AN ANALYSIS OF CHANGES IN CRITICAL THINKING ABILITY, OPEN-MINDEDNESS, AND FARM POLICY OPINIONS OF PARTICIPANTS IN THE KELLOGG FARMERS STUDY PROGRAM

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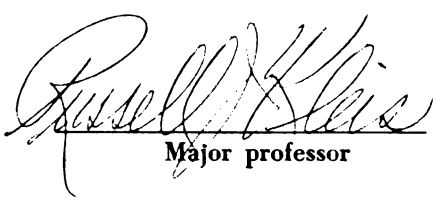

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ABSTRACT

AN ANALYSIS OF CHANGES IN CRITICAL THINKING ABILITY, OPEN-MINDEDNESS, AND FARM POLICY OPINIONS OF PARTICIPANTS IN THE KELLOGG FARMERS STUDY PROGRAM

By

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This study has provided a framework for exploring the relationship of level of formal education, age, sex and liberal education experience to the variables critical thinking ability and open-mindedness for a population of young adults not primarily engaged as students but involved in an extensive continuing education program.

The study was designed to investigate the impact of the Kellogg Farmers Study Program upon selected characteristics of participants. The population consisted of 119 men approximately 25-35 years old and their wives. All were Michigan farmers who were selected for and who took part in final interviews for entrance into the program. The study included six groups. The three groups admitted to the program in 1965, 1966, and 1967 respectively, comprise the treatment groups and the three groups interviewed and tested but not admitted comprise nonequivalent control groups.

The program is a liberal adult education program of three years duration which features study institutes, travel seminars, and independent study. An overall objective of the program is to develop knowledgeable, articulate agricultural leaders who are capable of assessing and adjusting to the realities of a changing world. The first year of the program involves study institutes and a state travel seminar. The second year includes study institutes and a national travel seminar. The third year features five weeks in an international travel seminar as well as study institutes.

The research findings indicated that the Kellogg Farmers Study Program had limited success in helping the participants to achieve the four following objectives: (1) to develop skills of critical thinking, (2) to become more open-minded, (3) to develop skills in identifying agricultural alternatives, and (4) to improve skills of reading. Test instruments which were used included the American Council on Education's Test of Critical Thinking (Form G), the ACE Inventory of Beliefs (Form I), the Michigan State University Reading Test, and the Farmers' Opinion Inventory.

The findings support the conclusions that young rural adults with higher levels of education have higher levels of critical thinking ability and open-mindedness 5-10 years following the completion or termination of formal schooling than do those who completed fewer years of schooling.

Persons with fewer years of formal schooling tend to make greater gains in critical thinking ability and open-mindedness than those who have previously completed more years of formal education. No statistically significant relationships were found between age and the variables studied. Little difference was noted between men and women on any of the variables studied. Persons who participated in the program improved slightly in reading comprehension ability over a three-year period while nonparticipants declined slightly in this ability. Participants improved in their ability to identify realistic solutions to farm policy problems while their wives declined in this ability. In general, participants became more pessimistic about the future of farming and became more willing to use the tactics of organized labor to obtain higher farm prices.

It was recommended that the Kellogg Farmers Study Program clarify and reassess the objectives of the program. Attention needs to be given to modifying the program in order to more effectively accomplish program objectives. Based upon this study and previous research by Wickman, Hadlock, and others, it is suggested that this and other liberal education programs for adults attempt to involve the learner more actively in the learning process. Experimentation with new and varied patterns of instruction are needed in liberal education in an attempt to develop more effective programs.

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CHAPTER I

INTRODUCTION

This study utilized the Kellogg Farmers Study Program as the basis for exploring the learning patterns of young adults involved in a program of liberal studies. It was thought that a study of changes in critical thinking ability, open-mindedness, reading comprehension, and the identification of realistic public policy alternatives would be helpful in answering the larger and more general question regarding the impact of liberal study programs upon adults who have assumed primary roles other than that of student.

Although numerous liberal study programs have been conducted in recent years, very few have utilized an experimental design to assess the impact made upon the adult participants. It was a major purpose of this study to seek additional information which might be used as a basis for improving liberal education programs.

Description of the Kellogg Farmers Study Program

In 1965 a three-year program of liberal studies for young farmers 25-35 years of age was established at Michigan State University. The program, financed by a

five-year grant from the W. K. Kellogg Foundation, is known as the Kellogg Farmers Study Program.

In the first year of the program, Treatment Group I participated in two five-day study institutes held at the Kellogg Center in December, January and February and a six-day traveling seminar in Michigan during March. In addition, two-day study institutes were held: one in July and one in August. The wives participated only in summer institutes. The second and third groups followed a very similar schedule except that they had one more five-day winter institute in their first year.

The second year of the program provided identical programs to Groups I and II. It consisted of three five-day study institutes at Kellogg Center held in December, January and February and a two-week national traveling seminar during March. A two-day institute held in July and another in August included the wives.

During the third year of the program, Group I took part in two five-day study institutes held at Kellogg Center during December and January. An international traveling seminar of approximately five weeks' duration took place during February and the first week of March. Two weeks were spent in Europe and approximately three weeks in either Asia, Africa, or South America. A one-day institute was held in late March to exchange information and a three-day institute was held at Camp Kett in

July. The summer institute included the wives and concluded the three-year program.

Group I, consisting of thirty participants, was selected and started studies in 1965. In 1966, the thirty participants in Group II began the three-year program. In the same manner, Group III started the program in 1967 and Group IV, selected in October 1968, started studies in late 1968. This study is concerned only with Groups I, II, and III.

The curriculum of the Kellogg Farmers Study Program varied slightly in subject matter from year to year, but basically the content and time allocation was as presented in Tables 1 and 2.

The Kellogg Farmers Study Program had several week-long institutes each of which featured three or more of the major curriculum topics. Experts in the various subject matter fields held one or more sessions with the group of thirty participants. Most of the resource persons were Michigan State University faculty members but several outside resource people such as legislators and judges spoke to the groups. Recommended readings were provided as general and voluntary background readings for the participants in most subject matter areas. The presentations were primarily lectures followed by question and answer sessions.

TABLE 1.--Resident Study Curriculum for the Period December 1967-Summer 1968.

Topic	First Year of Program	Second Year of Program	Third Year of Program	Total Hours
Economics	19.5 hours	43.5 hours	21 hours	84.0
Political Science	13.5 hours	10 hours	6.5 hours	30.0
Communications	27 hours	14 hours	4.5 hours	45.5
Sociology	16.5 hours			16.5
Applied Philosophy	8 hours	5 hours		13.0
The Arts	3.5 hours	5 hours	7 hours	15.5
Natural Resources	9 hours			9.0
Special Topics (Nearly all agricultural topics)		25.5 hours	9 hours	34.5
Religion			12 hours	12.0
Education			1.5 hours	1.5
International Studies			25.5 hours	25.5
TOTALS	97.0 hours	103.0 hours	87.0 hours	287.0

TABLE 2.--Approximate Number of Days Spent in Studying Various Topics During Travel Seminars in 1968.

Topic	First Year State Traveling Seminar	Second Year National Traveling Seminar	Third Year Inter-national Traveling Seminar
Experience Common to Participants			
Economic Development	1		
Social Problems	2		
State Govermnent	2		
Federal Government and Agencies		4	
National Farm Organizations		1	
Southern U. S. Agriculture		1	
California Agriculture		4	
California Education, Labor, and Industry		1	
Cultural and Historical Points of Interest		3	3
Eurpoean Economic Community			1
U.N. Food and Agriculture Organization			1
Experience Varied by Country			
Local Farming Operations			5
Agricultural Research			2
Overview of Agricultural Situation			4
Education			4
Economic Development Programs			3
Industries			3
Travel and Free Time			7
TOTAL No. Days Involved	5	14	33

Kellogg Farmers Study Program Objectives

The author reviewed the original proposal to the W. K. Kellogg Foundation in an attempt to identify the objectives of the program. Since no list of measurable objectives was found, the staff members of the Kellogg Farmers Study Program as a group identified the following program objectives in 1968. It is significant that the program had been underway for three years before the following objectives were identified:

General Objectives

1. To encourage participants to identify problems facing societies and to analyze alternative solutions to these problems.
2. To broaden farm people's knowledge of public issues that will influence the future of Michigan agriculture and rural communities.
3. To encourage participants to provide leadership and to increase their participation and voice in local, state and national affairs.
4. To help the participants become more cosmopolitan and aware of the impression they convey to others.

Specific Objectives

1. To help participants gain knowledge in the following subject matter areas outside of agricultural production: (a) economics, (b) political science, (c) communications, (d) sociology, (e) applied philosophy, (f) education, (g) labor, and (h) cultural arts.
2. To help participants gain knowledge about local, state, national, and international political affairs and the structure of political institutions.
3. To help participants develop skills of critical thinking.
4. To help participants develop skills in identifying agricultural and non-agricultural policy alternatives.
5. To help participants improve skills of reading, speaking, and writing.
6. To help participants become more open-minded in their beliefs regarding ideas and institutions, social groups, interpersonal relations and self.
7. To determine the amount of personal sacrifice farmers are willing to make in order to take part in the program.

The research concentrated upon achievement of specific objectives 3 and 6 and components of objectives 4 and 5. It comprehensively assessed changes in critical thinking ability and open-mindedness. Impact upon one reading ability component of specific objective 5 was measured by using a test of reading comprehension to identify changes in this element of reading ability. Progress relating to that part of specific objective 4 which referred to developing skills in identifying agricultural policy alternatives was evaluated. It was hoped that the assessment of achievement of these objectives would be helpful in the larger task of planning, conducting, and evaluating this and similar liberal adult education programs.

The Problem

Very little is known about the variables critical thinking ability and open-mindedness for a population of young non-student adults. Limited research on these variables has been done in adult education programs. Most previous studies of changes in critical thinking ability and open-mindedness have been with college students, and it was not known whether young adults, not primarily engaged as students, perform in a manner similar to college students. The Kellogg Farmers Study Program focuses on a population which serves as a basis for answering many

questions about the learning patterns of such non-college young adults.

The basic problem was to determine what effect an adult, liberal and multi-format continuing education program (one which included study institutes, traveling seminars and independent study) had upon the selected variables in a group of young adults. This research was needed to determine if the Kellogg Farmers Study Program did modify the beliefs of young adults, as measured by the Inventory of Beliefs, their intellectual abilities, as measured by a test of critical thinking ability and a reading comprehension test, and their capacity to make judgments as measured by the Farm Policy Scale.

Before the present study was initiated, there was no research to indicate whether the Kellogg Farmers Study Program was effectively accomplishing its objectives of increasing the critical thinking ability and open-mindedness of participants or any of its other objectives. Furthermore, assuming that progress was being achieved, it was of interest to determine which year or years of the program brought about the greatest changes.

Research Objectives

The following research objectives were set as the bases for this study:

1. To determine if young adult subjects changed in critical thinking ability during periods of one, two and three years, and, if changes did occur, to determine if the changes were associated with participation in the Kellogg Farmers Study Program.
2. To determine whether young adult subjects changed in the degree of open-mindedness during periods of one, two and three years, and, if changes did occur, to determine if the changes were associated with participation in the Kellogg Farmers Study Program.
3. To determine if young adult subjects changed in their ability to identify realistic farm policy solutions during periods of one, two and three years, and, if changes did occur, to determine if the changes were associated with participation in the Kellogg Farmers Study Program.
4. To determine if young adult subjects changed their farm policy opinions during periods of one, two, and three years, and, if changes did occur, to determine if the changes were associated with participation in the Kellogg Farmers Study Program.
5. To determine the relationship between changes in open-mindedness, critical thinking ability, the

ability to identify realistic farm policy solutions, and the number of years of participation in the program (one, two, or three years).

6. To determine the relationship between amount of formal education prior to the Kellogg Farmers Study Program and changes in open-mindedness and critical thinking ability.
7. To determine the relationship between age at time of entering the program and changes in open-mindedness and critical thinking ability.
8. To determine if wives of participants changed on the same variables, and, if change did occur, to determine the direction and the extent of the change.
9. To determine if Group I participants (those in the program for three years) improved their reading comprehension ability.

Limitations of the Study

The basic design and scope of this study was shaped by those who initiated the Kellogg Farmers Study Program and the testing program which accompanied it. Certain limitations, which restrict the scope of the findings and the extent to which generalizations can be drawn from the findings, accompany the design of this research. It is dependent upon three instruments which were designed for use with college students and one which was designed to

obtain an inventory of opinions farmers have about farm policy. The three instruments borrowed from the college setting had been quite well validated and tested for reliability, but the fourth instrument lacked both validity and reliability tests prior to the present research.

The extent to which treatment and control groups were not equivalent limited the interpretation of the findings. The relatively small size of the control groups as compared with the treatment groups is also a limitation, particularly in the case of Control Groups I and II.

There is a limitation due to the fact that five men who could have been included in Control Group I declined to take the battery of posttests. In addition, no pretest data were available on the Farmers' Opinion Inventory for Control Group I or wives of Treatment Group I.

The testing was done by several different persons at different times and locations, but the differences in testing situations was not seen as a major limitation. All the pretests were given at final interview sessions, supposedly under relatively equivalent conditions. However, there are several factors which differed in the posttest between treatment and control groups. The treatment groups took the posttest at summer institutes held in July and August of 1968, but control groups did not take the posttests until October and November, 1968. Some final

control group testing was conducted in December and one couple did not complete the tests until January, 1969. The two-to-four-month delay in the control group testing was unfortunate, but it should be pointed out that the period of time being tested was one, two, and three years, and therefore this delay does not represent, proportionally, a major time period.

The effect of the time lapse was difficult to evaluate. National elections were held in November of 1968, at a time when only a few of the control group had been tested. The election was assumed to have had very little effect on critical thinking ability or reading ability. It might have been an influencing factor on opinions about agricultural policy, but since farm policy questions were not dominant campaign issues there is little reason to believe that the control groups were influenced in regard to farm policy opinions by the political campaign and election. The Inventory of Beliefs, which measures open-mindedness, has a few questions related to racial issues. Since race relations did constitute a major election issue the timing of posttests for control groups may have prejudiced scores on that test.

Care was devoted to assure that the same motivational factors had been present in all phases of testing. All pretests were included as a part of the final interview session, so there was reason to believe that all persons

were highly motivated. The posttest situations were probably more informal for both the treatment and control groups. The people in the treatment groups were well-acquainted and the tests were given at summer institutes at Camp Kett. The control groups were tested in County Extension Offices and in their homes, where there was more personal contact and more informality. There was no reason to believe that people did not try to do their best on the posttests, although they were probably more relaxed then than during the pretests.

It was assumed that all participants and nonparticipants had similar experiences, except for participation in the Kellogg Farmers Study Program, although participants and nonparticipants were scattered over the state, and there was no assurance that they had similar experiences. It was also assumed that the participants in Treatment Groups I, II, and III had relatively equal experiences during their first year of participation in the program, and that Treatment Groups I and II had similar experiences in their second year of the program. Since the three treatment groups had different group coordinators, and, to a certain extent, different experiences, it was possible that some differences in performance may have been due to differences in program experiences for the three treatment groups.

Although this study attempted to assess changes made in one, two and three year periods, this was not entirely possible since measures are not available on the same group at the end of one, two and three years. Instead, measures are available for different groups representing one, two and three years of participation in the program. Thus, the measurements employed represent approximations of those which might have been produced had they come from a single group tested annually.

Finally, this study represents only a partial evaluation of the Kellogg Farmers Study Program. Only a few objectives were studied and no attempt was made to evaluate all the changes made by the participants.

CHAPTER II

REVIEW OF LITERATURE

Critical Thinking

The ability to reason logically and think clearly has been recognized as an important educational objective for many years. Locke[1] and Mann[2] stressed the need for learning to reason and for being prepared to solve the problems faced by society.

It is apparent that there has been increased attention given to critical thinking in recent times. Symonds was one who criticized the emphasis on drill and memorization in schools and pointed out the need for students to learn to think for themselves. He noted, "Education in general is so thoroughly concerned with seeing pupils get the right answer that the teachers cannot afford to permit pupils to learn to think by permitting them to make mistakes."[3]

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[1]M. V. C. Jeffreys, John Locke (London: Methuen and Co., Ltd., 1967), pp. 43-44.

[2]J. E. Morgan, Horace Mann, His Ideas and Ideals (Washington, D. C.: National Home Library Foundation, 1936), pp. 93-94 as quoted in Edward M. Glaser, An Experiment in the Development of Critical Thinking (New York: Bureau of Publications, Teachers College, Columbia University, 1941), p. 7.

[3]Percival M. Symonds, Education and the Psychology of Thinking (New York: McGraw-Hill, 1936), p. 14.

Glaser, one of the developers of the Watson-Glaser Test of Critical Thinking, stated that the ability to think critically involved three things:

> (1) An attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences, (2) knowledge of the methods of logical inquiry and reasoning, and (3) some skill in applying those methods.[1]

Glaser made five assumptions about critical thinking ability, citing previous research and giving other justification for each. His assumptions were:

> (1) In a democracy it is of vital importance to educate citizens to think critically. . . .
> (2) The ability to think critically, or at least important aspects of that ability as herein defined, can be improved by certain kinds of educational experiences. . . .
> (3) There are a number of component abilities involved in critical thinking. . . .
> (4) Growth in some of the component abilities assumed to be involved in critical thinking may validly and reliably be measured by means of paper-and-pencil tests of critical thinking. . . .
> (5) The abilities in critical thinking are related to, but not identical with, the abilities measured by the commonly used intelligence tests, such as the Otis, Thorndike, Army Alpha, and others. . . .[2]

Around 1950, the American Council on Education undertook a Cooperative Study of Evaluation in General Education. The establishment of the Critical Thinking Committee

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[1]Edward M. Glaser, An Experiment in the Development of Critical Thinking (New York: Bureau of Publications, Teachers College, Columbia University, 1941), pp. 5-6.

[2]Ibid., pp. 12-13.

was made on the rationale that critical thinking is a pervasive objective covering many subject matter areas.[1]

The American Council on Education reviewed eleven existing instruments and found none satisfactory to evaluate critical thinking ability. Major criticisms of the instruments were:

> (1) Use of problems or tasks devoid of realism, such as puzzles or abstract numerical or geometrical problems, (2) too limited coverage of critical skills as listed by the committee; and (3) unsuitable content loading.[2]

A new instrument to measure critical thinking ability, A Test of Critical Thinking, was developed and used at several colleges.[3] From the results of the testing done using the American Council on Education's Test of Critical Thinking a considerable body of knowledge and theory exists regarding critical thinking ability of college students.

Studies of College Students

One of the major studies was undertaken at Michigan State University. This study traced changes in Michigan State University students from freshman through senior years in the time period 1958-1962.[4] This study and

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[1] Paul L. Dressel and Lewis B. Mayhew, General Education: Explorations in Evaluation (Washington, D. C.: American Council on Education, 1954), pp. 174-176.

[2] Ibid., pp. 181-182.

[3] Ibid., pp. 183-207.

[4] Irvin J. Lehmann and Paul L. Dressel, Changes in Critical Thinking Ability, Attitude, and Values Associated with College Attendance, Final Report of Cooperative Research Project No. 1646, Michigan State University, East Lansing, Michigan, 1963, p. 38.

studies of college students at several other institutions[1] have produced similar findings which indicate that college students make significant gains in critical thinking ability during their collegiate experience. Since most of the research was conducted by administering pretests and posttests to college students, limited control was given to the role which maturation plays in young adults. Confounding variables, such as some college education by all studied and the lack of control group posttests, appear to pose problems in determining causal relationships.[2] Those students who withdraw from college during their freshman year had much lower freshman entrance scores on critical thinking ability.[3] This raised some questions about the appropriateness of comparisons made between college dropouts and those who continued their college education.

It appears that the greatest gains in critical thinking occur during the freshman and sophomore years. Lehmann and Dressel, in the study of 1,051 students at Michigan State University in the period of 1958-62, found the following gain scores in critical thinking ability from freshman entrance examination level:

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[1]Dressel and Mayhew, op. cit., pp. 204-205.

[2]Lehmann and Dressel, 1963, op. cit., p. 148.

[3]Ibid., p. 204.

TABLE 3.--Gain Scores in Critical Thinking Ability by College Students.[a]

Sex	Fall 1958 to Spring 1959	Fall 1958 to Spring 1960	Fall 1958 to Spring 1961	Fall 1958 to Spring 1962
Males	4.69	6.24	6.17	6.90
Females	4.41	5.46	5.89	6.38

[a]Irvin J. Lehmann and Paul L. Dressel, Critical Thinking, Attitudes and Values in Higher Education, Final Report of Cooperative Research Project No. 590, Michigan State University, East Lansing, Michigan, 1962, p. 58.

This Michigan State University study notes a leveling-off of gains in critical thinking ability after the sophomore year. Little change was noted in the junior year, but some gain is noted in the senior year.[1]

Lehmann and Dressel found it difficult to explain why the major gains took place in the first two years of college. They postulated that experiences in some of the general education courses, especially Natural Science courses, in the freshman year resulted in the students becoming more rational, objective, and scientific.[2]

Dressel and Mayhew found that students who initially scored low on the Test of Critical Thinking gained more on this variable during their collegiate experience than did

[1]Lehmann and Dressel, 1962, op. cit., p. 59.

[2]Lehmann and Dressel, 1963, op. cit., pp. 148-150.

those who initially scored high on the instrument. In a study of seven colleges, those students initially scoring low (in range 11-27) had a mean gain of 6.68 while those initially scoring high (in range 40-53) showed a mean gain of only 1.59.[1] The greater relative gain by low scorers on the Test of Critical Thinking Ability may be partially attributed to statistical regression.

Wickman found that freshmen college students made significant gains in critical thinking ability during a college history course.[2] He was able to modify the learning experiences in history classes in various ways which resulted in significant differences in critical thinking ability scores.[3] Wickman based his research partially on an earlier study by Bloom, who found that discussion in small groups contributed to greater gains in critical thinking ability.[4]

Studies of Adults

Hadlock did a study of adults enrolled in a World Politics Discussion Program which was prepared by the

[1]Dressel and Mayhew, op. cit., pp. 204-205.

[2]Peter M. Wickman, "An Exploration into the Relevance of Methods and the Organization of Learning Experiences to the Objective of Critical Thinking in History of Civilization at Greenville College" (unpublished Ed.D. dissertation, Michigan State University, 1960), p. 83.

[3]Ibid., pp. 100-107.

[4]Benjamin S. Bloom, "Thought Processes in Lectures and Discussions," The Journal of General Education, VII, No. 3 (April, 1953), pp. 160-169.

American Foundation for Political Education. Two-hour discussions based upon a set of readings were held weekly for ten weeks. The primary objective of the program was "To develop an ability on the part of each participant to think critically and make independent judgments in matters of current affairs."[1] Although Hadlock did not report the specific ages of the participants in his study the participants in the World Politics Program were older and the age range much wider than for those in the Kellogg Farmers Study Program. The participants in the World Politics Discussion Program ranged from twenty to over sixty years old. Their educational background ranged from less than high school graduation to completion of a doctoral degree. Using the American Council on Education's Test of Critical Thinking (apparently Form G), Hadlock found that participants in the program increased an average of 3.89 points from pretest to posttest. He concluded that there was a significant increase in critical thinking ability at the .01 level which was probably due to participation in the discussion program.[2] Hadlock utilized a control group made up of volunteers from the faculty, spouses of faculty members, and others who all had at least a baccalaureate

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[1]Alton Parker Hadlock, "A Study of the Development of Critical Thinking Through Adult Discussion Groups" (unpublished Ph.D. dissertation, University of California, Los Angeles, 1958), p. 2.

[2]Ibid., p. 61.

degree. According to Hadlock, the members of the control group were not concurrently participating in an educational endeavor,[1] but, interestingly, they made gains on the Test of Critical Thinking which were significant at the .10 level. However, through the use of a statistical test Hadlock determined that World Politics discussion participants made significantly higher gains than the control group.[2] This research is the only one which attempted to control for gains on the test due to the practice effect and possible extraneous variables. However, one might question the appropriateness of the Hadlock control group; when a number of the control group were faculty members of the university, one might question his statement "none was currently participating in an educational endeavor."[3]

One other study using the Watson-Glaser Critical Thinking Appraisal with graduate students having a mean age of 36 found a significant increase in critical thinking ability during an intensive six-week course in research methods.[4]

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[1] Ibid., pp. 9-10.

[2] Ibid., pp. 61-63.

[3] Ibid., pp. 9-10.

[4] Joseph C. Bledsoe, "A Comparative Study of Values and Critical Thinking Skills of a Group of Educational Workers," Journal of Educational Psychology, Vol. 46, No. 9 (November, 1955), pp. 408-417.

Formal Educational Level and Critical Thinking Ability

Lehmann and Dressel have noted a close relationship between educational level and improvement in critical thinking ability. College freshmen and sophomores made greater gains in critical thinking ability than did juniors and seniors.[1]

Hadlock reasoned that individuals with greater amounts of academic training might have already learned how to think critically and that they would be less likely to show improvement than those with less education. However, he found that groups with different levels of educational background did not vary significantly from the mean of the entire group, thus indicating no relationship between educational level and the gain in critical thinking ability. However, Hadlock then made a test between two educational groups representing lowest and highest levels of formal education within his population. One group had less than two years of college and the other had graduate degrees. On the basis of testing between the two groups, he found that individuals possessing graduate degrees made a significantly greater increase in critical thinking ability than those who had less than two years of college.[2] This finding is contradictory to the Lehmann and Dressel

[1]Lehmann and Dressel, 1962, op. cit., pp. 51-132.

[2]Hadlock, op. cit., pp. 64-66.

research and challenges the conclusion that a ceiling effect is operating with the critical thinking test.

Based upon the work of Lehmann and Dressel college students with higher levels of education score higher on the Test of Critical Thinking.[1] Hadlock did not test this relationship in his study of adults.

Age and Critical Thinking Ability

The relationship between age and the aptitude to improve critical thinking ability, one of the factors discussed here in relation to the Kellogg Farmers Study Program, has previously been investigated in studies involving college students and adults.

Older college freshmen have been found to show less progress in developing critical thinking ability than freshmen of average or below average age.[2] However, with adult participants arbitrarily divided into five age groups, Hadlock found no significant difference from pre-test to posttest scores in critical thinking ability. The Hadlock study had a wide age range and he concluded that the various age groups had an equal aptitude to increase their critical thinking ability.[3]

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[1]Lehmann and Dressel, 1962, op. cit., p. 58.

[2]Dressel and Mayhew, op. cit., p. 206.

[3]Hadlock, op. cit., p. 69.

Definition of Critical Thinking

Critical thinking has numerous definitions and has been the subject of many articles,books, and research projects in the past thirty years or more. Because of the close and intertwining relationship with other topics, such as logic, reasoning, scientific thinking, mental abilities and aptitude, it is often difficult to determine what has been meant by critical thinking in the past.

For the purposes of this study, critical thinking ability is the ability to define, analyze, and solve problems. It is measured by A Test of Critical Thinking, Form G, American Council on Education. This test was designed to measure five abilities thought to be involved in critical thinking, namely:

1. The ability to define a problem.
2. The ability to select pertinent information for the solution of a problem.
3. The ability to recognize stated and unstated assumptions.
4. The ability to formulate and select relevant and promising hypotheses.
5. The ability to draw conclusions validly and to judge the validity of inference.[1]

Summary

The role of maturation in relation to increase of ability to think critically has not been studied directly and cannot be ruled out entirely.

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[1]Dressel and Mayhew, op. cit., pp. 179-180.

Furthermore, even the influence of formal education has not been measured against a true control group: the groupings "to be educated" and "not to be educated" are not assigned randomly, either in regard to college admission or admission to the Kellogg Farmers Study Program. The control groups in the present study, although not truly equivalent to the experimental group, probably are a better--that is a more-nearly equivalent--control group than the faculty members and wives used in Hadlock's earlier study of adults.

The review of literature concerning critical thinking ability has provided the basis for the following propositions:

1. An adult educational program can improve the critical thinking ability of its participants.
2. No clear relationship appears to have been established between age and critical thinking ability.
3. Individuals can make significant gains in critical thinking ability in a relatively brief educational program such as a college course.
4. Those individuals initially scoring low on the pretest generally will make greater gains in critical thinking ability than will those initially scoring high.

5. Longer periods of participation in educational programs will result in greater gains in critical thinking ability than will shorter periods; and the gains will be proportionally greater in the first year of the program.
6. Persons with higher levels of education will score higher on the Test of Critical Thinking.
7. No clear relationship appears to exist between formal educational level attained and gains in critical thinking ability.

Open-mindedness

For the purposes of this study, "open-mindedness" is defined as an individual's freedom from rigidly fixed pre-conceptions. The present research will employ the term "open-mindedness" to indicate the characteristic which the Kellogg Farmers Study is designed to enhance and which the Inventory of Beliefs, Form I, American Council on Education, is designed to measure. The higher the score on the Inventory of Beliefs, the greater the degree of open-mindedness. It is assumed that open-mindedness and closed-mindedness are on a single continuum. Individuals scoring on the open-minded end of the continuum are characterized as being flexible, democratic and open to various points of view. Individuals scoring on the closed-minded end of the continuum are characterized as being rigid in outlook, compulsive, authoritarian, dogmatic, and stereotypic.

Rokeach, who studied the open and the closed mind and developed the Rokeach Dogmatism Scale noted that, if it were not so clumsy, he would have preferred to call The Dogmatism Scale "The Open-Closed Beliefs Scale."[1] Lehmann and Ikenberry noted that the theoretical scheme of Rokeach's Dogmatism Scale is similar to the Inventory of Beliefs.[2] A correlation of -.63 was found between Rokeach's Dogmatism Scale and the Inventory of Beliefs for male college freshmen.[3] One should note that a higher score on the Inventory of Beliefs indicates a less dogmatic or more open-minded individual.

The study of belief systems gained impetus from events that occurred in National Socialist Germany. Rokeach noted that the concern about the ideological content of anti-Semitism brought researchers to study beliefs in the early 1940's.[4] (Fromm's book Escape from Freedom appeared in 1941 and Adorno's research for The Authoritarian Personality [1950] was undertaken in the 1940's.)[5]

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[1]Milton Rokeach, The Open and Closed Mind (New York: Basic Books Inc., 1960), pp. 19-20.

[2]Irvin J. Lehmann and Stanley O. Ikenberry, Critical Thinking, Attitudes, and Values in Higher Education, Preliminary Report, Michigan State University, East Lansing, Michigan, 1959, pp. 123-125.

[3]Lehmann and Dressel, op. cit., p. 272.

[4]Rokeach, op. cit., pp. 11-12.

[5]Ibid., p. 11.

As the research on anti-Semitism progressed, it became clear that those who were prejudiced against Jews were also prejudiced against other minority groups. Thus, what first was the "fascism scale" became "the authoritarian personality scale." Rokeach noted "Authoritarianism and intolerance in belief and interpersonal relations are surely not a monopoly of Fascists, anti-Semites, Ku Klux Klanners, and conservatives."[1]

Lehmann and Dressel postulate that attitudes of young adults can be changed to some extent.

> Although it is agreed that attitudes and values are instilled early in life and are most easily modifiable in infancy and adolescence, it is readily evident that changes do take place from age eighteen to twenty-two or older.[2]

Hill reported that a number of studies (many of them with adult populations) have clearly established that both lecture and discussion methods are capable of effecting changes in attitudes.[3]

Kaplan, who did research on a study-discussion problem for adults in the liberal arts noted,

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[1] Ibid., p. 13.

[2] Lehmann and Dressel, 1962, op. cit., p. 272.

[3] Richard J. Hill, A Comparative Study of Lecture and Discussion Methods (White Plains: Fund for Adult Education, 1960), p. 94.

> In almost every group observed there were instances of participants who had modified previously-held views considerably. In a few cases there were complete reversals of position or opinion.[1]

Age and Open-mindedness

Although there seems to be agreement that adult attitudes can be changed, Lorge found that older adults have more stable attitudes.

> Lorge attempted to discover whether older persons' attitudes tended to be more stable over a relatively short period of time. Two age groups in which each person in the 20-25 year group was watched [matched] in CAVD scores with a person in the 40-47 year group, were given a series of attitude scales in different forms at a two-week interval. The relation between the earlier and later attitude scores was significantly higher in the older group indicating that the attitudes of older intellectual peers were more firmly fixed than those of equally intelligent younger adults.[2]

Lorge commented,

> Each individual's interests, attitudes, concepts, and values develop over the life span. The longer the span the more familiar they become, the more overlearned they are.[3]

Dressel and Mayhew noted that apparently the opposite relationship exists between age and beliefs among young adults in college. Their research indicates that older students score significantly higher on the open-mindedness

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[1] Abbott Kaplan, Study-Discussion in the Liberal Arts (White Plains: Fund for Adult Education, 1960), p. 118.

[2] Irving Lorge, et al., Psychology of Adults (Washington, D. C.: Adult Education Association of the U.S.A., 1963), pp. 1-4.

[3] Ibid.

dimension.[1] The question arises concerning the role of environment as well as age. College students are at a stage in their life and in a social environment where they are in the active process of forming attitudes. Their values and beliefs are constantly subject to a wide variety of views from professors and fellow students. It seems logical that persons within the age span 18-25 and enrolled in college may be quite different from persons in older age ranges and living in the environment of a non-student adult. Therefore college students and non-student young adults may differ significantly in relation to open-mindedness and influences of educational experiences upon it.

Kelly estimated the long term consistency of several personality domains over a twenty year period. He noted only an 8% consistency for attitudes as compared to 48% for values and 45% for vocational interests.[2]

Impact of Educational Programs Upon Open-mindedness

Dressel and Mayhew reported on studies at thirteen colleges which used the Inventory of Beliefs in a pretest-posttest situation for a one year period. Eleven of the thirteen institutions reported that students became more

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[1] Dressel and Mayhew, op. cit., p. 229.

[2] E. Lowell Kelly, "Consistency of the Adult Personality," The American Psychologist, Vol. 10 (November, 1955), p. 675.

open-minded while two institutions reported that students became slightly less open-minded.[1] The average gain on the Inventory of Beliefs was 4.72 points in one year.[2] Students apparently become more open-minded as they progress through college. Lehmann reported that the greatest gains appear during the freshman and sophomore years although some change occurs during each of the four years of college.[3]

Jacob noted that persons with more education appear to be more tolerant[4] and that well-organized programs of general education appear to have a greater effect than others in liberalizing students' beliefs on a broad range of issues.[5] A study using Schaie's Test of Behavioral Rigidity found that extremely flexible individuals had an average of four more years of education than rigid individuals.[6]

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[1] Dressel and Mayhew, op. cit., p. 227.

[2] Ibid.

[3] Irvin J. Lehmann, Birendra K. Sinha, and Rodney T. Hartnett, "Changes in Attitudes and Values Associated with College Attendance," Journal of Educational Psychology, Vol. 57, No. 2 (1966), pp. 89-90.

[4] Philip E. Jacob, Changing Values in College (New Haven: Edward Hazen Foundation, 1956), pp. 22-32.

[5] Ibid.

[6] K. Warner Schaie, "Differences in Some Personal Characteristics of 'Rigid' and 'Flexible' Individuals," Journal of Clinical Psychology, Vol. 14 (January, 1958), pp. 11-14.

Dressel and Mayhew found that those college students initially scoring lower on the Inventory of Beliefs made greater gains in open-mindedness than those who scored higher.[1] The F Scale (Fascism) and the E Scale (Ethnocentrism) have been used in numerous studies of college students.[2] A study at Vassar indicated that a decrease in authoritarian outlook and intolerance was associated with collegiate experience. However, other studies have not been as conclusive. At one Catholic University male students actually appeared to become more intolerant after attending college, although the change was not statistically significant.[3]

Imbler, using the Rokeach Dogmatism Scale, conducted a study of the effects of a twelve-week Resident Labor Education Program for union workers at Indiana University. The experimental group of nine adults with an average age of thirty-five received fourteen two-hour sessions of training which utilized small group discussion methods. No significant change was found on the open-closed mindedness dimension.[4]

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[1] Dressel and Mayhew, op. cit., pp. 222-227.

[2] Walter T. Plant, Personality Changes Associated with a College Education (San Jose, California: San Jose State College, 1962), pp. 9-11).

[3] Ibid.

[4] Irene Iris Imbler, "The Effects of Participation Training on Closed-Mindedness, Anxiety, and Self-Concept" (unpublished Ph.D. dissertation, Indiana University, 1967), pp. 54-73.

Using the Sanford and Older's Short Authoritarian Scale[1] Hadlock found no significant change by the adult participants on the dimension of authoritarianism.[2]

The Imbler and Hadlock findings suggest that short term adult education programs may not have the same impact upon adult attitudes that college experience has upon college students.

Sex and Open-mindedness

Lehmann and Dressel reported,

> Both males and females become more open-minded and/or more receptive to new ideas from their freshman to senior year, the females undergoing more marked change than males.[3]

Females consistently scored higher on the Inventory of Beliefs. Although there was no statistical difference between the sexes at the freshman entry level, there was a marked difference in favor of the females at the senior level.[4]

Although freshmen college females were more open-minded as measured by both the Inventory of Beliefs and Rokeach's Dogmatism Scale, the differences between the sexes were not significant at the .05 level of confidence in the freshman year. Plant, using a modified form of

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[1]Hadlock, op. cit., p. 54

[2]Ibid., pp. 67-109.

[3]Lehmann and Dressel, 1962, op. cit., p. 54.

[4]Ibid., pp. 51-54.

the Ethnocentrism Scale, found that females became significantly more open-minded than males during four years of college. His finding was significant at the .05 level.[1]

Influence of Spouse

Kelly found that on thirty-four personality variables, spouses did not become more alike during the first twenty years of marriage.[2] In a study of 115 married couples, the cross-spouse correlations were all relatively low, indicating little tendency for the husband to change toward the original score of his wife, or the wife to change toward that of her husband. In fact, on some variables there was a slight trend for one spouse to be further away from the original score of the other spouse.[3]

Summary

The review of literature concerning open-mindedness did not locate any study using The American Council on Education's Inventory of Beliefs with an adult population other than college students; however, several studies related to adult changes in open-mindedness have provided indications of possible relationships which are of interest.

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[1]Walter T. Plant, "Changes in Ethnocentrism Associated with a Four-Year College Education," Journal of Educational Psychology, Vol. 49, No. 3 (1958), pp. 162-165.

[2]Kelly, op. cit.

[3]Ibid.

Tentative propositions based upon the review of the literature are as follows:

1. Adults can become more open-minded during the course of an educational program.
2. Greater gains in open-mindedness are likely to occur in the first year of an educational program than in succeeding years.
3. Longer periods of participation in an educational program will result in greater gains in open-mindedness.
4. There is no significant difference in the degree of open-mindedness between sexes at the freshman college level, but females become more open-minded than males during four years of college.
5. Persons with higher levels of education are more open-minded than those with less education.
6. Those persons with less education will make greater gains on the Inventory of Beliefs than those with more education.
7. Younger persons make greater gains in open-mindedness during their college experience than do older persons.
8. Spouses do not become more similar over time on the dimension of open-mindedness.
9. Those persons initially scoring low on the Inventory of Beliefs pretest will make greater

gains than those initially scoring high, probably as a result of statistical regression.

Reading Comprehension

Hadlock found that adult participants in the World Politics discussion groups made no significant gains on the Cooperative English Test of Reading--Higher Level, which was used to measure reading comprehension.[1]

Otto noted that all types of measurable skills tend to decline after the age of thirty.[2] Although he does not specifically state that the average adult will decline in reading comprehension ability over a period of years, one can infer that decreased speed due to age may cause persons to score poorer on a timed test as they grow older.[3]

Farm Policy Opinions

It is important for farm leaders such as the participants in the Kellogg Farmers Study Program to develop more realistic approaches in solving the problems of agriculture. Hathaway has provided an analytical statement of the problems of agriculture.[4] He noted the difficulty in obtaining

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[1] Hadlock, op. cit., pp. 54-57.

[2] Wayne Otto and David Ford, Teaching Adults to Read (Boston: Houghton Mifflin Co., 1967), p. 38.

[3] Ibid., p. 39.

[4] Dale E. Hathaway, Government and Agriculture (New York: Macmillan Co., 1965), pp. 386-400.

agreement on farm policy alternatives because farmers value individual freedom and resist programs which involve production controls.[1]

His study "Michigan Farmers in the Mid-Sixties" revealed that farmers overwhelmingly agree as to what must be done to improve their income position, but they generally are unwilling to submit themselves to the discipline of a farm organization or to adopt tactics that are likely to be effective in obtaining higher income.[2] This study reported the responses for the same fifty-six item Farmers' Opinion Inventory that was used in the present research. The 1965 study included a one per cent probability sample of all farms in Michigan and involved 804 on-the-farm interviews.[3] Subjects in the study were classified into groups according to farm organization membership, and income. Comparisons were made between groups on their responses to statements in the Farmers' Opinion Inventory. There were few differences on the responses between those with high and low incomes, but there were differences between members of different farm organizations.[4] It was

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[1] Ibid., pp. 388-389.

[2] Dale E. Hathaway, et al., Michigan Farmers in the Mid-Sixties, Research Report No. 54 (East Lansing: Michigan State University Agricultural Experiment Station, 1966), p. 64.

[3] Ibid., pp. 1-9.

[4] Ibid., pp. 55-76.

noted that the members of the National Farmers Organization differed significantly from Farm Bureau and Grange members on several items. In general the NFO members were younger[1] and were more willing to take action to improve the income position of farmers.[2]

Morrison and Warner studied a few of the items included in the instrument, Farmers' Opinion Inventory, in the analysis of factors associated with farmers' attitudes toward government involvement in agriculture. They found no evidence to support their hypothesis that economic variables in the farmers' environment are strongly associated with economic attitudes.[3] The suggestion was made that voluntary organizations may be uniquely important for farmers as instruments which intervene between the economic situation and economic attitudes.[4]

Hadley utilized many of the same opinion statements that were used in the 1965 state-wide study of farmers. He compared the opinions of "committed" farmers with Extension personnel on several farm policy opinion items.

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[1] Ibid., pp. 47-48

[2] Ibid., p. 25.

[3] Denton E. Morrison and W. Keith Warner, "Organization or Economic Men? Factors Associated with U. S. Farmers' Attitudes Toward Government Agricultural Involvement," Paper presented at the Second World Congress of Rural Sociology, Enschede, the Netherlands, August 5-10, 1968, pp. 16-23.

[4] Ibid.

Many significant differences of opinions were found between farmers and Extension personnel. In general one could categorize the Extension personnel as being more knowledgeable about the farm policy situation and more optimistic that farm problems could be solved. However, the item by item analysis makes it difficult to summarize.[1]

For the purposes of this study the Farm Policy Scale will be used to measure the ability of farmers to identify realistic solutions to farm policy problems. This scale consists of eleven of the fifty-six items in the Farmers' Opinion Inventory.

Summary

The Farmers' Opinion Inventory was used in a statewide study of farmers in 1965 and was also used in a study comparing the opinions of Extension personnel with farmers.

The income level of farmers does not appear to be associated with farm policy opinions, but the research has indicated farm organization membership may be an influencing factor. Since the NFO members were considerably younger, age may also be a factor.

None of the previous studies has utilized a longitudinal design to determine what opinions change and the

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[1]Herbert H. Hadley, "A Comparison of the Attitudes of the Michigan Cooperative Extension Service Staff Toward Marketing, Agricultural Policy, and Farm Organization" (unpublished Ph.D. dissertation, Michigan State University, 1967), pp. 1-44.

direction of the changes if changes do occur over periods of one, two, and three years. No research has indicated what changes in farm policy opinions occur as a result of an intensive educational program. Furthermore, previous research has not attempted to measure the farm policy opinions of farmers' wives.

CHAPTER III

THE PROBLEM DETAILED

The review of literature produced a theoretical basis for a study of critical thinking ability, open-mindedness, and opinion change with a young adult population. The studies reviewed provided a relatively sound basis for predicting how young adults in college would change on the variables critical thinking and open-mindedness. The problem was to explore in detail what changes young adults, of ages 25-35, not primarily engaged as students made over periods of one, two, and three years in an adult education program. The nature of the research involved the testing of numerous relationships.

For the majority of the hypotheses posed in this study, a general hypothesis is stated and specific hypotheses follow as sub-hypotheses.

Equivalency of Groups

The use of treatment and control groups which were not selected on the basis of random assignment poses limitations in interpreting the research findings. The final selection process for admission (or nonadmission, and hence assignment to control groups) to the program, and

hence to treatment groups consisted of personal interviews and made use of subjective judgements of Michigan State University faculty members. The selection was not based upon criteria closely relevant to this study; thus the process did not appear to have contributed to the non-equivalency of treatment and control groups. However, tests were conducted to determine the equivalency of the groups. It was hoped that the populations of the treatment and control groups would be found to be very similar, and that such a finding indicating equivalency would support the argument that changes found in treatment groups were due to the Kellogg Farmers Study Program and not to other variables. It was therefore hypothesized that:

H_1: There is no significant difference on the variables being studied between respective treatment and control groups at the time of final interviews. (This was the time when the battery of pretests was administered.)

A. Critical Thinking Ability

A_1: There is no significant difference in mean pretest scores between Treatment Group I (participants in the program for three years) and Control Group I (nonparticipants over a three-year period) on the Test of Critical Thinking.

A_2: There is no significant difference in mean pretest scores between Treatment Group II (participants for two years) and Control Group II (nonparticipants over a two-year period) on the Test of Critical Thinking.

A_3: There is no significant difference in mean pretest scores between Treatment Group III (participants for one year) and Control Group III (nonparticipants over a one-year period) on the Test of Critical Thinking.

B. Open-mindedness

B_1: There is no significant difference in mean pretest scores between Treatment Group I and Control Group I on the Inventory of Beliefs.

B_2: There is no significant difference in mean pretest scores between Treatment Group II and Control Group II on the Inventory of Beliefs.

B_3: There is no significant difference in mean pretest scores between Treatment Group III and Control Group III on the Inventory of Beliefs.

C. Farm Policy Scale (Ability to identify realistic farm policy alternatives)

C_1: There is no significant difference in mean Farm Policy Scale pretest scores between Treatment Group II and Control Group II.

C_2: There is no significant difference in mean Farm Policy pretest scores between Treatment Group III and Control Group III. (Note: No pretest data on the Farm Policy Scale are available for Control Group I.)

D. Level of Formal Education[1]

D_1: There is no significant difference between Treatment Group I and Control Group I on the variable mean years of formal education.

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[1] "Level of formal education" is defined as the number of years of formal education attained. Those persons with a high school education would have twelve years. Persons who took additional formal education were credited with additional years. When a person attended college for only a part of the year, credit was given only if he attended at least half of an academic year. Since many of the participants had attended Michigan State University short courses, the following assignment of educational level was made. If a person attended a short course for 16 weeks, this was considered to be one-half of an academic year so the individual received credit for an additional year of education. If the individual attended short courses for a total of 32 weeks, he still was only credited with one year of education beyond high school.

D_2: There is no significant difference between Treatment Group II and Control Group II on the variable mean years of formal education.

D_3: There is no significant difference between Treatment Group III and Control Group III on the variable mean years of formal education.

E. Age

E_1: There is no significant difference in mean age at the time of final interviews between Treatment Group I and Control Group I.

E_2: There is no significant difference in mean age at the time of final interviews between Treatment Group II and Control Group II.

E_3: There is no significant difference in mean age at the time of final interviews between Treatment Group III and Control Group III.

F. Reading Comprehension

F_1: There is no significant difference in mean scores between Treatment Group I and Control Group I on the pretests of the Michigan State University Reading Test.

Critical Thinking Ability

The improvement of critical thinking ability is an objective of the Kellogg Farmers Study Program. Research has indicated that undergraduate and graduate students make significant gains in critical thinking ability during their collegiate experience. The hypothesis was advanced that the objective of increased critical thinking ability would be achieved.

H_2: Participants in the Kellogg Farmers Study Program have significantly greater gains in mean scores of critical thinking ability than control group members who did not participate in the program.

H_2a: Treatment Group I has a significantly greater gain in mean scores of critical thinking ability than Control Group II.

H_2b: Treatment Group II has a significantly greater gain in mean scores of critical thinking ability than Control Group II.

H_2c: Treatment Group III has a signfiicantly greater gain in mean scores of critical thinking ability than Control Group III.

Studies of college students have indicated increases in critical thinking ability throughout four years of college, but have noted the greatest gains in the freshman and sophomore years. The hypothesis was advanced that participants would increase in critical thinking ability throughout the duration of the program, but those increases would be proportionally greater in the first year of the program than in the second year of the program, and proportionally greater in the second year of the program than in the third year of the program.

H_3: Gains in critical thinking ability are positively associated with length of period of participation in the program.

H_3a: Treatment Group I, which participated in the program for two years, has a significantly greater gain in mean scores of critical thinking ability than Treatment Group III, which participated for one year.

H_3b: Treatment Group I, which participated for three years, has a significantly greater gain in mean scores of critical thinking ability than Treatment Group II, which participated for two years.

H_3c: Treatment Group I, which participated for three years has a significantly greater gain in mean scores of critical thinking ability than does Treatment Group III, which participated for one year.

H_4: The proportion of gain in critical thinking ability is greater in the first year of the program than in the second year of the program; and the proportion of gain in the second year is greater than the proportion of gain in the third year.

H_4a: The mean gain on the Test of Critical Thinking Ability of Treatment Group III in their first year of the program is a greater proportion than the mean gain made in the second year of the program by Treatment Group II.

H_4b: The proportion of gain in critical thinking ability in the second year of the program by Treatment Group II is greater than the proportion gained in the third year of the program by Treatment Group I.[1]

Lehmann and Dressel found that college upperclassmen scored higher than freshmen and sophomores on

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[1]Comparison is to be made between approximate gain in the first year and the approximate gain in the second year of the program, and between the approximate gain made in the second year and the approximate gain made in the third year of the program. The total gain is the amount Treatment Group I gained in three years. The gain in the first year of the program is taken as the amount gained by Treatment Group III (one year of the program). The gain for the second year of the program is derived by subtracting the gain of Treatment Group III (one year of the program) from the gain of Treatment Group II (two years of the program). The gain for the third year of the program is derived by subtracting the gain of Group II (two years of the program) from the gain of Group I (three years of the program).

critical thinking abiilty.[1] Based on this finding the following hypothesis was posed.

H_5: For participants in the three treatment groups, there is a significant positive correlation between the amount of formal education attained and the mean pretest score of critical thinking ability.

Previous research studies have produced somewhat contradictory findings on the relationship between educational level and the aptitude for increasing critical thinking scores.[2,3] Since participants in the program ranged in educational level from high school graduates to persons holding a masters degree, it is possible that educational level might be associated with changes in critical thinking ability although the previous research gave no firm basis for a directional hypothesis.

H_6: There is no significant relationship between gain scores on critical thinking ability and the amount of formal education of participants.

H_6a: There is no significant relationship between gain scores on critical thinking ability and the amount of formal education of participants in Treatment Group I.

H_6b: There is no significant relationship between gain scores on critical thinking ability and the amount of formal education of participants in Treatment Group II.

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[1] Lehmann and Dressel, 1962, op. cit., p. 58.

[2] Ibid., pp. 51-132.

[3] Hadlock, op. cit., pp. 64-66.

H_6c: There is no significant relationship between gain scores on critical thinking ability and the amount of formal education of participants in Treatment Group III.

Previous research using the American Council on Education's Test of Critical Thinking with an adult population found no relationship between gains on a timed test of critical thinking ability and age.[1] Since the limited age range of 25-35 is used in this study the following hypothesis was posed.

H_7: There is no significant relationship between age of participants at entry into the program and change in critical thinking ability as measured by the gain between pretest and posttest scores of critical thinking ability.

H_7a: In Treatment Group I there is no significant relationship between age of participants at entry into the program and change in critical thinking ability as measured by the gain between pretest and posttest scores of critical thinking ability.

H_7b: In Treatment Group II there is no significant relationship between age of participants at entry into the program and change in critical thinking ability as measured by the gain between pretest and posttest scores of critical thinking ability.

H_7c: In Treatment Group III there is no significant relationship between age of participants at entry into the program and change in critical thinking ability as measured by the gain between pretest and posttest scores of critical thinking ability.

H_8: There is no significant relationship between age of control group members (nonparticipants and change in critical thinking ability as measured by differences in pretest and posttest scores.

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[1] Ibid., p. 69.

H_8a: In Control Group I there is no significant relationship between age of participants and change in critical thinking ability as measured by pretest and posttest scores.

H_8b: In Control Group II there is no significant relationship between age of participants and change in critical thinking ability as measured by pretest and posttest scores.

H_8c: In Control Group III there is no significant relationship between age of participants and changes in critical thinking ability as measured by pretest and posttest scores.

The wives of the participants were directly involved in the program for two days at each of the summer institutes. The content and procedure for the summer institutes was part of the total curriculum and did not differ greatly from other institutes at which the wives were not present. In addition to attending the summer institutes, the wives undoubtedly discussed the Kellogg Farmers Study Program with their husbands. Critical thinking is a highly developed skill, and it appeared that the wives would be less likely than husbands to improve in this ability, since they received a minimum of direct contact with the program. However, there remained the possibility that wives would gain in critical thinking ability even with limited exposure to the program. In an effort to assess possible effects of very brief direct exposure and/or long-term indirect exposure to an intensive adult education program upon critical thinking ability of women, the following hypothesis was posed.

H_9: Wives of participants will not make significantly different mean gain or loss scores on The Test of Critical Thinking Ability than will wives of non-participants.

It was of interest to determine whether husbands and wives changed in the same direction in critical thinking ability, if they changed at all.

H_{10}: The mean posttest difference between participants and their wives does not vary significantly from the mean pretest difference on the variable critical thinking when the three treatment groups are combined and compared with the three groups of participants' wives combined.

H_{11}: The mean posttest difference between nonparticipants and their wives does not vary significantly from the mean pretest difference on the variable critical thinking when the three control groups are combined and compared with the three control group wives combined.

Open-mindedness

Based on the general finding that young adult college students become more open-minded as they progress through college and the proposition that attitudes and values of non-student adults can be changed[1] it was logically deduced that young adults in the Kellogg Farmers Study Program would become more open-minded.

H_{12}: Participants in the program become significantly more open-minded than nonparticipant members of control groups.

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[1]Lehmann and Dressel, 1962, op. cit., p. 272; and Kelly, op. cit.

$H_{12}a$: Treatment Group I has a significantly higher mean gain score on Inventory of Beliefs than Control Group I.

$H_{12}b$: Treatment Group II has a significantly higher mean gain score on Inventory of Beliefs than Control Group II.

$H_{12}c$: Treatment Group III has a significantly higher Inventory of Beliefs mean gain score than Control Group III.

Studies of college students indicated increases in the Inventory of Beliefs scores throughout four years of college, but note the greatest gains during the first two years of college.[1] There appears to be a relationship between the length of the educational experience and the degree of change in open-mindedness among young adults enrolled in college. If educational experiences for young adults not primarily engaged as students resulted in similar patterns of change, the following hypothesis would be substantiated.

H_{13}: Gains in open-mindedness are associated with length of participation in the program.

$H_{13}a$: Treatment Group II has a significantly higher mean gain score on the Inventory of Beliefs than Treatment Group III.

$H_{13}b$: Treatment Group I has a significantly higher mean gain score on the Inventory of Beliefs than Treatment Group II.

H_{14}: The proportion of gain in open-mindedness is greater in the first year of the program than in the second year; and the proportion of gain in the second year is greater than the proportion of gain in the third year.

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[1]Lehmann and Dressel, 1962, op. cit., p. 55.

$H_{14}a$: The mean gain on scores on the Inventory of Beliefs of Treatment Group III in the first year is a greater proportion than the mean gain made in the second year of the program by Treatment Group II.

$H_{14}b$: The proportion of gain in scores on the Inventory of Beliefs by Treatment Group II in the second year of the program is greater than the proportion gained in the third year of the program by Treatment Group I.[1]

Previous research with college students indicates that persons with higher levels of formal education score higher on the Inventory of Beliefs than do those with less education.[2] Since participants in the Kellogg Farmers Study Program ranged in educational level from high school graduates to persons holding a masters degree, it was expected that educational level would be associated with open-mindedness scores.

H_{15}: Those subjects with higher levels of formal education are more open-minded than those subjects with lower levels of formal education.

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[1]Comparison is to be made between approximate gain in the first year and the approximate gain in the second year of the program, and between the approximate gain made in the second year and the approximate gain made in the third year of the program. The total gain is the amount Treatment Group I gained in three years. The gain in the first year of the program is taken as the amount gained by Treatment Group III (one year of the program). The gain for the second year of the program is derived by subtracting the gain of Treatment Group III (one year of the program) from the gain of Treatment Group II (two years of the program). The gain for the third year of the program is derived by subtracting the gain of Group II (two years of the program) from the gain of Group I (three years of the program).

[2]Lehmann and Dressel, 1962, op. cit., p. 55

$H_{15}a$: Those participants with higher levels of formal education score significantly higher on the Inventory of Beliefs pretest than do participants with lower levels of formal education when the three treatment groups are combined.

$H_{15}b$: Those nonparticipants with higher levels of formal education score significantly higher on the Inventory of Beliefs pretest than nonparticipants with lower levels of formal education when the three control groups are combined.

$H_{15}c$: Those subjects with higher levels of formal education score significantly higher on the Inventory of Beliefs pretest than subjects with lower levels of formal education when all treatment groups and control groups, including wives, are combined.

Past research indicates that college students with higher educational levels, who, according to the previous hypothesis, are more open-minded, achieve lesser gains in open-mindedness scores than students with lower levels of education. Although it is quite likely that statistical regression is contributing to this phenomenon, an examination of the relationship between educational level and the amount of change on the dimension of open-mindedness was proposed.

H_{16}: Those participants with lower levels of formal education show significantly greater gains in open-mindedness than those with higher levels of education.

$H_{16}a$: Participants in Treatment Group I with lower levels of formal education show significantly greater gains on the Inventory of Beliefs than those with higher levels of education.

$H_{16}b$: Participants in Treatment Group II with lower levels of education show significantly greater gains on the Inventory of Beliefs than those with higher levels of education.

$H_{16}c$: Participants in Treatment Group III with lower levels of education show significantly greater gains on the Inventory of Beliefs than those with higher levels of education.

Research has indicated that adult attitudes and beliefs become more firmly fixed with advancing age.[1] Nonetheless, there is a serious question whether the age range of participants in the Kellogg Farmers Study Program is sufficiently wide to produce significant differences in gain scores on the Inventory of Beliefs. With reservations, the following hypothesis was posed:

H_{17}: Younger participants demonstrate significantly greater change in open-mindedness than older participants.

Research by Kelly indicates that the influence one spouse has upon the other appears to be limited.[2] The wives of the Kellogg Farmers Study participants were involved in four days of summer institutes each year, and hence, had direct contact with only four out of the twenty-five to thirty or more days of the program in a year, although they may be assumed to have been exposed to the thinking and attitudes of their husbands throughout the

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[1] Lorge, op. cit., p. 5.

[2] Kelly, op. cit.

husband's involvement in the program. Previous research provides no basis for hypothesizing that the husbands influenced their wives' beliefs. To discover if the influence of their husband's participation and/or their own brief direct contact with the program produced significant changes in open-mindedness among participants' wives, the following hypothesis was posed:

H_{18}: The wives of participants do not demonstrate significantly greater change in open-mindedness than wives of those in the control groups.

Lehmann and Dressel reported that freshmen college females consistently scored higher than males on the Inventory of Beliefs, but the finding was not statistically significant.[1] In order to determine if a similar relationship exists for a population of young adult farm men and women, the following hypothesis was posed:

H_{19}: Wives of participant and control group members are not significantly more open-minded than men on the Inventory of Beliefs pretest, when all treatment and control groups are combined.

Kelly found that during twenty years of marriage spouses did not become more similar in numerous personality characteristics. In fact, there was a slight trend for scores of husbands and wives to become more divergent

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[1]Lehmann and Dressel, 1962, op. cit, pp. 51-54.

over the years.[1] Thus, the question arose as to whether individual husbands' and wives' scores would become closer together or further apart while the husband was involved in a liberal education program. The following hypotheses were posed:

H_{20}: There will be no significant relationship in changes on the dimension of open-mindedness between participants and wives.

H_{21}: There will be no significant relationship in changes on the dimension of open-mindedness between nonparticipants and their wives.

Reading Comprehension

The Kellogg Farmers Study Program has an objective of improving reading skills and did provide a few hours of instruction in this area. However, based on the Hadlock finding[2] and the fact that a limited amount of attention was given to developing reading skills, it was hypothesized that participants over a three-year period did not make a significant change in reading comprehension ability. Hence, the following hypotheses were posed to evaluate changes in reading ability.

H_{22}: There is no significant difference in mean gain scores on the Michigan State University Reading Test between Treatment Group I and Control Group I.

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[1] Kelly, op. cit.

[2] Hadlock, op. cit., pp. 67-68.

H_{23}: There is no significant difference in mean gain scores on the Michigan State University Reading Test between wives in Treatment Group I and wives in Control Group I.

Farm Policy Opinions

Previous research which utilized all or most of fifty-six items in the Farmers' Opinion Inventory analyzed the data by individual items. After a review of the instrument, it seemed to be appropriate to attempt to develop two sub-scales, one to measure knowledge about the recent farm policy situation and one to measure the ability to identify realistic solutions to farm problems. As noted in the section on instrumentation, page 66, the attempt to form scales had only limited success and only the scale designed to measure the ability to identify realistic farm problem solutions was utilized.

The ability to identify realistic solutions to farm policy problems was measured by an eleven-item Farm Policy Scale developed from the Farmers' Opinion Inventory as part of the present research. As mentioned in the section on instrumentation, page 69, this scale has limitations, but it does provide a tool for measuring the overall impact of the Kellogg Farmers Study Program upon the opinions held by participants. The scale, which consists of opinion items, was designed to differentiate those whose opinions reflected unrealistic approaches to solving farm problems from those whose opinions reflected more

realistic approaches. It was hypothesized that participants in the Kellogg Farmers Study Program developed more realistic approaches in solving the problems of agriculture.

H_{24}: Participants in the Kellogg Farmers Study Program make significantly greater gains in the ability to identify realistic farm policy solutions than nonparticipants.

$H_{24}a$: Treatment Group II has a significantly greater gain in mean scores on the Farm Policy Scale than Control Group II.

$H_{24}b$: Treatment Group III has a significantly greater gain in mean scores on the Farm Policy Scale than Control Group III. (Note: Control Group I did not take a pretest so no comparison could be made with Treatment Group I.)

It was hypothesized that those in the program for longer periods of time would make greater gains in farm policy problem solving ability than those in the program for shorter periods of time, that is, there would be a positive relationship between gain and time, as was hypothesized for critical thinking ability.

H_{25}: Gains in the ability to identify realistic farm policy solutions are positively associated with longer periods of participation in the program.

$H_{25}a$: Group II, which received two years of the program, made a significantly greater gain in mean scores on the Farm Policy Scale than Group III, which received one year of the program.

$H_{25}b$: Group I, which received three years of the program, made a significantly greater gain in mean scores on the Farm Policy Scale than Group II, which received two years of the program.

Since the wives were not directly involved in the program for any prolonged period of time and received only indirect contact by discussions with their husbands, the following hypothesis was posed.

H_{26}: The wives of participants do not show significantly different changes in the ability to identify realistic farm policy solutions than wives in the control groups.

$H_{26}a$: There are no significant differences in change in mean scores on the Farm Policy Scale between wives in Treatment Group II and wives in Control Group II.

$H_{26}b$: There are no significant differences in change in mean scores on the Farm Policy Scale between wives in Treatment Group III and wives in Control Group III.

CHAPTER IV

PROCEDURES

The Population

The population involved in the study consisted of a group of Michigan farmers approximately 25-35 years old and their wives who underwent final interviews for entrance into the Kellogg Farmers Study Program. There were 119 men and 110 women included in the study.

Young farmers were selected for admission to the program on the basis of personal interviews. Those admitted to the program constitute treatment groups, and those not admitted constitute nonequivalent control groups. Because a number of those not admitted to the program in the first year applied and were accpeted into the program at a later time, the sizes of the control groups are fairly small in comparison to the treatment groups. Each treatment group originally comprised thirty participants, but three participants dropped out of Group I (the three year group) within the first two years. Two dropped out because of lack of time due to labor shortages at home and one because of sickness. The one who dropped out because of illness assumed a vacant position in Group II. Both

Group II (the two year group) and Group III (the one year group) had thirty participants at the time of the study.

Fifteen nonparticipants, those tested and interviewed in 1965, but not accepted for the program prior to 1968, were eligible for inclusion in Control Group I. Ten of the fifteen cooperated in taking the battery of posttests. Only six nonparticipants were eligible for Control Group II (those interviewed and tested in 1966 but not accepted into the program prior to 1968) and all six cooperated in taking the battery of posttests. Sixteen of the seventeen individuals in Control Group III cooperated in completing the battery of posttests.

Wives appeared less willing to take the posttests than the men. One wife from Control Group I and two wives from Control Group III refused to take the posttest battery. There are a small number of cases where missing data cannot be secured. For example, some couples missed one or more of the pretests. Thus, in some cases, the number of observations on a variable will be slightly less than the total number of subjects in the group under study.

Research Design

The research design was greatly influenced by events over which the researcher had no control. At the time the researcher became involved in the project, all pretests had been administered; and Treatment Groups I, II, and III had already been selected. Ideally, one half

of the group of nominees would have been randomly assigned to treatment groups and one half to control groups. However, since this was not done, the best alternative appeared to be one that used the most precise experimental design and still made use of the available data. It should be emphasized that those selected as participants in the program were not selected on the basis of any of the variables which this study measures. Campbell and Stanley have noted "The more similar the experimental and the control groups are in their recruitment and the more this similarity is confirmed by scores on the pretest, the more effective this control becomes."[1]

It appeared that the Nonequivalent Control Group Design[2] utilizing pretest and posttest measures was the most appropriate. The use of nonequivalent control groups provides a better basis for interpretation than would a design which included only a pretest and posttest on treatment groups. Campbell and Stanley have also pointed out that nonequivalent control groups, ideally, should be similar; but, they state "The control group, even if widely divergent in method of recruitment and in mean level, assists in the interpretation."[3]

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[1]Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally and Company, 1966), pp. 47-48.

[2]Ibid.

[3]Ibid., p. 50.

The use of control groups provided a means of detecting invalidities inherent in the method of testing. If retesting with the same test form resulted in improved performance due to knowledge of the test, this same result should have occurred in both the experimental and control groups. The control group also provided a basis for controlling for effects of other variables, such as current events and maturation.

Instrumentation

A Test of Critical Thinking Ability, Form G (CT), American Council on Education, 1952, was used to measure critical thinking ability. Lehmann and Dressel described the instrument as follows:

> This scale consists of 52 objective-type questions and was designed to measure five abilities thought to be involved in critical thinking: (1) defining a problem, (2) recognizing stated and unstated assumptions, (3) selecting pertinent information, (4) formulating and selecting relevant hypotheses, and (5) drawing valid conclusions. The reliability of the test is .79. . . . The test retest reliability is .71.
>
> It is readily evident that the Test of Critical Thinking is a relatively stable instrument. In addition, it would appear that this is more a test of ability in the processes involved in critical thinking than a measure of critical thinking, per se.[1]

The test is timed and takes fifty minutes to administer.

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[1]Lehmann and Dressel, 1963, op. cit., pp. 26-27.

Dressel and Mayhew reported on the process of developing the test and noted that the trial Forms A and B of A Test of Critical Thinking were prepared, with the hope that they might be equivalent forms, for use with college freshmen in the fall of 1951.[1] Although the original plan called for two equivalent forms of the test, poor results with Form B led to its abandonment and the decision to develop a single form. After considerable testing, Form G was developed. Form A and Form G are somewhat similar, but Form G was adopted as the best test and Form A and other forms were discontinued.[2]

Using the same instrument for pretesting and posttesting constituted a problem with this test. It was assumed that gains due to previous knowledge of the test would be negligible in this study, since control groups are used and the span between pretest and posttest is one full year, but this study indicated considerable gains made by control groups, suggesting that previous knowledge of the test was indeed an important factor.

Dressel and Mayhew, who reported testing at many institutions of higher education, indicated no test results for individuals not enrolled in college or another formal educational program. It was noted that several non-student

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[1] Dressel and Mayhew, op. cit., p. 187.

[2] Ibid., p. 190.

groups were contacted,but apparently they lacked interest in cooperating in such a study.[1]

It appeared that the studies of critical thinking ability of college students had in many cases neglected to control for the effect of complicating factors. Extraneous variables, such as some exposure to college education and the lack of control group posttests,posed problems in inferring causal relationships between college education and improvement of critical thinking ability.[2] It was believed that the use of nonparticipant but otherwise similar applicants for admission to the Kellogg Farmers Study Program afforded more-nearly equivalent control groups than the Hadlock study.[3] Tests of equivalency were conducted on each major variable using a one-way analysis of variance to determine if the treatment and control groups differed significantly on the pretest.

The Inventory of Beliefs, Form I, (IB) developed by the American Council on Education in 1951, was used to measure the degree of open-mindedness. Lehmann and Dressel describe the instrument as follows:

> This scale consists of 120 pseudo-rational cliches to which the subject is asked to respond by means of a four-element key: strongly agree, agree, disagree, and strongly disagree. Some examples of items are "The best government is one

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[1]Dressel and Mayhew, op. cit., p. 206.

[2]Lehmann and Dressel, 1963, op. cit., p. 148.

[3]Hadlock, op. cit., pp. 8-11.

> which governs least," "The worst danger to real Americanism during the last 50 years has come from foreign ideas and agitators."
>
> This instrument explores the students' tendency toward (1) ethnocentrism, (2) ideocentrism, (3) sociocentrism, and (4) egocentrism. The inventory is designed to distinguish students who tend to accept stereotypes and who are dependent and rigid in their attitudes and values from those who are more mature in their viewpoints and who tend to be more adaptable in their beliefs and attitudes. Scores can range from 0-120. A higher scorer is thought to be mature, flexible, adaptive, and democratic in his relationships with others; a low scorer is immature, rigid in outlook, compulsive, and authoritarian in his relationships with others. The reliability coefficients range from .68 to .95 with a median r = .86.[1]

The test, although not timed, takes approximately thirty minutes to administer.

Dressel and Mayhew noted that from over three thousand items, 120 statements were selected for inclusion in the final instrument. "All of the statements selected were intended by the committee to be items with which students should disagree."[2] The Inventory of Beliefs, Form I has been subject to considerable research and has been proven reliable for group or individual measurement.[3]

The MSU Reading Test Form B62, is a 50-item test which was developed at Michigan State University. This test was used to measure the subject's ability to comprehend reading passages. The test was timed and fifty

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[1] Lehmann and Dressel, 1962, op. cit., pp. 21-22.

[2] Dressel and Mayhew, op. cit., p. 218.

[3] Ibid., p. 222.

minutes were given to complete it. The reliability has been found to be approximately .82 with a college population.[1] The reliability of a very similar 45-item version of this test was found to be .79.[2]

The Farmer's Opinion Inventory was developed by the Michigan State University Agricultural Economics Department and was used to identify changes in opinions and changes in the ability to identify realistic farm policy solutions. It consists of 56 items and uses a five-point scale. This instrument was used with 804 farmers, a one per cent random sample of all Michigan farmers in 1965.[3]

Although considerable analysis had been made of the data collected with the instrument, no testing for validity or reliability had been done on the instrument previously. The present research attempted to develop meaningful scales from items in this instrument, but very limited success was achieved. A proposed eight-item scale to measure knowledge of the recent farm policy situation failed to be reliable or meaningful. However, a twelve-item scale to measure realistic approaches to solving farm policy problems has had slightly better reliability. The Farm Policy Scale, a modified form of the scale which dropped one of the

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[1]Conversation with Dr. Arvo Juola, Evaluation Services, Michigan State University, October 14, 1968.

[2]Lehmann and Dressel, 1963, op. cit., p. 30.

[3]Hathaway et al., op. cit., p. 1.

original twelve items, yielded reliabilities of .44 on the pretest and .62 on the posttest. These reliabilities were based on 176 persons, including farmers' wives. Reliability of the scales was determined by using a computer program, The Reciprocal Averages Program (RAVE), which determines the internal consistency of a scale and reassigns the item weights in order to maximize the internal consistency.[1] A weighting scheme was established a priori based upon agreement by at least three out of five staff members who worked with the Kellogg Farmers Study Program and rated the items independently.

Staff members working with the Kellogg Farmers Study Program identified the items from the Farmer's Opinion Inventory which they felt measured the ability to identify realistic solutions to farm policy problems. The staff members were asked to indicate how they would score the item. All items used on the scale had agreement on scoring direction. This procedure was the basis for establishing the validity of the scale and is subject to the limitation that there was not total agreement on the items to be included in the scale.

There were five possible responses to each item on the Farm Policy Scale as follows: (1) Completely Agrees,

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[1]David J. Wright and Andrew C. Porter. "An Adaptation of Frank B. Baker's Test Analysis Package For Use on The Michigan State University CDC 3600 Computer," Occasional Paper No. 1; Office of Research Consultation, School for Advanced Studies, College of Education, Michigan State University, January, 1968.

(2) Tend to Agree, (3) Tend to Disagree, (4) Completely Disagree, and (5) No Opinion. The "No Opinion" response was given a middle weighting between "Tend to Agree" and "Tend to Disagree." Six of the items, 13, 14, 18, 41, 43, and 47 were scored to give the lowest weight, 1, to the "Completely Agree" responses and highest, 5, to "Completely Disagree." The five other items, 17, 45, 48, 51 and 54 were scored in the opposite direction. (See Appendix B for actual items.)

Changes on additional items from the Farmers' Opinion Inventory were described if the treatment and/or control groups made considerable changes on these items between pretest and posttest.

The Farmers' Opinion Inventory did not appear to measure any one single category of opinions, but is a combination of opinion statements about various items. Many of the items are about farm policy, but some items ask for opinions about labor unions and other subjects.

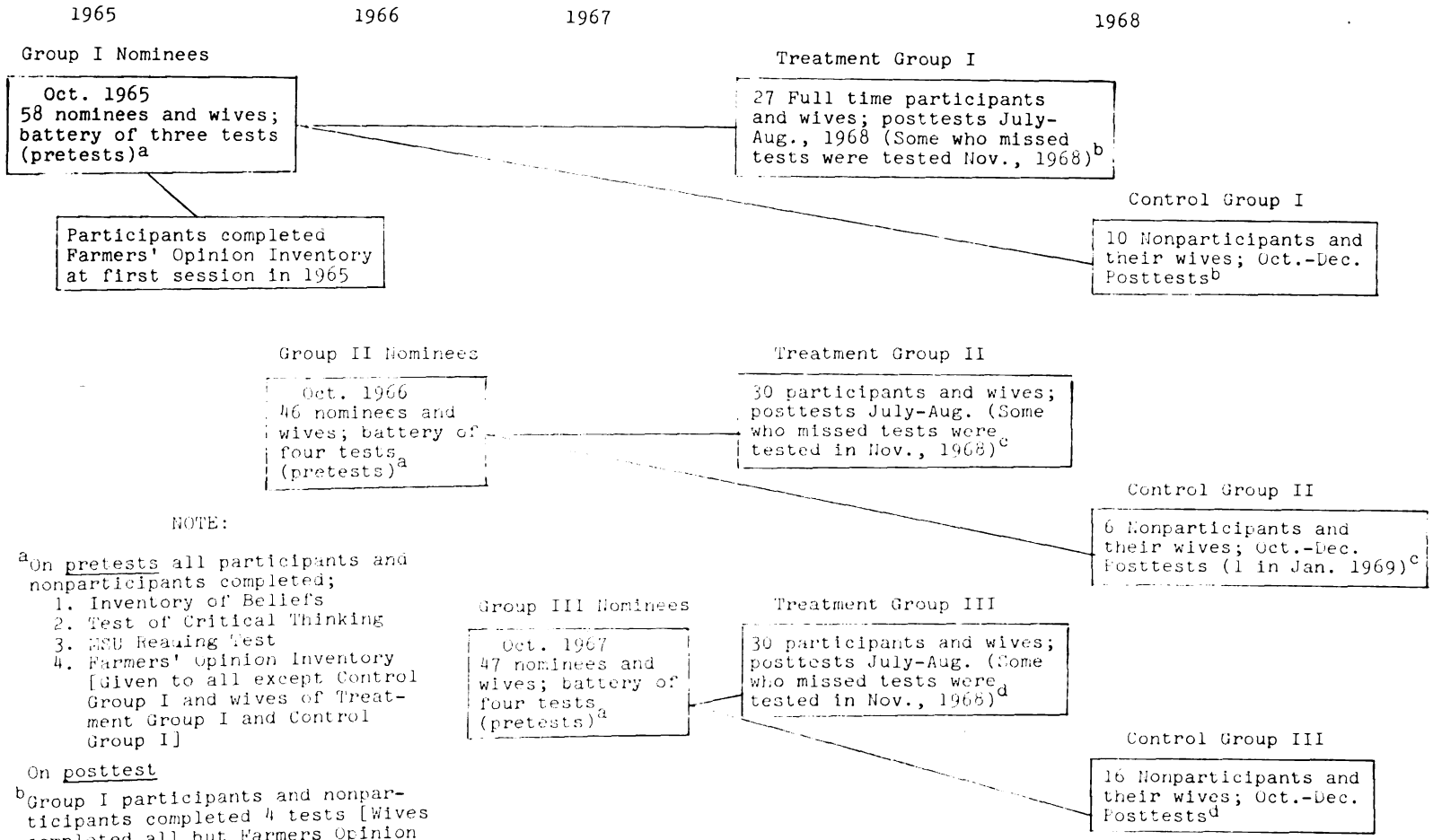
Working independently, members of the Kellogg Farmers Study Program staff did not completely agree on what opinions young farmers should possess after completing the three-year Kellogg Farmers Study Program. This lack of agreement presented problems in evaluating the changes made by participants.

Testing

Pretests were given at the time final interviews were held to select each group of participants. A battery of tests, as described on the following page, was administered to nominees attending the final interview session. Treatment Group I and Control Group I took the pretests in October of 1965. Treatment Group II and Control Group II took the pretests in October of 1966, and Treatment Group III and Control Group III took the pretests in October of 1967. Posttests were administered to all treatment groups during the late summer of 1968 and to all control groups in the fall of 1968.

Posttesting of control group members was accomplished under varying conditions. Fourteen individuals in control groups were tested at five testing sessions in the state. Thirty were tested in their homes. In October, 1968, eight persons were tested while attending final interviews for selection into Kellogg Group IV. Since seven persons had difficulty arranging a time with the researcher to take the tests, the tests were mailed with specific instructions included. On the timed posttests, the number of test items completed by those receiving the tests by mail was nearly the same as the number of items completed on the pretests.

When the posttesting of the control groups was initiated in October, 1968, some posttest data were missing



NOTE:

[a]On pretests all participants and nonparticipants completed;
1. Inventory of Beliefs
2. Test of Critical Thinking
3. MSU Reading Test
4. Farmers' Opinion Inventory [Given to all except Control Group I and wives of Treatment Group I and Control Group I]

On posttest

[b]Group I participants and nonparticipants completed 4 tests [Wives completed all but Farmers Opinion Inventory.]

[c]Group II participants and nonparticipants completed all tests but reading.

[d]Group III participants and nonparticipants completed all tests but reading.

Figure 1. Description of Testing Program

on thirty-five persons out of the three treatment groups. These were participants and wives who missed the tests at the summer institutes. All posttest data were missing for only twelve of these. Missing test data on eleven persons were received at the five testing sessions, and twenty-two more completed the missing tests and returned them by mail. Followup telephone calls were made in an attempt to have as complete a set of posttest data as possible. Missing data were collected on all but two persons.

Collection and Coding of Data

The pretest and posttest scores for the objective tests used in this study, the Test of Critical Thinking, the Inventory of Beliefs, and the Michigan State University Reading Test, were obtained directly from the individual answer sheets, scored by the Scoring Office of Michigan State University's Evaluation Services Department.

Items of biographical data (age, formal educational level, and sex) were taken from individual applications, which are a part of the file on each participant and non-participant included in this study.

Individual data sheets were used to provide a systematic collection, recording and coding of both test scores and biographical data. An arbitrary identification number was assigned to each subject in the study and a couple-identification number was also assigned to husband-and-wife teams. The data for each individual was coded,

and this summary of information was then transferred to key-punched data cards. Statistical analysis was made using the Michigan State University 3600 computer.

The Analysis

The basic assumption was that the participants in the Kellogg Framers Study Program would gain in critical thinking ability and open-mindedness during their continuing education experience. As noted by the hypotheses, some tests were made to measure gain, while others measured change--a variation to lower, as well as higher, scores.

In this study, a measurement of the initial level of the major variables was made at the time of final interviews. Therefore, a comparison made between the pretest scores and the posttest scores was the basis for determining what change occurred during the interval between admission (treatment groups) or nonadmission (control groups) and the close of one, two, or three years. By using control groups, it was possible to have a stronger basis for inferring that changes which occurred were associated with the program and were not due to other uncontrolled variables.

The statistical treatment of gains is complicated and there is no one clear-cut method for the analysis of data utilizing pretest and posttest results. However, the analysis of variance is a well-established statistical procedure, having a number of advantages over other

statistical methods. Kerlinger,[1] Hays,[2] Edwards,[3] and other authors in the field of statistics explain this statistical method.

The one-way analysis of variance utilizing gain scores where appropriate was used to test Hypotheses 1, 2, 3, 9, 12, 13, 18, 19, 22, 23, 24, and 26.

In order to test Hypotheses 10, 11, 20, and 21 a test of paired difference was made utilizing the pretest and posttest means of the differencesbetween the scores of husbands and wives using a one-way analysis of variance.

The Test of Significance Between Two Proportions, as illustrated by Edwards,[4] was used to test the difference between proportions for Hypothesis 4. Hypothesis 14 was to be tested in the same manner but the erratic results indicated no need to test the relationship.

The Pearson Product-moment Correlation Coefficient was used to test the correlation between variables for Hypotheses 5, 6, 7, 8, 15, 16 and 17.

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[1]Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, 1964), pp. 187-209.

[2]William L. Hays, Statistics for Psychologists (New York: Holt, Rinehart and Winston, 1963), pp. 357-385.

[3]Allen L. Edwards, Experimental Design in Psychological Research (New York: Holt, Rinehart and Winston, 1960), pp. 117-132.

[4]Ibid., pp. 51-54.

The .05 level of significance was used as the criterion for accepting or rejecting research hypotheses.

Intercorrelations of Variables

A previous study[1] reported the intercorrelations for three of the variables in this study on a group of 256 college freshmen males. Table 4 indicates the findings for Treatment Group I which had pretest and posttest measures on the three variables.

TABLE 4.--Intercorrelations of Critical Thinking Ability, Open-mindedness, and Reading Comprehension for 27 Participants in Treatment Group I.

Variable	Open-mindedness		Reading Comprehension		
	1965	1968	1965		1968
Critical Thinking Ability	.51 (.35)*	.23	.86	(.62)*	.69
Open-mindedness			.53	(.23)*	.45

*Indicates previous correlations reported by Lehmann for 256 freshmen college males (Lehmann and Ikenberry, op. cit., p. 125).

[1]Lehmann and Ikenberry, op. cit., p. 125.

CHAPTER V

FINDINGS

This chapter is organized around the research hypotheses and in the order in which they have been developed in Chapter III. The first section describes the findings related to the equivalency of treatment and control groups. The latter sections report the changes made by participants and nonparticipants and their wives in critical thinking ability, open-mindedness, reading comprehension, the ability to identify realistic farm policy solutions, and an inventory of farmers' opinions.

Equivalency of Treatment and Control Groups

Since random selection was not used to assign applicants to treatment and control groups, the equivalency of these groups was a matter of prime concern in this study.

Hypothesis 1

The hypothesis that there was no significant difference between the treatment groups and the control groups on the pretest was tested by calculating the overall level of significance by analysis of variance on each of the variables. The number in each group, mean, standard deviation, and overall F are reported in the following tables. Only the variables education, age, and ability

to identify realistic farm policy solutions were statistically different between groups at the .05 level.

Members of the treatment groups had more education and were better able to identify realistic solutions to farm problems at the time of the pretest. Age varied between the various groups. Members of Treatment Group III (one year of participation) were, on the average, considerably older than members of Control Group III, but members of Treatment Group II (two years of participation) were considerably younger than Control Group II.

Analysis of variance was used to test whether or not there were significant differences among group means. If significant differences at the .05 level did occur between groups, further examination by either the t test or the Scheffé Post Hoc Comparison could be used to determine significance between specified groups. The F value for group comparisons equals Mean Square between Groups divided by Mean Square Error for the specified numbers of degrees of freedom. The t value found in a t test equals the square root of the F value when the appropriate degrees of freedom are used for both values The statistical significance of F varies with the degrees of freedom. In general, for the size and type of comparisons made in this study, an F value of less than 2.00 is neither statistically significant nor indicative of a major trend.

Statistical and visual inspection of the data indicated very little difference between mean scores of

TABLE 5.--Critical Thinking Ability of Participants and Nonparticipants Prior to Group Selection*

Group	N	Mean Score	S.D.
Treatment I	26	30.4	8.5
Control I	10	30.1	6.8
Treatment II	30	31.8	8.3
Control II	6	27.3	8.8
Treatment III	30	29.8	9.1
Control III	16	28.4	5.8

*F between groups = .55. Since F is less than 1.0, this indicates extremely little difference between groups.

groups on the Test of Critical Thinking given to participants and nonparticipants during the final interview session.

TABLE 6.--Open-mindedness of Participants and Nonparticipants as Measured by Inventory of Beliefs Prior to Group Selection.*

Group	N	Mean Score	S.D.
Treatment I	26	70.5	18.5
Control I	10	60.9	9.4
Treatment II	28	68.2	14.5
Control II	6	61.5	18.0
Treatment III	29	63.4	14.0
Control III	16	60.1	12.8

*F between groups = 1.57. This value is less than the 2.29 needed for significance at the .05 level with 5 (greater mean square) and 114 degrees of freedom.

Members of the treatment groups were consistently more open-minded than members of the control groups at the time of final interviews, though the differences were not statistically significant at the .05 level.

TABLE 7.--Ability to Identify Realistic Farm Policy Solutions as Measured by the Farm Policy Scale Prior to Group Selection.*

Group	N	Mean Score	S.D.
Treatment I**	27	38.1	4.7
Treatment II	27	35.0	5.1
Control II	6	34.2	5.6
Treatment III	29	36.2	4.6
Control III	16	32.3	4.9

*F between groups = 4.17. This value is greater than the 2.46 needed for significance at the .05 level with 4 (greater mean square) and 104 degrees of freedom.

**Note: No data were available for Control Group I.

Members of the treatment groups scored higher than members of the control groups on the Farm Policy Scale which measured the ability to identify realistic farm policy solutions. A t test between Treatment Group II and Control Group II indicated t = .53, a value which is less than the 2.04 needed for significance at the .05 level with 31 degrees of freedom for a two-sided test. A test between Treatment Group III and Control Group III

found t = .38 which is less than the 2.02 needed for significance at the .05 level with 43 degrees of freedom for a two-sided test. These findings indicated that there were no significant differences in scores on the farm policy scale between members of paired treatment and control groups.

TABLE 8.--Level of Formal Education of Participants and Nonparticipants Prior to Group Selection.*

Groups	N	Mean in Years	S.D.
Treatment I	27	14.6	2.0
Control I	10	12.4	.5
Treatment II	30	14.2	1.6
Control II	6	12.8	1.3
Treatment III	30	13.5	1.6
Control III	16	13.1	1.8

*F between groups = 4.41, a value which is greater than the 2.29 needed for significance at the .05 level for 5 (greater mean square) and 118 degrees of freedom.

Members of Treatment Groups I and II have considerably higher educational levels than members of Control Groups II and III. However, there is little difference in educational level between members of Treatment Group III and members of Control Group III.

TABLE 9.--Mean Age of Participants and Nonparticipants at Time of Final Interviews Prior to Group Selection.*

Group	N	Mean Age	S.D.
Treatment I	27	31.3	4.0
Control I	10	32.8	2.7
Treatment II	30	30.0	4.0
Control II	6	33.5	3.8
Treatment III	30	32.0	4.0
Control III	16	28.4	3.8

*F between groups = 3.23, a value which is greater than the 2.29 needed for significance at the .05 level for 5 (greater mean square) and 118 degrees of freedom.

There was considerable variation among the mean ages of members of the groups. Members of Treatment Group II averaged 3.5 years younger than members of Control Group II, but members of Treatment Group III averaged 3.6 years older than members of Control Group III.

TABLE 10.--Reading Comprehension Scores of Participants and Nonparticipants at Time of Final Interviews Prior to Group Selection.*

Group	N	Mean Score	S.D.
Treatment I	27	28.4	8.7
Control I	9	26.6	7.3

*F = .32 which is less than 1.0. This indicates very little difference between groups.

Critical Thinking Ability

Hypothesis 2

Although it was predicted that the participants would make significantly greater gains in critical thinking ability than the nonparticipants, this hypothesis was not supported. A one-way analysis of variance test indicated no significant difference between the treatment and control groups on the amount of gain in critical thinking ability.

TABLE 11.--Gain in Critical Thinking Ability by Participants and Nonparticipants from Pretest to Posttest*

Group	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D
Treatment I	26	30.4	34.6	4.2	5.3
Control I	10	30.1	30.6	- .5	4.7
Treatment II	29	31.7	33.8	2.1	5.0
Control II	6	27.3	26.5	- .8	2.4
Treatment III	30	29.8	31.3	1.5	5.9
Control III	16	28.4	32.7	4.3	4.9

*F between groups = 1.94, a value which is less than the 2.30 needed for significance at the .05 level with 5 (greater mean square) and 110 degrees of freedom.

The difference in gain in critical thinking ability between Treatment Group I (the three year group) and

Control Group I approached significance at the .05 level using a t test for a one-sided comparison. For this comparison t = 1.66 with 34 degrees of freedom, a value which is very slightly less than the 1.69 needed for significance at the .05 level.

Other comparisons, including a Scheffé test between the three treatment groups and the three control groups, did not identify differences which were significant at the specified level of .05. The large gain by Control Group III was very surprising and complicated the interpretation of the data.

A more detailed examination of the changes made from pretest to posttest on the Test of Critical Thinking is given in Table 12.

TABLE 12.--Description of Changes Made in Critical Thinking Ability by Participants in the Three Treatment Groups.

Change Made	Treatment Groups		
	I	II	III
Increased 5 or more points	12	8	8
Increased 1-4 points	9	10	12
No change	0	5	2
Decreased 1-4 points	3	4	5
Decreased 5 or more points	2	3	3
	26	30	30

A majority of all participants made gains in critical thinking ability. The largest majority was found in Group I, where 21 of the 26 participants showed a gain in this area.

Hadlock found that participants in the World Politics Discussion Groups made significant gains in critical thinking ability.[1] Although the participants in the Kellogg Farmers Study Program did make gains in critical thinking ability, the gains were not statistically significant. Since Treatment Group I, which had three years of the program, came extremely close to having a significant gain over Control Group I at the .05 level it appears that the Kellogg Farmers Study Program has the potential of increasing critical thinking ability.

Both the Hadlock study and the present research found that control groups made improvement in their scores by taking the same test a second time. The fairly high gain made by the Hadlock control groups in a ten-week period and the extremely high gain made by Control Group III in a one-year period indicate that persons do increase their performance by taking the Test of Critical Thinking a second time. However, other factors such as maturation, further education, reading and influence of others may account for gains made by Control Group III.

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[1]Hadlock, op. cit., pp. 60-63.

Hypothesis 3

It was hypothesized that those in the program for longer periods of time would have a greater increase in critical thinking ability. H_3 was not supported at a statistically significant level, although a trend in the predicted direction was evident.

TABLE 13.--Comparison of Treatment Groups on Critical Thinking Gain.*

Group	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment I	26	30.4	34.6	4.2	5.3
Treatment II	29	31.7	33.8	2.1	5.0
Treatment III	30	29.8	31.3	1.5	5.9

*F between the three groups = 1.85, a value which is less than the 3.11 needed for significance at the .05 level with 2 (greater mean square) and 82 degrees of freedom.

Those who participated in the program for three years made the greatest gain, but less difference in gain is apparent between Treatment Groups II and III which participated in the program for two years and one year respectively. Analysis of variance between Treatment Groups I and II yielded an F of 1.26, a value which is less than the 4.04 needed for significance at the .05 level with 1 (greater mean square) and 49 degrees of freedom. A comparison

between Treatment Groups II and III indicated F = .34. Any value less than 1.0 indicates very little difference between groups.

Hypothesis 4

It was hypothesized that the gain in critical thinking ability in the first year would be proportionately greater than the gain in the second year of the program; and that the gain in the second year would be proportionately greater than the gain in the third year, however, the results of the tests of the sub-hypotheses produced contradictory results and failed to support H_4.

The 1.53 point gain in the first year of the program was significantly higher than the .61 gain during the second year of the program and supported the hypothesis. A test of significance between the approximate proportions of gain yielded a Z score of 3.31, a value which is greater than the 1.64 required to indicate significance at the .05 level. However, the relative gains in the second and third years contradict the hypothesis, although the results are similarly significant. Comparison of the .61 points gained in the second year with the 2.09 point gained in the third year produced a Z score of 3.93, a value greater than the 1.64 needed to indicate significance at the .05 level.

There is a possible explanation for variation in gain in critical thinking ability. The first year, as predicted,

produced an increase in critical thinking ability. The second year was similar in format and little gain in critical thinking ability was noted. The final year of the program featured study institutes as well as a five-week International Traveling Seminar. Perhaps the combination of increased amount of time spent in the third year of the program and the international travel stimulated further gains in critical thinking ability.

TABLE 14.--Approximate Gain in Critical Thinking Ability by Participants During One, Two and Three Years of the Program.

Year in Program	Approximate Gain
First Year (Gain by Group III)	1.53
Second Year (Group II Mean Gain minus Group III Mean Gain)	.63
Third Year (Group I Mean Gain minus Group II Mean Gain)	2.09

Hypothesis 5

It was predicted that there would be a significant positive correlation between amount of formal education and the pretest score on the Test of Critical Thinking Ability for participants who ranged from high school graduates to those possessing a masters degree. This

hypothesis was supported by a .26 correlation between education and critical thinking ability as measured by the pretest on 87 participants. The .26 correlation was greater than the .18 correlation needed for significance at the .05 level for a one-sided test. Those participants with higher levels of education definitely performed better on a timed test of critical thinking ability than did those with less education.

Since a statistically significant correlation was found between level of formal education and critical thinking ability pretest scores for the participants it was of interest to further explore this relationship. Table 15 presents the data by years of education for all persons in the study.

TABLE 15.--Years of Formal Education Attained and Mean Critical Thinking Ability Pretest Score for All Persons in the Study.

Years of Formal Education	N	Mean Critical Thinking Ability Score
12 or less	83	24.7
13	54	28.0
14	20	30.5
15	10	34.7
16 or more	58	36.1
All Combined	225	29.4

These findings suggest that persons with a college education tended to increase their critical thinking ability while in college and maintained this ability over a period of several years. It appears that one of the returns from the investment in higher education is a citizenry which is better able to think critically.

Hypothesis 6

It was hypothesized that there would be no significant correlation between gain scores on critical thinking ability and the amount of formal education that participants had attained. The hypothesis of no difference was not rejected although there was a tendency for those with less education to make slightly more gain on the Test of Critical Thinking. A -.13 correlation was found between years of formal schooling and gains in scores on the Test of Critical Thinking Ability for the three treatment groups as a whole. This value is less than the -.18 correlation needed for significance at the .05 level for a one-sided test.

The correlation between level of formal education and the amount of increase in critical thinking ability from pretest to posttest produced varied and contradictory results as noted in Table 16.

The -.39 for Treatment Group I surpassed the -.32 value needed for significance at the .05 level with 25 degrees of freedom for a one-sided test. Treatment Group II had a positive correlation of .31, a finding which,

TABLE 16.--Correlations Between Level of Formal Education Attained and Increase in Critical Thinking Ability for Participants.

Treatment Group	N	Range in Age	Mean Educ. Level	Mean Increase in Critical Thinking	Correlation Bet. Educ. & Cr. Thinking Increase
I	26	25-38	14.5	4.2	-.39
II	28	25-39	14.1	1.8	.31
III	29	24-39	13.4	1.4	-.49

though unexpected, was similar to Hadlock's.[1] The .31 correlation indicated attainment of significance at the .05 level with 27 degrees of freedom for a one-sided test, but it was in the opposite direction from that predicted. Treatment Group III had a -.49 correlation between formal level of education and gain in critical thinking ability. This value is greater than the .31 needed for significance at the .05 level with 28 degrees of freedom for a one-sided test. There is no apparent explanation for the difference between groups.

Hypothesis 7

It was predicted that there would be no significant relationship between age of participants and amount of gain

[1]Hadlock, op. cit., pp. 64-65.

in critical thinking ability. There is a trend for younger persons to make greater gains on the Test of Critical Thinking than older persons, but the hypothesis of no difference, H_7, was not rejected by the statistical test, since the -.15 correlation between age and gain in critical thinking ability scores found for the three treatment groups as a whole does not indicate significance at the .05 level with 84 degrees of freedom for a one-sided test. A correlation of -.18 would be needed to reject the hypothesis of no difference at the .05 level.

A separate correlation between age and critical thinking change was made for Treatment Group I and a correlation of -.02, which is not significant, was found. Analysis of variance, as well as the correlations cited, indicated no significant relationship between age and gain in critical thinking for the three treatment groups. The F's for Treatment Groups I, II, and III respectively were .79, 1.65, and .23.

The findings indicate that age difference, within the range 25-35 years, is not a major factor in influencing performance on a timed test of critical thinking ability. This finding supports Hadlock's study which included a wider range of ages.[1] However, trends revealed by data in this study suggest that if a wider range of ages were studied, a significant relationship might be demonstrated

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[1] Ibid., p. 69.

between age and the potential of adults to increase in critical thinking ability as measured by a timed test.

TABLE 17.--Relationship Between Age and Gains in Critical Thinking Ability for Treatment and Control Groups.

Group	N Age 30 or Under	N Over Age 30	Mean Gain Made by Age 30 or Under	Mean Gain Made by Age 30 or Over	F
Treatment Group I	11	15	4.1	4.3	.79
Control Group I	1	8	10.0	- .6	1.33
Treatment Group II	16	9	3.5	.9	1.65
Control Group II	2	4	0.0	- .8	--
Treatment Group III	12	16	2.6	.9	.23
Control Group III	8	1	4.4	2.0	.41

Hypothesis 8

It was predicted that there would not be a significant relationship between age and change in critical thinking ability of control group members. H_8 was supported since no significant relationship was found. Control Group I had F = 1.33 and Control Group III had F = .41. No calculation was made for Control Group II since there were only six men and the changes appeared to be nearly equal

for the six ages represented. Again, as in the case of the participants, there was a slight tendency for younger men to make greater gains in critical thinking ability.

Hypothesis 9

As was hypothesized, analysis of variance indicated that wives of participants did not make significantly different gains or losses than wives of nonparticipants on the Test of Critical Thinking Ability. Therefore, the null hypothesis was not rejected.

TABLE 18.--Pretest to Posttest Gain in Critical Thinking Ability by Wives of Participants and Nonparticipants*

Group	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment I	23	27.7	29.7	2.0	5.3
Control I	7	21.3	28.0	6.7	4.9
Treatment II	25	31.0	33.6	2.6	5.7
Control II	5	21.8	24.8	3.0	4.3
Treatment III	27	30.3	33.9	3.6	6.7
Control III	13	28.1	32.1	4.0	5.9

*F between groups = .85. This value is less than 1.00 and indicates very little difference between groups.

No further tests were made between the groups because the low level of F indicated that no significant differences existed. However, it is interesting to note that in each case the wives of the control group members made slightly greater gains than wives of treatment group members.

Hypothesis 10

It was predicted that differences in scores on the critical thinking posttest between participants and their wives would not vary significantly from the pretest difference. Analysis of variance as reported in Table 19 indicated no significant difference, and H_{10} was not rejected.

Limited gain in critical thinking ability by the participants and some increase in critical thinking ability by the wives resulted in little change in the relationship between participants' scores and their wives' scores on the critical thinking test for both the pretest and posttest. Table 19, however, does indicate a slight tendency for participants' and their wives' critical thinking scores to become closer together from pretest to posttest.

Hypothesis 11

It was predicted that the control groups, similar to the treatment groups covered by H_{10}, would not show

TABLE 19.--Differences in Critical Thinking Scores Between Spouses.

Groups	N	Pretest Mean Diff. between Spouses*	Posttest Mean Diff. between Spouses	F
Treatment Group Combined	78	.78	.50	.08
Control Group Combined	27	3.81	1.96	2.68**
Treatment and Control Combined	105	1.56	.88	.76

*Difference between spouses is defined as husband score minus wife score.

**F = 2.68, a value which is less than the 4.22 needed for significance at the .05 level with 1 (greater mean square) and 26 degrees of freedom.

significant changes from pretest to posttest in the difference between husbands' and wives' scores of critical thinking. No significant differences were found and thus H_{11} was not rejected. It appears that there is a slight tendency for nonparticipant husbands and wives to become more alike in critical thinking ability over a period of time. Statistics are reported in Table 19.

Open-mindedness

Hypothesis 12

It was predicted that participants in the program would become significantly more open-minded than members of the control groups, but an analysis of variance between

groups indicated no significant differences, and H_{12} was not supported.

TABLE 20.--Gains in Open-mindedness from Pretest to Posttest by Treatment and Control Groups.*

Group	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment I	26	70.5	66.2	-4.3	13.8
Control I	9	67.4	68.4	1.0	6.3
Treatment II	26	69.1	70.9	1.8	10.3
Control II	6	61.5	60.7	- .8	10.3
Treatment III	28	63.6	63.1	- .5	10.0
Control III	13	58.5	60.3	1.8	8.8

*F between groups = 1.03, a value which is less than the 2.30 needed for significance at the .05 level with 5 (greater mean square) and 107 degrees of freedom.

A t test between Treatment Group I and Control Group I indicated t = 1.06 with 33 degrees of freedom. This value is less than the 1.69 needed for significance at the .05 level for a one-sided test. No further tests were made between groups because the data indicated no significant differences.

In order to further expose the changes made by participants on the Open-mindedness variable, the following table was developed. No clear pattern emerged. A majority

of the participants in Groups I and III decreased in open-mindedness rather than gaining, but in Group II a majority exhibited an increase.

TABLE 21.--Changes in Open-mindedness Scores Between Pretest and Posttest by the Three Treatment Groups.

Change Made	Treatment Groups		
	I	II	III
Increased 11 or more points	5	3	4
Increased 6-10 points		5	5
Increased 1-5 points	3	8	4
No change		2	1
Decreased 1-5 points	5	7	4
Decreased 6-10 points	5	2	8
Decreased 11 points or more	8	2	4
	26	29	30

Hypothesis 13

It was predicted that gains in open-mindedness would be associated with length of participation in the program. This hypothesis was not supported. This was to be expected, since H_{12} revealed no significant relationship of any sort between participation and gains in open-mindedness.

The erratic results of the tests of H_{13} are presented in Table 22.

TABLE 22.--Years of Participation and Gains in Open-mindedness.

Group	Years in Program	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment I	3 years	70.5	66.2	-4.3	13.8
Treatment II	2 years	69.1	70.9	1.8	10.3
Treatment III	1 year	63.6	63.1	- .5	10.0

Analysis of variance between Treatment Group I and Treatment Group II indicated F = 3.35, a value which is less than the 4.03 needed to indicate significance at the .05 level with 1 (greater mean square) and 51 degrees of freedom. Furthermore, the relationship found is in a different direction from that expected since Treatment Group I decreased 4.3 points on the 120 item Inventory of Beliefs. The statistical test indicated little difference between Treatment Group II and Treatment Group III as evidenced by F = .70, a value which is less than 4.01 needed to indicate significance at the .05 level with 1 (normally greater mean square) and 55 degrees of freedom.

Hypothesis 14

H_{14} predicted that there would be a greater proportion of gain during the first year than during the second year and a greater proportion of gain during the second year than during the third year. This hypothesis was not supported, although there is support, of limited reliability, for the hypothesis that gains during the second year would be greater than gains during the third year. In the first year of the program, which was the year predicted to have the greatest proportion of gain, there was a decline of .5 as exhibited by Treatment Group III. Those who completed two years of the program had a gain of 1.8 over their pre-test but Treatment Group I, which had three years of the program, had a net decrease of 4.3 over the three year period. Since a longitudinal study was not made of one group and the cross sectional comparison of different groups are known to have severe limitations these findings cannot be viewed as revealing anything except those limitations.

Hypothesis 15

It was predicted that persons with initially higher levels of formal education would be more open-minded than persons with lower levels of formal education. H_{15} was strongly supported. Eighty-three participants had a .43 correlation between level of education and the Inventory of Beliefs pretest. The .43 correlation was greater than the .18 needed to indicate significance at the .05 level

for a one-sided test. A test of correlation for non-participants in the three control groups yielded a correlation of .36, a value which is greater than the .29 needed to indicate significance at the .05 level for a one-sided test.

TABLE 23.--Correlations Between Level of Formal Education Attained and Open-mindedness Pretest Scores for Participants, Nonparticipants and the Entire Study Population.

Group	N	Correlation Between Education and Open-mindedness	r Needed for Significance at .05 Level
3 Treatment Groups Combined	87	.43	.18
3 Control Groups Combined	32	.36	.29
All Groups Combined Including Wives	211	.45	less than .16

The correlation for 211 persons, including treatment groups, control groups, and wives, on the variables educational level and open-mindedness was found to be $r = .45$, a value which is greater than .16 needed to indicate significance at the .05 level for a one-sided test with 100 degrees of freedom. (Note: there are 210 d.f. in this case.) In all cases, a positive relationship was found between the level of formal education and open-mindedness.

Young farm adults who have had some college education appear to be more open-minded than those without a college education. Since the level of education in nearly all cases ranges from high school completion to four years of college, the high correlation between education and open-mindedness is an indication that open-mindedness is associated with collegiate experience. The data presented in Table 24 specifically indicate that more years of formal education are associated with higher open-mindedness scores.

TABLE 24.--Years of Formal Education Attained and Mean Open-mindedness Score for All Persons in Study.

Years of Formal Education	N	Mean Open-mindedness Score
12 or less	84	59.9
13	53	61.6
14	20	70.6
15	10	71.5
16 and over	52	76.8
All Combined	219	67.2

Lehmann and Ikenberry had noted in their analysis of 1958 Michigan State University freshmen entrance tests that "Males who lived most of their life on a farm are more stereotypic and dogmatic and have the highest traditional

value score."[1] Based upon the Lehmann and Ikenberry finding and the results of the Inventory of Beliefs pretest given to Kellogg Farmers Study Program participants, non-participants and wives, there is a strong indication that gains in open-mindedness are made by college students with farm backgrounds. Furthermore, there is an indication that this increase in open-mindedness has persisted for a 5-10 year period following the completion or termination of college education.

Hypothesis 16

It was predicted that participants with lower levels of education would show greater gains in open-mindedness than those with higher levels of education. H_{16} was not supported although a strong tendency appeared in the predicted direction. The correlation for 82 participants was -.17 between the variables of educational level and gains in open-mindedness. The -.17 is slightly less than the -.18 value needed to indicate significance at the .05 level for a one-sided test. This supports the proposition that persons with lower levels of education will make greater gains in open-mindedness than will persons with higher levels of education, but it fails by a narrow margin to meet the statistical test.

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[1]Lehmann and Ikenberry, op. cit., p. 29.

Separate correlations for each of the three treatment groups indicated negative correlations, as hypothesized, for Treatment Groups I and III, but a small positive correlation for Treatment Group II. Results are presented in Table 25.

TABLE 25.--Correlations Between Level of Formal Education Attained and Gain in Open-mindedness for Participants.

Group	N	Mean Education Level	Mean Open-mindedness Gain	r
Treatment Group I	26	14.5	-4.3	-.17
Treatment Group II	27	14.0	1.8	.09
Treatment Group III	29	13.5	- .5	-.33*

*r = -.33, a value which is greater than the -.31 needed to indicate significance at the .05 level.

No clear reason appeared for the negative relationship between education and gain in open-mindedness for two treatment groups and a positive correlation for one treatment group. Possibly the lower mean educational level for Treatment Group III may have more clearly illustrated the negative relationship between formal educational level and gains in open-mindedness.

Hypothesis 17

It was predicted that younger participants would become significantly more open-minded than older participants. H_{17} was not supported. A test which included all three treatment groups found a correlation of -.003, indicating no significant relationship between the age variable in the 25-35 year range and gains in open-mindedness. Apparently age differences within this narrow range have little relationship to the changes made in open-mindedness.

Hypothesis 18

It was predicted that the wives of participants would not become more open-minded than wives of control group members. Since no significant difference was found between the groups, H_{18} was not rejected.

TABLE 26.--Changes in Open-mindedness by Wives of Participants and Wives of Control Group Members.*

Group of Wives	N	Mean Change	S.D.
Treatment I	21	0.0	13.7
Control I	9	8.1	11.3
Treatment II	25	- .2	12.0
Control II	5	-3.0	7.1
Treatment III	24	- .7	8.6
Control III	12	1.2	7.2

*F between groups = 1.07, a value which is less than the 2.32 needed to indicate significance at the .05 level with 5 (greater mean square) and 90 degrees of freedom.

Hypothesis 19

It was predicted that there would be no significant difference between men and women on the pretest measure of open-mindedness. This prediction was supported.

TABLE 27.--Scores of All Men and Women on Open-mindedness Pretest.*

Group	N	Mean	S.D.
Men	115	65.4	15.2
Women	103	65.9	15.8

*F = .06, a value which is less than 1.00, indicating very little difference between men and women.

This finding concides with the findings of Lehmann and Dressel who found that there was no significant difference between freshmen males and females on the Inventory of Beliefs Test.[1] In both the Lehmann and Dressel study and the present research, women scored slightly higher than men on the Inventory of Beliefs indicating that women tend to be slightly more open-minded.

Hypothesis 20

It was predicted that open-mindedness posttest difference between participants and their wives, calculated by subtracting the wife's score on the Inventory of Beliefs

[1]Lehmann and Dressel, 1962, op. cit., pp. 51-53.

from the husband's score, would not vary significantly from the pretest difference. Analysis of variance, as reported in Table 28, found no significant relationship and H_{20} was not rejected. The retention of the null hypothesis indicates that participants and wives did not move further apart or closer together in open-mindedness during the time the husbands were involved in the Kellogg Farmers Study Program.

TABLE 28.--Differences in Open-mindedness Scores Between Spouses.

Group	N	Pretest Mean Diff. Between Spouses*	Posttest Mean Diff. Between Spouses	F
Treatment Groups Combined	75	-2.03	-2.05	.005
Control Groups Combined	27	1.26	-1.00	1.41**
Treatment and Control Combined	102	-1.14	-2.05	.45

*Difference between spouses is defined as husband score minus wife score. Those men without wives or with wives that lacked Inventory of Beliefs pretest and posttest could not be included, thus this table shows a greater advantage for wives than Table 27 which reports only pretest mean scores.

**F = 1.41, a value which is less than the 4.22 needed to indicate significance at the .05 level with 1 (greater mean square) and 26 degrees of freedom.

Hypothesis 21

It was predicted that the open-mindedness posttest difference in scores between nonparticipants and their wives, similar to the differences between participants and their wives, would not vary significantly from the pretest difference. No significant differences were found by analysis of variance, as reported in Table 28 and H_{21} was not rejected although it was found that the number of points difference changed for the couples in the control groups. On the pretest, the husbands scored 1.26 points higher in open-mindedness than wives, but on the posttest the wives scored 1.00 point higher than the husbands on the 120 item Inventory of Beliefs (see Table 28).

Reading Comprehension

Hypothesis 22

No significant difference was found between Treatment Group I and Control Group I in the amount of change on the variable reading comprehension, thus H_{22} was not rejected. However, it should be pointed out that the treatment group made a very slight gain in reading comprehension over the three year period, while the control group had a loss of 2.2 points on the test with 50 possible right answers. Although the differences are not significant, this finding may indicate that young adults who are actively involved in an educational program which demands

a fairly sophisticated level of reading are able to maintain or improve their reading comprehension ability, while those who are not involved in such a program have a tendency to decline in reading comprehension ability over a period of three years.

TABLE 29.--A Comparison Between Treatment Group I and Control Group I on Change in Reading Comprehension Scores.*

Group	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment I	26	28.0	28.5	.5	6.1
Control I	8	27.1	24.9	-2.2	5.5

*F between groups = 1.34, a value which is less than the 4.14 needed to indicate significance at the .05 level with 1 (greater mean square) and 33 degrees of freedom.

Hypothesis 23

The analysis of changes in reading comprehension made by wives of Treatment Group I and Control Group I members over the three year period produced similar, but more extreme results than analysis of changes in their husbands' reading comprehension. However, since analysis of variance indicated no significant difference, H_{23}, the hypothesis of no difference, was not rejected.

TABLE 30.--A Comparison Between Wives of Treatment Group I and Wives of Control Group I on Changes in Reading Comprehension Scores.*

Group of Wives	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment I	22	26.5	27.7	1.2	7.12
Control I	7	21.0	17.8	-3.2	6.20

*F between groups = 2.16, a value which is less than the 4.20 needed to indicate significance at the .05 level for 1 (greater mean square) and 28 degrees of freedom.

No clear reason is apparent for the increase in reading comprehension by the wives of participants and the decrease in reading comprehension by wives of the nonparticipants. Perhaps the wives of participants were stimulated to do more reading, a reaction which maintained their reading comprehension ability.

Ability to Identify Realistic Farm Policy Solutions

Hypothesis 24

It was predicted that the participants would make significantly greater gains than nonparticipants in scores on the Farm Policy Scale, which measures the ability to identify realistic solutions to farm policy problems. An analysis of variance between groups indicated no significant differences, thus H_{24} was not supported.

TABLE 31.--Changes in Scores by Participants and Nonparticipants on the Farm Policy Scale (Ability to Identify Realistic Solutions to Farm Policy Problems).*

Group	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment I**	25	38.1	38.6	.5	7.0
Treatment II	26	35.0	38.7	3.7	6.3
Control II	5	34.6	37.4	2.8	5.6
Treatment III	29	36.6	36.6	0.0	4.6
Control III	15	32.0	31.8	- .2	6.4

*F between groups = 1.79, a value which is less than the 2.46 needed to indicate significance at the .05 level with 4 (greater mean square) and 99 degrees of freedom.

**Note: Control Group I did not have the pretest and is therefore omitted from the analysis.

Very little difference is noted between treatment and control groups on the amount of gain. Treatment Group II and Control Group II were similar in their gain on the Farm Policy Scale. Treatment Group III and Control Group III were also similar.

Hypothesis 25

It was predicted that gains in the ability to identify realistic farm policy solutions would be positively associated with longer periods of participation in the program. No statistical test was made, but the data do not support H_{25}. It was revealed in testing H_{24} that no

significant gain was made in the first year, slight gain was made in the second year, and essentially no change occurred in the third year. The similarity between Treatment Group II and Control Group II and between Treatment Group III and Control Group III suggests that factors other than the Kellogg Farmers Study Program were associated with the slight changes made in the ability to identify realistic farm policy solutions.

Hypothesis 26

It was predicted that wives of participants would not differ significantly from wives of control group members on changes in scores on the Farm Policy Scale. Analysis of variance indicated no significant differences between groups, thus H_{26} was not rejected. It is interesting to note that while changes are not statistically significant, the wives of Control Group II showed small gains in the ability to identify realistic solutions to farm policy problems while wives of participants declined slightly in this ability.

Since cross-reference between Tables 31 and 32 gave an indication that husbands and wives moved farther apart in their scores on the Farm Policy Scale, analysis was made of this difference. It was found that participants and their wives had scores significantly further apart on the posttest than on the pretest. However, the control group members and their wives did not have a significant

TABLE 32.--Changes in Scores on the Farm Policy Scale Made by Wives of Participants and Nonparticipants (Ability to Identify Realistic Solutions to Farm Policy Problems).*

Group of Wives	N	Pretest Mean Score	Posttest Mean Score	Mean Gain	S.D.
Treatment II	25	32.7	31.2	-1.5	5.8
Control II	5	31.4	33.2	1.8	4.1
Treatment III	26	33.0	30.9	-2.1	4.9
Control III	12	30.6	30.2	- .4	6.2

*F between groups = 1.49, a value which is less than the 2.75 needed for significance at the .05 level for 3 (greater mean square) and 67 degrees of freedom.

TABLE 33.--Differences in Farm Policy Scale Scores Between Spouses (Ability to Identify Realistic Solutions to Farm Policy Problems).

Group	N	Pretest Mean Diff. Between Spouses	Posttest Mean Diff. Between Spouses	F
Treatment Groups II & III Combined***	53	2.76	6.70	15.38*
Control Groups II & III Combined	18	2.17	2.44	.03
Treatment & Control Combined	71	2.80	5.65	11.53**

*F is greater than 4.03, the value needed to indicate significance at the .05 level with 52 d.f.

**F is greater than 3.98, the value needed to indicate significance at the .05 level of 71 d.f.

***Note: No data were available for Treatment Group I or Control Group I.

change in difference between scores from pretest to posttest. The findings are tabulated in Table 33.

As indicated in Table 33, participants and their wives became further apart in their ability to identify realistic solutions to farm policy problems. The participants improved or maintained their ability to identify realistic solutions to farm policy problems while the wives declined in this ability. The control groups had little change between husbands' and wives' scores on this variable.

Description of Opinion Changes

Eleven questions from the fifty-six item Farmers' Opinion Inventory were combined to form the Farm Policy Scale previously reported. An additional twenty-one items were of interest because the treatment and/or control groups changed their responses considerably on these items over the course of one, two, and three years. The changes in opinions made by treatment and control groups and their wives from pretest to posttest are reported for the entire fifty-six items in Appendix B. Opinion changes on the twenty-one items are described in the following sections.

Consumers

As is revealed by the pretest to posttest changes made by treatment and control groups on Item 9, the three treatment groups tended to more strongly agree that

consumers ought to pay more for farm products than they are now paying.

Labor

There was increased agreement by the treatment groups that union contracts which make it possible for a company to hire only union members are a good idea [Item 61]. The two control groups made very little change on the item. The members of the treatment groups tended to change in the direction of disagreeing that policies of most labor unions are determined by the rank and file members [Item 28]. The two control groups remained relatively stable.

Role of Government and Farmers in Solving Farm Problems

On the statement "Farmers cannot count on government assistance in solving their marketing and price problems" [Item 7] there was a tendency for the treatment groups, on the posttest, to move to a more middle-of-the-road position. That is, they tended to choose the answer "Tend to agree" or "Tend to disagree" rather than "Agree completely" or "Disagree completely." It is interesting to note, however, that there is a trend suggested by responses of the three treatment groups. Treatment Group I changed to a position of more agreement with Item 7 than did Treatment Groups II or III. There appears to be an association

between length of time in the program and changes made on this item.

There was a slight trend for both treatment and control groups toward agreement that "Federal Marketing orders should be expanded to cover more Michigan products" [Item 22]. This was one case where the wives of both treatment and control groups did not move in the same direction as the husbands.

All groups, which include treatment groups, control groups, and wives, moved toward disagreement with the statement "Some simple and workable solutions to the problems of agriculture could be found if people would just think about it more" [Item 10].

Future of Farming

On the statement "Today farmers can't really do much to determine the way things turn out for them" [Item 37] all treatment groups increased in agreement. Interestingly, 100% of Treatment Group I and 89% of both Treatment Groups II and III disagreed with this statement at the time of their interview for entrance into the program, but over the course of the program 26-41%, varying by group came to agree with the statement. According to general concensus of Michigan State University Staff members working with the program, the participants should have disagreed with this statement.

In response to a similar item, that it is hard to tell what the future of farming will be, there was greater tendency for treatment group members to agree [Item 25]. The responses of the control groups indicated little change.

Credit

There has been a tradition that a farmer should be proud to be out of debt. Between the pretest and posttest, all groups, including the control groups, changed toward disagreeing to a greater extent that a farmer should be proud to be free of debt [Item 21]. Apparently, credit is becoming an accepted way of operating the farm business.

The Family Farm

The family farm system is a tradition that has persisted over the years. On the statement "The replacement of family farms by large-scale farms using hired labor would have undesirable economic and social consequences for the nation" [Item 29] there was more disagreement on the posttest than on the pretests, especially by the treatment groups. A contradictory pattern existed for the control groups. The treatment groups were consistent with the desired direction on this item as stated by those Michigan State University staff members working with the program. During the course of the Kellogg Farmers Study Program, members of the treatment groups came to agree to a greater

extent that the family farm will be replaced by large farms run by hired labor [Item 11]. However, the control groups tended to move from strongly agree and disagree positions to more moderate positions. The wives of both control and treatment groups made little change on the item.

Nearly all groups changed their viewpoint regarding the statement "It is more important that farm people earn satisfactory incomes than it is to maintain the family farming system" [Item 16]. However, the treatment groups showed the more pronounced change. This finding is consistent with the opinions of several staff members working with the program.

Farm Organizations

After participation in the Kellogg Farmers Study Program the members of treatment groups agreed to a greater extent that " A farm organization should have only operating farmers as members" [Item 20]. The control groups were very stable on this item from pretest to posttest, but the wives of the control groups were more erratic in their responses to this item. The wives of Treatment Groups II and III had a pattern of change similar to the husbands.

On the item "A farm organization should have membership dues high enough so that only farmers serious about the organization and its purposes will join it" [Item 14] there seemed to be a pattern of greater agreement with the

statement by the Treatment Groups I and III, but Treatment Group II did not have a consistent trend. Little change was noted for wives or control groups on the item.

On the statement "In most general farm organizations, the policies are determined by the rank and file farmer members" [Item 39] the participants in the program had a consistent pattern of moving from the "Agree completely" and "Disagree completely" positions to more moderate views of "Tend to agree" and "Tend to disagree." No consistent pattern prevailed for the control groups or wives.

Farm Production and Hunger

On the posttest, nearly all groups moved to a position of disagreeing to a greater extent with the statement "Farmers should raise all of the crops and livestock possible as long as there are hungry people" [Item 36]. This finding is consistent with the desired direction stated by several Michigan State University staff members associated with the Kellogg Farmers Study Program.

Farm Marketing

There was greater agreement by Treatment Groups II and III during their experience in the program that producers must cut off the available supply to the processor in order to make their bargaining power felt [Item 34]. However, Treatment Group I, the three year group, made

little change on this item. Control Groups II and III progressed in the opposite direction of Treatment Groups II and III.

There appears to be a trend for those who took part in the Kellogg Farmers Study Program to agree more with the statement "Farm prices are largely determined by large processors and retailers" [Item 52]. This finding is contrary to the desired direction on this item stated by several staff members of the Kellogg Farmers Study Program.

Items 52, 53, and 54 all add varying degrees of support to the proposition that those who took part in the Kellogg Farmers Study Program gained in agreement concerning the use of the tactics and procedures of organized labor to obtain higher farm prices. No consistent pattern appears for the control groups or wives on the same items.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Introduction

This study of the Kellogg Farmers Study Program served as a basis for an examination of the relationship of education, age, and sex to the influences of an extensive, liberal, and multi-format continuing education program upon the variables critical thinking ability, open-mindedness, reading comprehension, and ability to identify realistic public policy alternatives for a group of young adults.

The study attempted to assess the impact of the Kellogg Farmers Study Program on the variables "critical thinking ability," "open-mindedness," "farm policy opinions," and "reading comprehension" in a population of young adult farmers. It was undertaken to determine if the Kellogg Farmers Study Program was accomplishing its objectives and, if so, to determine which years of the program brought about the greatest changes.

The Kellogg Farmers Study Program is an adult education program of three years duration. The first year of the program involves study institutes and a state travel seminar. The second year includes study institutes and a

national travel seminar. The third year features five weeks in an international travel seminar as well as study institutes. This cross sectional study involved pretest and posttest measures on three different treatment groups. One group had completed the entire three year program, the second group had completed two years of the program, and the third group had completed one year of the program.

The population included Michigan farmers ages 25-35 and their wives who underwent final interviews for entrance into the Kellogg Farmers Study Program. There were 119 men and 110 women included in the study. Those interviewed and admitted to the program (participants) comprised the treatment groups and those interviewed and not included in the program (nonparticipants) comprised the nonequivalent control groups.

The research design used in this study is best described as a Nonequivalent Control Group Experimental Design. The reader is directed to Campbell and Stanley who discuss the strengths and weaknesses of this type of experimental design.[1]

The study made use of a battery of tests given to applicants and their wives prior to final selection of participants. Similar tests were given to participants in the late summer of 1968 and to nonparticipants in the fall of 1968.

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[1]Campbell and Stanley, op. cit., pp. 47-50.

Analysis of variance was used to determine if the treatment groups made significantly greater gains than control groups in critical thinking ability and open-mindedness. Additional tests used were Pearson Product-moment Correlation Coefficient, a test of significance between two proportions, t test, and Scheffé test. The .05 level of significance was the basis for support or rejection of hypotheses.

Summary of Findings

The pretest indicated that treatment and control groups, at the time of entry into the program, were equivalent on the variables critical thinking ability, open-mindedness, and reading comprehension, but were not equivalent on the variables education, age, and ability to identify realistic farm policy alternatives.

There was no significant difference in gain from pretest to posttest by treatment groups over control groups on the variables critical thinking ability, open-mindedness, reading comprehension, and the ability to identify realistic farm policy alternatives.

Critical Thinking Ability

Gains were made in critical thinking ability by the treatment groups, but these gains were not significantly greater than gains made by the control groups. It appears that a portion of the gain on the American Council on

Education's Test of Critical Thinking, Form G can be explained by the phenomenon of young adults improving their performance by repeating the same test. The influence of maturation, current events, mass media, personal contacts and other influences upon critical thinking ability is unknown. Participants in the Kellogg Farmers Study Program for the three year period made gains in critical thinking ability which approached statistical significance at the .05 level. Participants for one and two years also made consistent though not statistically significant gains.

Those persons with higher levels of previous education scored significantly higher on the critical thinking pretest. A strong relationship was found between formal education level and critical thinking ability.

Persons with less formal education made slightly greater gains in critical thinking ability during the program than those with higher levels of schooling. It was also noted that younger persons generally made greater gains in critical thinking ability than older persons, but the relationship was not statistically significant at the specified .05 level.

Wives of both treatment and control group members made gains in critical thinking ability, but the difference between treatment and control groups was not statistically significant.

A test of paired differences was made utilizing the pretest and posttest differences in critical thinking scores between husband and wife. No statistically significant changes were noted in the relationship between husbands' and wives' scores, though for both participant and non-participant groups, husbands' and wives' scores tended to become more similar during the period of the study.

Open-mindedness

The treatment groups did not make any statistically significant gains over the control groups in open-mindedness. Participants for one and three years declined slightly in open-mindedness, but the change was not statistically significant. Changes in open-mindedness did not appear to be related to the program as a whole. It is possible that the very slight changes were related to variations in groups, to unintended differences in the program, or to learning experiences not related to the program at all.

The degree of open-mindedness was strongly related to the formal educational level at entry into the program. A .45 correlation was found between educational level and open-mindedness, as measured by the pretest. Each additional year of formal education beyond high school appears to be associated with increased open-mindedness.

There was an indication that persons with lower levels of education made greater gains in open-mindedness

than persons with higher levels of education but the relationship was not statistically significant at the .05 level.

No relationship was apparent between age and gain in open-mindedness for this population of 25-35-year-olds.

There was no significant change in open-mindedness by wives of either treatment group or control group members. Males and females scored almost identically on the pretest measure of the degree of open-mindedness. The point span between husband's and wife's scores did not change significantly from pretest to posttest.

Reading Comprehension

While no statistically significant change was noted in reading comprehension ability by Treatment Group I, it was noted that both husbands and wives gained in reading comprehension ability. Those in Control Group I declined in this ability during the three year period.

Ability to Identify Realistic Farm Policy Solutions

No statistically significant gains were made by treatment groups over control groups in the ability to identify realistic solutions to farm policy problems. Gains were made by both treatment and control groups and the gains tended to be similar, indicating that participation in the program was not associated with the change. No statistically significant relationship was noted between length of

of time in the program and the ability to identify realistic farm policy solutions.

The wives of participants in Treatment Groups II and III showed slight declines in the ability to identify farm policy solutions, but the difference between wives in the treatment groups and wives in the control groups was not statistically significant. It was found that the scores of husband-and-wive pairs became significantly farther apart for Treatment Groups II and III. In the treatment groups, the husbands gained slightly in the ability to identify realistic farm policy solutions while their wives declined slightly in this ability.

Opinion Changes

In general, during the course of their experience, the participants in the Kellogg Farmers Study Program became more willing to use tactics of organized labor to reach the objective of higher farm prices. The participants became more pessimistic about the future of farming. In addition, they came to place more value on income and less value on maintaining the family farm system.

Conclusions

The research findings indicated that the Kellogg Farmers Study Program had limited success in helping the participants to achieve the four following objectives: (1) to develop skills of critical thinking (2) to become

more open-minded, (3) to develop skills in identifying agricultural policy alternatives, and (4) to improve skills of reading.

Although no statistically significant gains were made by the participants on the four preceeding objectives the results were generally in the predicted direction and in some cases were very close to being statistically significant at the .05 level. Since progress was made toward achieving the objectives which were studied it appears that the program has been worthwhile. The lack of significant gains may be attributed to the possibility that the variables were not measured in the most precise manner as well as the possibility that the program had limited success in achieving four specific objectives.

The present study of farm adults ages 25-35 has shown that:

1. Critical thinking ability appears to remain relatively stable, with only modest increases over periods of one, two, and three years. This is true even in the face of an extensive liberal educational program intended to increase it.
2. Open-mindedness is relatively stable over periods of one, two, and three years. It appears difficult to change the degree of open-mindedness of persons who are participating in a liberal education program.

3. Higher levels of formal education are associated with greater critical thinking ability and greater open-mindedness. Critical thinking ability and open-mindedness are higher for college educated persons than noncollege persons 5-10 years following termination of formal college education.
4. Persons with less education generally make greater gains in both critical thinking ability and open-mindedness while involved in an educational program.
5. Age differences within the 25-35 year age range are not a significant factor in determining the amount of gain a person will make in either critical thinking ability or open-mindedness.
6. There is no significant difference in open-mindedness between sexes.
7. Participation in the program is not associated with the ability to identify realistic solutions to farm policy problems.
8. Husbands and wives tend to be stable, perhaps becoming slightly more alike, in relation to each other on the variables critical thinking ability and open-mindedness.

9. Those involved in an educational program maintain their reading comprehension ability while those not involved decline slightly in these skills.

Implications

1. The lack of significant changes by participants suggests that the program did not provide the inputs which are necessary to increase critical thinking ability and open-mindedness, and/or that farm adults ages 25-35 are difficult to change on these variables.

Although older persons may not make as great a change in critical thinking or open-mindedness in the college setting, research indicates that they do change. Therefore, it may be necessary to analyze the components of a college education program to determine what factors bring about changes in critical thinking and open-mindedness in order to determine how to bring about these changes in an adult education program.

2. This study indicates an interesting possibility in the field of continuing education. It appears that participants with less previous formal education are likely to make greater gains in critical thinking ability and open-mindedness than those with higher levels of formal education. This suggests that those who would benefit the most from continuing education relating to to critical thinking are those with less formal education.

3. Previous studies indicate that discussion programs have been relatively effective in changing attitudes and critical thinking ability. Greater involvement of the learner in group discussions might produce better results in both critical thinking ability and open-mindedness.

4. Could it be that non-college youth generally make considerable gains in critical thinking ability as do college students and as did the nonparticipant middle-age adults in the Hadlock study and young adult nonparticipants in this study? This raises a question concerning the causal role of college education in increasing critical thinking ability.

5. One wonders if the changes in critical thinking ability and open-mindedness would have been greater if the participants had had a greater role in the determination of the curriculum and learning activities.

Previous research by Wickman indicated that students who are given responsibility for selecting learning activities make greater gains in critical thinking ability. The participants in this study, like young adults generally, are in position to know which subject matter areas are of most concern to themselves and their communities. It would appear appropriate that the learner should be given a larger role in determining what is to be learned and how it is to be studied.

There was some indication based upon reading the evaluations of study institutes that motivation was not too high for some subjects and some speakers. In addition, the enthusiasm for individual reading was somewhat disappointing. Perhaps if the learner had more choice in selection of topics, the motivation for learning might be greater.

6. Were the method and time of testing factors which led to different results from those in studies of college students? College students were tested at the beginning and end of the academic year, but the Kellogg participants were tested at the time of final interviews and again after periods of nearly one, two, and three years. The college students were on campus during their spring term and were involved in intensive programs of study at the time they took their posttest. The participants in this study had been away from direct contact with the educational program for a period of several months, roughly from March to late July, at the time that they took their posttest. During this period away from the Kellogg Farmers Study Program, the participants were back in their home environment where the rural community undoubtedly presented challenges and contradictions to their learnings from on-campus or travel experience. Hence, it appears that the present research may have been testing persistent effects of the program rather than the

immediate results. It could be that the college students might have made some regression on the Inventory of Beliefs if they had been tested after a summer in their home communities rather than during the spring term while still at the college. Similarly it might be that the participants in this study might have scored differently if tested in the spring, immediately at the close of the program.

7. Since there is no statistically significant difference between men and women in critical thinking ability and open-mindedness, perhaps wives should be included in more of the program. Additional involvement of the wife might assure greater changes in the husband and provide a measure of support for the husband as he returns to the community. The wife's influence in the community could also be a favorable factor in developing more capable leadership in rural communities, an implied long term goal of the program.

8. Age does not seem to be an important factor associated with changes in critical thinking and open-mindedness. Therefore, from a learning standpoint, there does not seem to be any substantial reason to limit the inclusion of participants in the program to 25-35 year olds. Perhaps this would imply a selection method based on interest in the program and position in the community, without a restrictive age limit.

9. Although the results of the research indicated that the Kellogg Farmers Study Program had limited success in attaining several of its objectives, the program should not be judged as being ineffective. It may have accomplished objectives, such as increasing knowledge of economics and political affairs, which were not measured. The program also may have brought about many positive benefits which were not stated as objectives.

In the 1950's, a series of programs called "Liberal Education for Executives" was supported at several colleges and universities by the American Telephone and Telegraph Company. The Center for the Study of Liberal Education for Adults attempted to assess the benefits of these programs. Both the businessmen and the scholars listed their expectations of these programs, such as breadth of vision, an open mind, value discrimination, etc., but the academicians could not say whether or not the liberal education programs actually produced the desired changes.

> There was little question about the refreshing qualities of this kind of liberal adult education, but beyond that the educators could only place their faith in the traditional claims that liberal education made a better individual. It might also make a better executive or leader, but educators were reluctant to accept the burden of proof. Some even doubted that the values of liberal education could ever be proved.[1]

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[1]James B. Whipple, et al., Liberal Education Reconsidered (Syracuse: Syracuse University Press, Publications Program in Continuing Education, 1969), p. 15.

Thus one can see that the Kellogg Farmers Study Program was not alone in finding it difficult to measure the effectiveness of a liberal education program.

Recommendations

1. It is recommended that those who have the responsibility for the Kellogg Farmers Study Program clarify and reassess the objectives of the program.

Rationale: Since one group has completed the three year program and since the present research has indicated progress on a few specific objectives it seems appropriate to determine future directions for the Kellogg Farmers Study Program. Perhaps some objectives need to be revised and others added. The program might be more effective if the objectives were more clearly defined in operational terms and the program designed to meet these objectives. It is apparent that there is a lack of agreement on objectives in the area of farm policy. Those who operate the program ought to more clearly define what changes they would like the participants to make.

2. It is recommended that tests be sought or developed to evaluate other phases of the program.

Rationale: The Kellogg Farmers Study Program was an innovative program that tried an unique combination of study institutes and travel seminars. This approach seemed to be extremely popular with the participants and may have accomplished objectives which this study did not

measure. For example, it is quite possible that if the participants had been given pretests and posttests to measure knowledge of economics and political science, they might have shown significant gains. The third year of the program, which features a five-week international travel seminar, is particularly worthy of further evaluation. The Farmers' Opinion Inventory was an instrument which produced some interesting results, but it appears that the instrument needs revision if it is to be of great assistance in evaluating the program.

3. It is recommended that follow-up testing be done with Groups II, III, and IV on the variables critical thinking ability and open-mindedness.

Rationale: It seems appropriate to follow-up with additional tests to see if results similar to those for Group I are obtained. The present study, which was a cross sectional study, had limitations. It may be worthwhile to retest Group III in the summers of 1969 and 1970 to have a yearly assessment of one group.

4. The selection criteria might be changed to allow a wider range of ages and to place less emphasis on seeking college educated participants.

Rationale: Age does not seem to be an important factor regarding changes in critical thinking and open-mindedness. There is evidence indicating that persons with

less formal education may make greater gains in critical thinking ability and open-mindedness.

5. It is recommended that wives be involved to a greater extent in the program on a voluntary basis.

Rationale: Men and women have similar abilities and the wives may be a supporting influence which may bring about even greater changes in the husbands. The wives may also play a major role in community affairs.

6. It is recommended that a long range follow-up study be made of the Kellogg Farmers Study Program participants and Control Group members in another 2-5 years to determine what leadership positions the individuals hold.

Rationale: The lapse of a few years will indicate, to some extent, whether the Kellogg Farmers Study Program was effective in developing rural leadership.

7. It is recommended that the American Council on Education's Test of Critical Thinking, Form G be supplemented with an alternative form.

Rationale: Research from the Hadlock study and the present research indicates that adults not involved in an educational program make gains on this test. One explanation for this is that gains in scores may occur due to previous knowledge of the test rather than actual changes in critical thinking ability.

8. It is suggested that the Kellogg Farmers Study Program and similar adult liberal education programs try

new approaches which would place more of the responsibility for learning upon the learner. Experimentation with different teaching methods such as simulation, case study, and multi-media approaches could be done to achieve this effect.

Rationale: Previous research by Wickman indicated that the form of instruction can be a factor in making gains in critical thinking ability. Wickman found that the experimental history class which utilized committees of six students to plan activities for each unit made greater gains in critical thinking ability than those taught by traditional forms of instruction. He noted,

> Students in the "c" group [experimental] felt they had greater freedom to think, to ask questions or investigate, and they accepted a greater responsibility to contribute both to the group and to their own learning progress.[1]

The results from the greater use of discussion groups in both the World Politics Discussion Program for adults as well as results from extensive use of committees and varied instructional techniques used by Wickman at Greenville College indicate that the form of instruction does make a difference in critical thinking ability. Any form of instruction which provides a more active involvement of the learner in the learning process may result in more improvement in critical thinking ability.

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[1]Wickman, op. cit., p. 75.

Based upon the differences noted in the form of instruction between the World Politics Discussion Program and the Kellogg Farmers Study Program, persons who conduct liberal education programs for adults should closely check their programs with six principles for adult learning presented by Gibb:

1. Learning must be problem centered.
2. Learning must be experience-centered.
3. Experience must be meaningful to the learner.
4. The learner must be free to look at the experience.
5. The goals must be set and the search organized by the learner.
6. The learner must have feedback about progress toward goals.[1]

The six principles by Gibb cover in a global sense, a set of detailed suggestions discussed by Wickman, who felt that they should contribute to improved critical thinking skills.[2]

Suggestions for Future Research

First, it is suggested that follow-up testing be done with the Kellogg Farmers Study Program Groups II, III, and IV. Since the cross sectional study approach had limitations, it would be better to do a longitudinal study with one or more of the groups which have not yet completed the program. For example, the findings concerning

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[1]Malcolm S. Knowles, ed., Handbook of Adult Education in the United States (Chicago: Adult Education Association of the U.S.A., 1960), pp. 58-62.

[2]Wickman, op. cit., pp. 139-141.

open-mindedness seem to vary with the individual group. If the battery of tests, or at least the Inventory of Beliefs, would be given to Group III in the summer of 1969 and again in the summer of 1970, it would provide measurements on the same group at the end of one, two and three years.

It is suggested that a liberal education program be designed with various patterns of instruction to test what differences in critical thinking ability and open-mindedness can be attributed to the methods of instruction. From such research a more effective model could be developed for use with adult liberal education programs.

It is apparent that more research needs to be done with adults using the American Council on Education's Test of Critical Thinking Form G and the ACE Inventory of Beliefs Form I. The ACE Test of Critical Thinking should be researched more carefully to determine whether it is appropriate to have only one form of the test. A research design should be set up to determine the effect of retaking the test over varying periods of time on adults not involved in an educational pursuit.

Research needs to be conducted with a wider variety of ages to further explore the relationship of age to critical thinking ability. There is an indication that a wider age range may demonstrate differences in the potential to improve critical thinking ability.

A study should be made of gains made by participants in the Kellogg Farmers Study Program in knowledge about economics, political science, and international affairs as well as other subject matter areas.

The third year of the program, which features the international travel seminar should be studied in further detail in an effort to determine what contributions this phase of the program provides.

It seems appropriate to study the acceptance and influence of the Kellogg Farmers Study Participants in their local communities.

Since a population of over 200 adults now exists that has been tested at various intervals ranging from one to three years, there is a possibility that someone in future years may wish to do a longitudinal study to attempt to determine how rural adults change on the variables critical thinking ability, open-mindedness, and reading comprehension over a greater number of years.

Concluding Statement

This study proposed to explore only a few specific aspects of the Kellogg Farmers Study Program and it should not be interpreted as representing "the evaluation of the program." Each study institute and travel seminar has been evaluated by participants. These participant evaluations were of interest to this researcher and undoubtedly to those who direct the program. This

dissertation represents one additional phase of evaluation made by an outsider using a set of tests. Unfortunately, test scores do not tell us about the total impact of the program.

The author was invited to undertake the task of evaluating specific aspects of the Kellogg Farmers Study Program. While exploring the possibility of doing the evaluation it became apparent that the Kellogg Farmers Study Program might serve as a useful case in studying the learning patterns of adults and that this study had the potential to contribute considerably to the field of adult education. It is hoped that this research will be helpful in planning, conducting, and evaluating the Kellogg Farmers Study Program as well as other adult liberal studies programs.

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APPENDICES

APPENDIX A

SAMPLE OF LETTERS SENT TO NON-PARTICIPANTS

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AND U

COOPERATIVE EXTENSION SERVICE

MICHIGAN STATE UNIVERSITY • EAST LANSING • MICHIGAN 48823

Agricultural Economics
Agriculture Hall

AND U.S. DEPARTMENT OF AGRICULTURE COOPERATING

October 29, 1968

It was a pleasure to meet you at the time you attended the final interview session for the Kellogg Farmers Study Program. As you may be aware, Group I has now completed their three-year study program which was started in 1965.

In order to determine some of the effects of the Kellogg Farmers Study Program, an evaluation study is now underway. This research is attempting to determine the appropriateness of investing scarce resources in a program such as the Kellogg Farmers Study. Hopefully, this research will indicate strengths and weaknesses in the current program. It is important to you and your community because it may be a factor in determining future programs for persons like yourself.

One part of the evaluation study involves having you and your wife retake some of the same tests you took during the final interview session held at Kellogg Center here at M.S.U. It is possible that certain other information may be sought by mail at a later date.

Mr. Lowell Rothert, who is conducting the evaluation study, is arranging plans for the tests as you will note in the accompanying letter. I do hope you will cooperate in this important study.

Sincerely,

Myron P. Kelsey,
Extension Specialist in
Agricultural Economics

MPK:ncw

Enclosures

Room 1, Agric. Hall
Michigan State University
East Lansing, Mich. 48823
October 29, 1968

Dear Mr. and Mrs.

As mentioned in the letter from Mike Kelsey, I am in the process of conducting an evaluation of the Kellogg Farmers Study Program.

The cooperation of both of you is needed in taking some of the same tests you took during the final interview session here at M.S.U. The testing can be completed in two and one-half hours or less. I would certainly appreciate your cooperation in this experimental endeavor.

I am planning to conduct testing sessions in different areas of the state, and plan to hold one session at the Kalamazoo County Center Building on Tuesday, November 12, at 8:00 P.M. A list of the dates and locations is enclosed. Choose another testing session if it would be more convenient to you.

Would you please return the card indicating whether you plan to attend the testing session? I realize that the harvest season is an extremely busy time, and I will plan to contact you by telephone to arrange an alternate time for you to take the tests if you cannot attend this testing session.

I hope to hear from you soon.

Sincerely,

Lowell Rothert

Kellogg Farmers Study Evaluation
Testing Sessions

Date	Location
Wednesday, Nov. 6 8:00 P.M.	Sanilac County Cooperative Extension Service Office, Federal Building, Sandusky
Thursday, Nov. 7 8:00 P.M.	Ingham County Cooperative Extension Service Office, 127 East Maple St., Mason, Mich.
Thursday, Nov. 12 8:00 P.M.	Kalamazoo County Center Building, Lake St., Room C or D For those approaching from East on I 94, take I 94 Business Loop. Continue on Business Loop for 2 stop lights. Turn right at 2nd stop light which is Lake St. until you see the Center on the right. For those approaching from West on I 94, get off at Portage Rd. exit. Go North on Portage until you reach Lake St. Turn right on Lake.
Tuesday, Nov. 19 8:00 P.M.	Lenawee County Cooperative Extension Service Office, Courthouse, Adrian, Mich.
Wednesday, Nov. 20 8:00 P.M.	Room 712, County Building, Bay City, Mich.
Thursday, Nov. 21 8:00 P.M.	Oceana County Cooperative Extension Service Office, Federal Building, Hart, Mich.

APPENDIX B

THE FARMERS' OPINION INVENTORY INCLUDING PERCENTAGE CHANGE ON EACH ITEM

Percentage Change from Pretest to Posttest on the Farmers' Opinion Inventory By Various Groups

Groups	Time Period	Number in Group Reported
T_1 = Treatment Group I	1965-1968	27
T_2 = Treatment Group II	1966-1968	27
T_3 = Treatment Group III	1967-1968	29
C_2 = Control Group II	1966-1968	6
C_3 = Control Group III	1967-1968	16
WT_2 = Wives in Treatment Group II	1966-1968	26
WT_3 = Wives in Treatment Group III	1967-1968	27
WC_2 = Wives in Control Group I	1966-1968	5
WC_3 = Wives in Control Group III	1967-1968	13

The first six numbers were used for demographic cata coding, thus the 56 statements included in the Farmers' Opinion Inventory are numbered 7-62.

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 7: "Farmers cannot count on Government assistance in solving their marketing and price problems."									
1. Agree completely	10	-8	-31	-33	25		-30	-20	-8
2. Tend to agree	11	7	10	17	-25		19		
3. Tend to disagree	-9	-7	17	33		4	15	20	15
4. Disagree completely	-15	7	3	-17		-8	-4		-8
5. No Opinion						4			
Statement 8: "On the average, farmers are faring about as well in terms of income as city workers at the present time."									
1. Agree completely		-7		-17					
2. Tend to agree	15	15	-3			4		20	-8
3. Tend to disagree	-4	-4			-6	-4			23
4. Disagree completely	-11	-4	3	17	6			-20	
5. No Opinion									-15
Statement 9: "Consumers ought to pay more for the farm products than they are now paying."									
1. Agree completely	15	7	21	-17	-6		-11	-20	-8
2. Tend to agree	-19	-22	-14	17	-13	15			
3. Tend to disagree	7	7	-4		19	-8			23
4. Disagree completely	-4	7				-8	7	20	-15
5. No Opinion							4		
Statement 10: "Some simple and workable solutions to the problems of agriculture could be found if people would just think about it more."									
1. Agree completely	-11	-22	-7	-33	-13	-15	-15	-40	-15
2. Tend to agree		-15	-10	33	-6	-27	4		8
3. Tend to disagree	4	22	4		-6	39	4	40	
4. Disagree completely	4	15	10		19	4	11		8
5. No Opinion	4		3		6		-4		

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 11: "If the economic situation for farmers continues like it is now, in a few years the family farm will be replaced by large farms run by hired labor."									
1. Agree completely	11	26	7	-17	-25	-8	4	-20	
2. Tend to agree	15	-4	19	33	19	8	4	20	
3. Tend to disagree	-7		-8		13	8	-4	20	
4. Disagree completely	-19	-22	-18	-17	-6	-8		-20	
5. No Opinion							-4		
Statement 12: "Consumers ought to pay enough for food to enable farmers to have an income equal to nonfarm workers."									
1. Agree completely		4	-3		-31	-4	-4	-40	-8
2. Tend to agree	-19	-11	7	33	25	-11	4	40	-8
3. Tend to disagree	19	7	-7	-33		15		-20	15
4. Disagree completely			3		6			20	
5. No Opinion									
Statement 13: "What agriculture needs most, even more than laws and political programs, is devoted, tireless, and courageous leaders in which farmers can put their faith."									
1. Agree completely	-4	-15	-10	-17	-22	-35	-11	-20	-15
2. Tend to agree	4	4	7	17	-3	-15	7		23
3. Tend to disagree	4	7	10		25	35	7		8
4. Disagree completely	-4	7	-10		-7	12		20	
5. No Opinion		-4	3		6	4	-4		-15
Statement 14: "A farm organization should have membership dues high enough so that only farmers serious about the organization and its purposes will join it."									
1. Agree completely	30	4	7		-12	4			-8
2. Tend to agree		-11	3		6	-15	22		-8
3. Tend to disagree	-7	-7	-4	17	6	15	-7		23
4. Disagree completely	-15	11	-7	-33			-15		-8
5. No Opinion	-7	4		17		-4			

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 15: "It would be to farmers' advantage to gain control over one of the large retail food chains."									
1. Agree completely	-19						4	-20	-15
2. Tend to agree		7	10	-17	6		15	20	38
3. Tend to disagree	22	-4	3	17		15	-11		-38
4. Disagree completely	-4	-11	-10		-6	-11	-7	20	15
5. No Opinion		7	-3			-4		-20	
Statement 16: "It is more important that farm people earn satisfactory incomes than it is to maintain the family farm system."									
1. Agree completely	15	11			-6	4	15	-40	8
2. Tend to agree	7	22	28	17	13	23	-11	20	38
3. Tend to disagree	-22	-22	-14				-4	20	-38
4. Disagree completely		-11	-7	-17	-13	-23			-8
5. No Opinion			-7		6	-4			
Statement 17: "Farmer organizations which concentrate on the marketing of one commodity are likely to be more effective in serving member interest than organizations which deal with several commodities."									
1. Agree completely	-15	4	3		-25	-4	-11	20	8
2. Tend to agree	7	-11		17	38		7		-23
3. Tend to disagree	11	19		-17	6			20	8
4. Disagree completely	-4	-7			-19	-4		-20	23
5. No Opinion		-4	-3			8	4	-20	-8
Statement 18: "Some legal limit should be put on the size of food processing companies, retail food chains, and other marketing organizations."									
1. Agree completely	-11		-10				3		
2. Tend to agree		-30	7	-17	-13	15	32	20	-23
3. Tend to disagree	15	7	17	17	19	-15	-16	-20	8
4. Disagree completely		19	-4	17	-6	-8	11		8
5. No Opinion	-4	4	-4	-17		8	-23		

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 19: "The marketing power of farmers can best be achieved by the use of the market price system. Under this system, supply and demand become the primary factors in determining the true market level for agricultural commodities."									
1. Agree completely	4	-19	-14	-67	5	-23	-5		-30
2. Tend to agree	11	-11	-4	33	17	15	2	20	40
3. Tend to disagree	-26	15	3	17	-8	-4	3		1
4. Disagree completely	11	11	7	17	14	12		-20	-9
5. No Opinion		4	7						-1
Statement 20: "A farm organization should have only operating farmers as members."									
1. Agree completely	15	-11	-3		6		7		-31
2. Tend to agree	7	18	14		-6	8	19		8
3. Tend to disagree	-15	-4	-3		13	-4	-7	-20	39
4. Disagree completely	-7	-4	-7		-13	-4	-19	20	-8
5. No Opinion									-8
Statement 21: "A farmer should be proud if he can say he owes money to no one."									
1. Agree completely	-11	-4	-7		-6	-4	-11	-20	-2
2. Tend to agree	7	-15	10		-6	8	-7		-1
3. Tend to disagree	11	7	14		12		11	20	6
4. Disagree completely	-7	7	-14			-7	4	20	-3
5. No Opinion		4	-3			4	4	-20	
Statement 22: "Federal marketing orders should be expanded to cover more Michigan products."									
1. Agree completely	7	7	-7	-20	-25		4	-20	-23
2. Tend to agree	7	7	17	50	38	-4	-7	20	
3. Tend to disagree	-7	-11		-7	-25	12	7		8
4. Disagree completely	4	-15	-14	-3	13	-15		-20	15
5. No Opinion	-11	11	4	-20		8	-4	20	

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 23: "If you want to solve agriculture's problems it's the production and marketing system as a whole that needs to be changed, not just the practices of individual farmers."									
1. Agree completely	-7	11	-12	-17	-13	-15	-15	-40	-8
2. Tend to agree	7	-8	12	33	25	4	4	20	15
3. Tend to disagree		4	7	17	-13	12	15	-20	-8
4. Disagree completely	-4	-7	-4	-33				40	
5. No Opinion	4		-4				-4		
Statement 24: "Those farmers who cannot earn a satisfactory income from farming under present conditions should plan to leave farming."									
1. Agree completely	-4	33	-4		-12	8			-26
2. Tend to agree	-4	-7	11	50	25	12	15		7
3. Tend to disagree	7	-11	-7	-50	-13		-26	-20	13
4. Disagree completely		-11				-12	4	20	-1
5. No Opinion		-4				-8	7		8
Statement 25: "The situation in agriculture today is so confusing that it is hard to tell what the future of farming in this country will be."									
1. Agree completely	7	15	-7	-17	-6	-19	-4	20	-16
2. Tend to agree		37	31	17	-25	27	11		23
3. Tend to disagree	-8	-30	-14	50	19	8	-7		
4. Disagree completely	-4	-22	-7	-50	13	-19	-4	-20	-7
5. No Opinion	4		-3			4	4		
Statement 26: "The ownership of farms ought to be restricted to those dependent upon farming for their income."									
1. Agree completely		-4	3	-17					8
2. Tend to agree	-4	7	-3	33	6			-20	8
3. Tend to disagree	11	11	24	-17	-6	15	7		-16
4. Disagree completely	-7	-15	-24	17		-15		20	-8
5. No Opinion		4		-17			-7		8

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 27: "Government estimates of crop production and of livestock receipts are accurate and unbiased."									
1. Agree completely	-11	4	-10	-17		8	-8		8
2. Tend to agree	7	22	21	33	6	-8	11	40	-8
3. Tend to disagree	-4	-11	-24		-19		21	-20	
4. Disagree completely	4	-11	10	-17	13	-4	-12		8
5. No Opinion	4	-4	4			4	-12	-20	-8
Statement 28: "In most labor unions the policies are determined by the rank and file members."									
1. Agree completely	-7		-4	17	12	-12	-4	-20	15
2. Tend to agree	-4	4	-7		-6	8	19	-20	39
3. Tend to disagree	11	7	10	-17		12	15	40	-23
4. Disagree completely	4	-7	4	33			-15		-8
5. No Opinion	-4	-4	-2	-33	-6	-8	-15		8
Statement 29: "The replacement of family farms by large-scale farms using hired labor would have undesirable economic and social consequences for the nation."									
1. Agree completely	-4	-19	-14	-17	19	-8	-16		
2. Tend to agree	15	7	-7	-33	-6	12	18	40	8
3. Tend to disagree	-4		17	33	-13	-15	-2		-15
4. Disagree completely	-11	7	4	17	-6	4	-1	-20	8
5. No Opinion	4	4			6	8		-20	
Statement 30: "It should be illegal to strike where the strike conflicts with public interest."									
1. Agree completely	11	-4	7	17	6	-12		20	7
2. Tend to agree	11		5	-17	13	-12	7	-60	38
3. Tend to disagree	-26	4	-1	17		19	4	20	-31
4. Disagree completely			-7		-19	4	4	20	-15
5. No Opinion	4		-4	-17			-15		

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 31: "Lawlessness and lack of respect for authority are major problems in the United States today."									
1. Agree completely	22	-4	-21	-50	-13	4	-18		
2. Tend to agree	11	11	17	67	13	4	11	-20	
3. Tend to disagree	-30	7	3	-17		-4	4		8
4. Disagree completely	-4	-11				-4	4		-8
5. No Opinion		4						20	
Statement 32: "Entry into farming ought to be restricted to young men with a farm background."									
1. Agree completely	4		4						
2. Tend to agree			-14			-4			-15
3. Tend to disagree	4	15	31	17		27	-4	-20	23
4. Disagree completely	-11	-19	-17	-17	-6	-27	7	20	-8
5. No Opinion	4	4	-4		6	4	-4		
Statement 33: "Today farmers can't really do much to determine the way things turn out for them."									
1. Agree completely	4	4		-17		8	4		
2. Tend to agree	4	4	7	17		-19	-11	20	-8
3. Tend to disagree	-11		4		-13	35	-11		-7
4. Disagree completely	3	-11	-10		12	-23	19	20	15
5. No Opinion		4						-40	
Statement 34: "The producers cannot make their bargaining power felt and will always be forced to yield, unless they can and do cut off the available supply to the processor."									
1. Agree completely	4	15	4		-6	-12		-20	-8
2. Tend to agree	-11		10	-33		12	-4	-20	23
3. Tend to disagree	4	-7	-3	17	19	4	15	-40	-16
4. Disagree completely	4	-7	-3	17	-13	-4	-7	80	
5. No Opinion			3				-4		

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 35: "A farm organization should have well-educated experts on its staff who are not necessarily farmers."									
1. Agree completely	-8	7			-13	8	7		
2. Tend to agree	8	11	-3	-17	31	8	-4		
3. Tend to disagree		-7	7		-13	-4	4		31
4. Disagree completely		-11	-3	17	-6	-12	-8		-23
5. No Opinion									-8
Statement 36: "Farmers should raise all of the crops and livestock possible as long as there are hungry people."									
1. Agree completely	4	-15	3	-50	6	-12	-7	-40	-15
2. Tend to agree	-37	-15	-10	17	-6	-23	4		23
3. Tend to disagree	15	4	24	17	25	19	4	40	15
4. Disagree completely	19	26	-17	17	-19	15			-23
5. No Opinion					-6				
Statement 37: "The government should step in and protect the public interest whenever organized groups get enough power to substantially raise prices and the cost of living."									
1. Agree completely			-3			-8	-7		-15
2. Tend to agree	-7		-7	17	-6	-4	-7	20	31
3. Tend to disagree	-4	7	24	-17	25	27	11		8
4. Disagree completely	11	-7	-14		-19	-15		-20	-23
5. No Opinion							4		
Statement 38: "Large supermarket chains tend to use their buying power to hold down farm prices."									
1. Agree completely	-4	4	-31		-19	-8	-19	20	-8
2. Tend to agree		11	35	17	13	4	22		38
3. Tend to disagree	11	-19	14		-6	-4			-8
4. Disagree completely	-7	4	-10	-17	13			-20	
5. No Opinion			-7			8	-4		-23

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_3	C_3	WT_2	WT_3	WC_2	WC_3
Statement 39: "In most general farm organizations the policies are determined by the rank and file farmer members."									
1. Agree completely	-15	-4	-7	17			-8		15
2. Tend to agree	19	4	10	-17	17	8	11	20	46
3. Tend to disagree	4	19	14	17	-12	-12	-11	-40	-46
4. Disagree completely	-7	-19	-10		-12	4	7	20	-8
5. No Opinion			-7	-17	7				-7
Statement 40: "When someone comes along with clear and simple ideas for solving some of agriculture's problems we should try to do what he says."									
1. Agree completely	-4		-4		-6	-12	-4	-20	
2. Tend to agree		-4				27	2	20	
3. Tend to disagree	4	-4			6	-12	10		
4. Disagree completely	-4	4				-4	-4		8
5. No Opinion	4	4	4				-4		-8
Statement 41: "It is a good idea to have a law that makes it illegal for dairy processors to sell any dairy products below cost."									
1. Agree completely	-4	-30	-4	-33	-3	-19	-13		8
2. Tend to agree	-7		10		-15	23	3	20	
3. Tend to disagree	11	7	-7		12		3	-20	15
4. Disagree completely	4	19	7	33	12		4		-15
5. No Opinion	-4	4	-7		-7	-4	31		-8
Statement 42: "A farm organization should have only operating farmers as elected officers."									
1. Agree completely		-5	4		25	15	-15		8
2. Tend to agree	-4	-12	-3	-17	-19	4	15	-40	
3. Tend to disagree	4	7	4	17	-13	-19	-4	20	8
4. Disagree completely	4	7	-4		6		4		
5. No Opinion	-4	4						20	-15

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 43: "Farmers ought to appreciate farming as a good way of life and be less concerned about their cash income."									
1. Agree completely	-4								-8
2. Tend to agree	4	-11			-6	-4			-8
3. Tend to disagree	-26	15		33	6	-4	-11	20	8
4. Disagree completely	22	-4		-33		8	11	-20	8
5. No Opinion	4								
Statement 44: "Large retail food chains should be prohibited by law from owning food processing facilities."									
1. Agree completely	4	7	-4	17	6	-4			8
2. Tend to agree		-11	10	17			19		16
3. Tend to disagree	4	-4	-4	-50	6	4	-4	-20	
4. Disagree completely	-7	7	3	17	-6		-11	20	-15
5. No Opinion			-7		-6		-4		-8
Statement 45: "Withholding products from the market in order to fix prices above the true market level cannot achieve a lasting improvement in farmers' market power."									
1. Agree completely	-9	7		17	6	15	-27	60	23
2. Tend to agree	17	-7	-4	-17	6	-12	21		
3. Tend to disagree		-4	4		-13	-4	14	-20	-31
4. Disagree completely	-8	4			-6		-4	-20	8
5. No Opinion					6		-4	-20	
Statement 46: "Farmers should be primarily concerned with producing farm products and let someone else worry about the marketing problems."									
1. Agree completely		-4	4						-8
2. Tend to agree	4	4					7	-20	
3. Tend to disagree	7		4	-17	6	23	-7		-16
4. Disagree completely	-11		-7		-6	-27	-4	20	15
5. No Opinion				17		4	4		8

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 47: "Food processors and retail chains should not be allowed to own farm production facilities such as cattle feeding lots, dairy herds, and vegetable farms."									
1. Agree completely	-11		3	-17	6		11	-20	-8
2. Tend to agree	19	-7	14	17	19	-4	22	-40	16
3. Tend to disagree	-7	11	-14		-6		-33	40	18
4. Disagree completely	-4		-7		-19	-4		20	-8
5. No Opinion	4	-4	4			8			-8
Statement 48: "Farmers must reduct the total amount of products going to market if they are going to receive a higher price for those products."									
1. Agree completely	-15	37	21		6	-12		-20	-8
2. Tend to agree		7		-17	6		-7	20	
3. Tend to disagree	15	-33	-10	17	-6	11	18		
4. Disagree completely		-11	-10		-6	4	-11		
5. No Opinion						-4			8
Statement 49: "It is proper for labor unions to use members' dues to try to get legislation that agrees with the union's official position."									
1. Agree completely	-33	15	-7	17	-6	-4	7		15
2. Tend to agree	30	-15			-12	-8	22	20	
3. Tend to disagree	7		14	17		8	-7	40	
4. Disagree completely	4	-4	-7	-33	19		-11	-20	8
5. No Opinion	-7	4				4	-11	-40	-23
Statement 50: "Government estimates of crop production and of livestock receipts tend to strengthen the position of the buyers and weaken the position of the farmers in farmer bargaining arrangements."									
1. Agree completely	7	-15	-7			-16	-15		-31
2. Tend to agree	-7	4	4	17	-25	-4	11	20	15
3. Tend to disagree		-7	7	17	25	-4		20	8
4. Disagree completely	-7	15		-17	6		-4	-20	
5. No Opinion	7	4	-3	-17	-6	24	7	-20	8

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 51: "In order to be effective, bargaining associations that attempt to get higher prices for farmers must be able to control the output that individual farmers market."									
1. Agree completely	-4	15	17	17	-13	-5	11	40	
2. Tend to agree	15		3		19	11	-7	40	31
3. Tend to disagree	-7	-15	-21	-17	-13	3	11	-40	-31
4. Disagree completely	-4				6	-12	-19	-20	-8
5. No Opinion						4	4	-20	8
Statement 52: "Farm prices are largely determined by large processors and retailers."									
1. Agree completely		7	-4		-6	-5	-19		-8
2. Tend to agree	4	11	24	33	-6	9	37		15
3. Tend to disagree	-7	-4	-7	-50		-9	-19	-20	
4. Disagree completely		-19	-14	17	13	-4		20	8
5. No Opinion	4	4				8			-15
Statement 53: "Farmers should use the same methods to get higher prices that make it possible for organized labor to get higher wages."									
1. Agree completely	4	-4	-11			-8	7		-23
2. Tend to agree	30	4	29	17	-9	3	7	20	15
3. Tend to disagree	-22	-7	-7	17	5	3	-11	-20	23
4. Disagree completely	-7	4	-11	-33	5	-5	-7		-8
5. No Opinion	-4	4				8	4		-8
Statement 54: "Farmers must get together in bargaining organizations to deal effectively with processors and retailers."									
1. Agree completely	-7	4	-13	-33	-12		1	20	-8
2. Tend to agree	15	-4	17	33	6	4	-5	-20	15
3. Tend to disagree	-7		-4	-17	6	-4	4	-20	
4. Disagree completely				17				20	-8
5. No Opinion									

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 55: "Buyers of farm products who sign a contract with a bargaining association should not be allowed to buy farm products from farmers who do not belong to the bargaining association."									
1. Agree completely	4	-15	-4		6	-13	3	20	-23
2. Tend to agree	22	33	7		-6	11	-5	-20	23
3. Tend to disagree	-22	-11	3	33	-6	-5	10		8
4. Disagree completely	4	-4	-10	-17	6	-13		20	-8
5. No Opinion	-8	-4	4	-17		20	-7	-20	
Statement 56: "The ownership of both processing facilities and retail chain stores by the same company gives it the power to hold farm prices below what prices would be if processing and retailing facilities were independently owned."									
1. Agree completely	11	-7	7	-17		14	-22	7	
2. Tend to agree			7			-32	32	-27	8
3. Tend to disagree	-4		-14	33		13	-5		15
4. Disagree completely	-7	7	-3	-17		-13			
5. No Opinion			4			18	-5	20	-23
Statement 57: "We shouldn't waste our time on discussions of the farm problems which don't offer clear solutions."									
1. Agree completely							4		
2. Tend to agree			-7	-17		-19	-15		-8
3. Tend to disagree	-4	-4	31	50	19	15	14	-20	15
4. Disagree completely	4	4	-20	-33	-12		2	20	-15
5. No Opinion			-4		-6	4	-4		8
Statement 58: "The government should do something to prevent the big unions and big companies from negotiating wage contracts that bring increases in consumer prices."									
1. Agree completely	4	4					-29	-25	15
2. Tend to agree	15	-7	7		25	8	25	35	31
3. Tend to disagree			10		-6	4	-6	15	-38
4. Disagree completely	-19		-21		-6	-12	-5		-8
5. No Opinion		4	3		-13		15	-25	

	Per Cent Increase or Decrease								
	T_1	T_2	T_3	C_2	C_3	WT_2	WT_3	WC_2	WC_3
Statement 59: "All farmers should contribute to a fund to help advertise their farm products."									
1. Agree completely	-7	8	-3		-6	-15	3		8
2. Tend to agree	4	7		33	13	35	-2		15
3. Tend to disagree		-11	10	-17		-12	-1	-20	-8
4. Disagree completely			-3	-17	-13	-8		20	
5. No Opinion	4	-4	-3		6				-15
Statement 60: "Farmers would be better off if there was only one farm organization representing all farmers."									
1. Agree completely	8	4	11			15	10	20	23
2. Tend to agree		-7	-13	17	23	4	-16	-20	46
3. Tend to disagree	7	-4	5		8		14		-23
4. Disagree completely	-15	7	-3	-17	-31	-19	1		-8
5. No Opinion							-8		8
Statement 61: "Union contracts that make it possible for a company to hire only union members are a good idea."									
1. Agree completely	4		-7		6	4	-4		
2. Tend to agree	19	4	14			4	7	-20	-8
3. Tend to disagree	7	7	-7		-25	24	-9	60	-15
4. Disagree completely	-30	-15		17	19	-48	-9	-40	
5. No Opinion		4		-17		16	15		23
Statement 62: "It is proper for farm organizations to use members' dues to try to get legislation that agrees with the organization's official position."									
1. Agree completely	-8	8	-21	-17	-13	-8	-5	-20	8
2. Tend to agree	11	-11	17	50	-19	4	26		
3. Tend to disagree	-4	4	4	-17	25		-8		15
4. Disagree completely					6	-4	-8	20	-8
5. No Opinion				-17		8	-4		-15