<td>Euclid</td>
<td>89</td>
<td>55</td>
<td>144</td>
</tr>
<tr>
<td>Brush</td>
<td>82</td>
<td>47</td>
<td>129</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>113</td>
<td>8</td>
<td>121</td>
</tr>
<tr>
<td>Shaker Heights</td>
<td>65</td>
<td>43</td>
<td>108</td>
</tr>
<tr>
<td>Jane Addams</td>
<td>4</td>
<td>101</td>
<td>105</td>
</tr>
<tr>
<td>Garfield Heights</td>
<td>70</td>
<td>35</td>
<td>105</td>
</tr>
</tbody>
</table>
ENROLLMENT DISTRIBUTION ACCORDING TO AGE
ALL STUDENTS
Cuyahoga Community College-Metro

<table>
<thead>
<tr>
<th>AGE</th>
<th>Count</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>136</td>
<td>1.3</td>
</tr>
<tr>
<td>18</td>
<td>884</td>
<td>8.3</td>
</tr>
<tr>
<td>19</td>
<td>1153</td>
<td>10.9</td>
</tr>
<tr>
<td>20</td>
<td>1066</td>
<td>10.1</td>
</tr>
<tr>
<td>21-25</td>
<td>3368</td>
<td>31.8</td>
</tr>
<tr>
<td>26-30</td>
<td>1369</td>
<td>13.0</td>
</tr>
<tr>
<td>31-40</td>
<td>1208</td>
<td>11.4</td>
</tr>
<tr>
<td>41-50</td>
<td>509</td>
<td>4.8</td>
</tr>
<tr>
<td>51 and over</td>
<td>203</td>
<td>1.6</td>
</tr>
<tr>
<td>No Data</td>
<td>635</td>
<td>6.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AGE</th>
<th>Largest Group</th>
<th>Count</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>1153</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>21-25</td>
<td>3368</td>
<td>31.8</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AGE</th>
<th>Smallest Group</th>
<th>Count</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>136</td>
<td>1.3</td>
<td></td>
</tr>
</tbody>
</table>
## STUDENT LOAD DISTRIBUTION
by Credit Hour Enrollment
Cuyahoga Community College

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FRESHMAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1015</td>
<td>25.5</td>
<td>1410</td>
<td>35.3</td>
<td>955</td>
<td>23.9</td>
<td>615</td>
<td>15.4</td>
</tr>
<tr>
<td>Female</td>
<td>1339</td>
<td>33.9</td>
<td>1310</td>
<td>33.0</td>
<td>788</td>
<td>19.9</td>
<td>515</td>
<td>13.3</td>
</tr>
<tr>
<td>Total</td>
<td>2354</td>
<td>29.5</td>
<td>2720</td>
<td>34.2</td>
<td>1743</td>
<td>21.9</td>
<td>1130</td>
<td>14.1</td>
</tr>
<tr>
<td>SOPHOMORE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>294</td>
<td>20.6</td>
<td>566</td>
<td>39.4</td>
<td>319</td>
<td>22.2</td>
<td>253</td>
<td>17.5</td>
</tr>
<tr>
<td>Female</td>
<td>276</td>
<td>22.8</td>
<td>507</td>
<td>41.9</td>
<td>233</td>
<td>19.3</td>
<td>192</td>
<td>16.0</td>
</tr>
<tr>
<td>Total</td>
<td>570</td>
<td>21.5</td>
<td>1073</td>
<td>40.7</td>
<td>552</td>
<td>20.9</td>
<td>445</td>
<td>17.0</td>
</tr>
<tr>
<td>ALL STUDENTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1309</td>
<td>24.0</td>
<td>1976</td>
<td>36.5</td>
<td>1274</td>
<td>23.5</td>
<td>868</td>
<td>16.1</td>
</tr>
<tr>
<td>Female</td>
<td>1615</td>
<td>31.2</td>
<td>1817</td>
<td>35.3</td>
<td>1021</td>
<td>19.8</td>
<td>707</td>
<td>13.7</td>
</tr>
<tr>
<td>Total</td>
<td>2924</td>
<td>27.6</td>
<td>3793</td>
<td>35.8</td>
<td>2295</td>
<td>21.6</td>
<td>1575</td>
<td>14.8</td>
</tr>
</tbody>
</table>
### DISTRIBUTION ACCORDING TO MAJOR PROGRAM
**UNIVERSITY PARALLEL-ALL STUDENTS**
*Guyahoga Community College-Metro*

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>Male Part-Time</th>
<th>Male Full-Time</th>
<th>Female Part-Time</th>
<th>Female Full-Time</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts and Sciences</td>
<td>304</td>
<td>9.3</td>
<td>411</td>
<td>19.2</td>
<td>242</td>
</tr>
<tr>
<td>Business Administration</td>
<td>303</td>
<td>9.2</td>
<td>234</td>
<td>10.9</td>
<td>115</td>
</tr>
<tr>
<td>Education</td>
<td>77</td>
<td>2.3</td>
<td>73</td>
<td>3.4</td>
<td>111</td>
</tr>
<tr>
<td>Engineering</td>
<td>203</td>
<td>6.2</td>
<td>104</td>
<td>4.9</td>
<td>15</td>
</tr>
<tr>
<td>Undecided</td>
<td>481</td>
<td>14.6</td>
<td>179</td>
<td>8.4</td>
<td>573</td>
</tr>
</tbody>
</table>
Dear:  

I am a Professor of Geography at Cuyahoga Community College in Cleveland, Ohio. We are attempting to restructure our Introductory Geography course, annual enrollment of approximately two hundred fifty students, to include the major concepts of population and resources education.  

We would like to incorporate the concepts in both visual and written form. I have gleaned from numerous sources, such as the Population Reference Bureau, what appear to be the key concepts for a unit on Population and Resources. I would appreciate your reviewing the enclosed list of concepts and would welcome any suggestions or comments that you would care to make.  

If you have developed a hierarchy of concepts and/or bibliographies pertaining to the topic I would very much like to receive the efforts of your work. Thank you for your interest in this matter. 

Sincerely, 

Richard J. Parish  
Professor of Geography  
Cuyahoga Community College
POPULATION AND RESOURCES CONCEPTS

1. Rate of natural increase
2. Growth rate
3. Age-specific birth rate
4. Completed fertility
5. Net migration
6. Sex ratio
7. Dependency ratio
8. Age structure
9. Crude birth rate
10. Mortality rate
11. Demographic transition
12. Population projection models
13. Determinants of differential fertility
14. Demographic types
15. Population density
16. Stationary population
17. Cohort
18. Cultural appraisal of resources
19. Renewable resources
20. Finite resources
21. Per capita income
22. Overpopulation
23. Underpopulation
24. Optimum population
25. Malthusian Doctrine
26. Green Revolution
Directions for Using the Readability Graph

1. Select three one-hundred-word passages from near the beginning, middle, and end of the book. Skip all proper nouns.

2. Count the total number of sentences in each one-hundred-word passage (estimating to nearest tenth of a sentence). Average these three numbers.

3. Count the total number of syllables in each hundred-word sample. There is a syllable for each vowel sound; for example: cat (1), blackbird (2), continental (4). Don't be fooled by word size; for example: polio (3), through (1). Endings such as -y, -ed, -el, or -le usually make a syllable, for example: ready (2), bottle (2). I find it convenient to count every syllable over one in each word and add 100. Average the total number of syllables for the three samples.

4. Plot on the graph the average number of sentences per hundred words and the average number of syllables per hundred words. Most plot points fall near the heavy curved line. Perpendicular lines mark off approximate grade level areas.
Average number of sentences per 100 words

Average number of syllables per 100 words
OBJECTIVES - PRINCIPLES OF DEMOGRAPHY

1. The student will define each of the following:
   crude birth rate    population growth rate
   mortality rate      net migration
   rate of natural increase    stationary population

2. The student will calculate the current population growth rate for the:
   1. United States
   2. World

3. The student will state the necessary conditions for a stationary population in the United States.

4. The student, using appropriate charts and graphs, will summarize in paragraph form the history of United States population change.

5. The student will define each of the following:
   age-specific birth rate
   completed fertility
   cohort

6. The student will write a paragraph explaining how age-specific fertility rates effect the rate of natural increase.

7. The student will explain how differing completed fertility rates would effect the population growth rate of the United States.

8. The student will analyze a graph showing the size of the reproductive female cohort groups for the 1930's and 1970's to determine the potential for future United States population increase.

9. The student will write a paragraph stating the changes that take place in the United States sex ratio from cohort group 1-5 through cohort group 65-69.
10. The student will define each of the following:
   sex ratio
   age structure
   dependency ratio

11. The student will compare the dependency ratios of
    the United States, Sweden, and India to determine
    how they effect the economy of each of the nations.

12. The student, using appropriate graphs and charts,
    will explain the effect of a changing age structure
    in the United States in terms of the need for
    schools, hospitals, and other social services.

13. The student will define each of the following:
    determinants of differential fertility
    demographic transition
    demographic types
    population projection models

14. The student, using appropriate charts and graphs
    as sources, will explain the apparent relationship(s)
    between income level, educational attainment level,
    and fertility.

15. The student will cite two examples of countries
    that have undergone demographic transition and two
    that have not.

16. The student will construct a table that lists the
    principle population characteristics of each of the
    world's major demographic types.

17. The student will cite at least one geographic area
    for each of the major demographic types.

18. The student, using population projection models
    for the United States, will explain how differing
    assumptions about birth rates, mortality rates, and
    net migration result in different population projections

19. The student will define the following:
    population density  renewable resources
    cultural appraisal of  finite resources
    resources           per capita income
20. The student will cite at least two examples of geographical areas with a high population density but a low per capita income.

21. The student will cite at least two examples of geographical areas with a high population density but a high per capita income.

22. The student will write a paragraph explaining, with specific examples, how cultural appraisal of resources has helped to create the high population density/low per capita income situation of the geographical areas cited in Objective 20.

23. The student will write a paragraph explaining, with specific examples, how cultural appraisal of resources has helped to create the high population density/high per capita income situation of the geographical areas cited in Objective 21.

24. The student will cite at least three examples of renewable resources and three examples of finite resources.

25. The student will write a paragraph describing how the United States is "extending the usability" of one or more finite resources.

26. The student will write a paragraph describing how at least one example of a renewable resource may have accelerated regeneration.

27. The student will define each of the following: overpopulation underpopulation optimum population Malthusian Doctrine

28. The student will state the criteria for overpopulation and cite at least two examples of geographical areas that may be considered overpopulated.

29. The student will state the criteria for underpopulation and cite at least two examples of geographical areas that may be considered underpopulated.

30. The student will state the criteria for optimum population.
31. The student will cite at least one example of a geographical area where the Malthusian Doctrine seems to apply.

32. The student will state his reasons for the geographical area cited in Objective 31.
APPENDIX E
Please complete the following personal data items:

Marital status ___M ___S   Sex ___M ___F

Number of quarters at C.C.C. 

Number of credit hours enrolled for Spring Quarter 1973

Previous college(s) attended prior to enrolling at C.C.C.

English courses completed at C.C.C. (list by course number)

High School attended

Year of high school graduation

Number of hours employed per week

Do you plan to transfer to a four year college

If you plan to transfer, what is your intended major field of study?

Is English your second language?
Directions:
The items on this questionnaire deal with four major categories for the unit on Population Principles: Learning Objectives; Teaching Method; Tests; and Reading Material.
Your responses will be of help to me in evaluating the unit materials, the unit tests, as well as the teaching method used for the unit.
Please consider each item carefully and then check the response that most nearly describes your feelings about the item in question.

Sample Question
Indicate your feelings about the time spent on the unit.

[ ] far too much
[ ] too much
[✓] sufficient
[ ] slightly too little
[ ] too little
[ ] far too little
1. Indicate your feelings about the amount of reading material assigned.
   - far too much
   - too much
   - sufficient
   - not quite enough
   - too little
   - far too little

2. Indicate your feelings about the difficulty of the reading material.
   - too difficult
   - difficult
   - adequate
   - slightly easy
   - easy
   - too easy

3. Indicate your feelings about how well the visual materials, such as graphs and charts, increased your understanding of the population problem.
   - a great deal
   - sufficient
   - somewhat
   - little
   - very little
   - none at all
4. Indicate your feelings about how well the written materials increased your understanding of the population problem.

   ______ greatly increased
   ______ increased
   ______ slightly increased
   ______ of little increase
   ______ of very little increase
   ______ of no increase

5. Indicate your feelings concerning the amount of materials you were asked to learn.

   ______ far too much
   ______ too much
   ______ sufficient
   ______ not quite enough
   ______ too little
   ______ far too little

6. Indicate your feelings about the teaching method used for this unit.

   ______ highly satisfactory
   ______ very satisfactory
   ______ satisfactory
   ______ somewhat satisfactory
   ______ unsatisfactory
   ______ very unsatisfactory
7. Indicate your feelings on how useful the teaching method was in preparing you for the unit tests.
   - very useful
   - useful
   - somewhat useful
   - of little use
   - of very little use
   - of no use

8. Indicate your feelings on the amount of in-class help by the instructor in preparing you for the tests.
   - a great deal
   - sufficient
   - some
   - little
   - very little
   - none at all

9. Indicate your feelings about the amount of outside study time required to learn the material.
   - far too much
   - too much
   - sufficient
   - little
   - very little
   - none at all
10. Indicate your feelings about the value of the class meetings in increasing your understanding of the population problem.

____ very valuable
____ valuable
____ somewhat valuable
____
____ of little value
____ of very little value
____ of no value

11. Indicate your feelings on how helpful the written objectives were in preparing you for the tests.

____ very helpful
____ helpful
____ slightly helpful
____
____ of little help
____ of very little help
____ of no help

12. Indicate your feelings on how well the unit objectives covered the material the instructor expected you to deal with on the tests.

____ very helpful
____ helpful
____ slightly helpful
____
____ of little help
____ of very little help
____ of no help
13. Indicate your feelings on how helpful the written objectives were in terms of your success in this unit.
   ___ very helpful
   ___ helpful
   ___ slightly helpful
   ___ ______
   ___ of little help
   ___ of very little help
   ___ of no help

14. Indicate your feelings on how well you would have done in this unit if you had followed the unit objectives and not used any reading material.
   ___ very well
   ___ well
   ___ adequate
   ___ ______
   ___ not quite as well
   ___ not as well
   ___ not at all well

15. Indicate your feelings about the number of unit objectives.
   ___ far too many
   ___ too many
   ___ sufficient
   ___ ______
   ___ slightly too few
   ___ too few
   ___ far too few
16. Indicate how closely you feel the test questions followed the unit objectives.
   ___ very closely
   ___ closely
   ___ somewhat closely
   ___
   ___ little
   ___ very little
   ___ not at all

17. Indicate how useful you feel the reading material was in helping you to answer the test questions.
   ___ very useful
   ___ useful
   ___ somewhat useful
   ___
   ___ of little use
   ___ of very little use
   ___ of no use

18. Indicate your feelings on how well the test questions tested your knowledge of population problems.
   ___ very well
   ___ well
   ___ somewhat
   ___
   ___ little
   ___ very little
   ___ not at all
19. Indicate your feelings concerning the difficulty of each test.

First test (terms)

- very difficult
- difficult
- somewhat difficult
- 
- somewhat easy
- easy
- too easy

Second Test (Conclusions)

- very difficult
- difficult
- somewhat difficult
- 
- somewhat easy
- easy
- too easy

Third test (essay)

- very difficult
- difficult
- somewhat difficult
- 
- somewhat easy
- easy
- too easy

20. Rate how well you feel the unit increased your understanding of population problems.

- greatly increased
- increased
- somewhat increased
- 
- of little increase
- of very little increase
- of no increase
APPENDIX F
1. New Reading Test, Form A
2. Knowledge Posttest Score
3. Knowledge Change (Pretest to Posttest)
4. Synthesis, Interpretation, Evaluation Posttest Score
5. Synthesis, Interpretation, Evaluation Change (Pretest to Posttest)
6. Rokeach Dogmatism
7. Environmental Opinions Posttest Score
8. Environmental Opinions Change (Pretest to Posttest)
9. Questionaire: Reading Materials Evaluation
10. Questionaire: Instructional Strategy Evaluation
11. Questionaire: Instructional Objectives Evaluation
12. Questionaire: Unit Tests Evaluation
13. Total Questionaire Evaluation

Population 62

Variables
2  .223
3  .184  .412
4  .208  .291  -.218
5  -.153  .062  .015  .322
6  -.111  -.259  .081  -.369  -.031
7  -.113  .346  .051  .189  .188  -.192
8  -.208  .109  .053  .017  .115  .203  .321
9  -.013  -.188  .052  -.014  .104  -.044  -.159  .137
10  .152  -.191  .004  .024  .099  .015  -.162  -.121  .297
11  -.059  -.222  .033  -.067  -.063  -.200  -.084  .103  .174  .295
12  -.292  -.090  .088  .021  .014  .043  -.053  .042  .215  .073  .186
13  -.123  -.256  .075  -.009  .050  -.061  -.166  .054  .568  .613  .642  .689

Variables 1  2  3  4  5  6  7  8  9  10  11  12
SELECTED BIBLIOGRAPHY

Books


**Articles**

Fry, Edward. "Fry's Readability Graph," *Journal of Reading*, XI, No. 7 (April, 1968)

Hadley, L. S. "New College Students Lack Study Techniques," *School and Society*, LXXXV (November, 1957)


**Papers**

Anderson, Clarence A. *A Description of the Flint Community Junior College Reading Program.* Paper presented at the North Central Reading Association Conference, Flint, Michigan, October 31-November 1, 1969.


Reports


Dissertations
