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ABSTRACT

The research project evaluates second grade economic materials developed over a three-year period with Des Moines, Iowa, teachers enrolled in the Developmental Economic Education Program (DEEP). The study measured the effectiveness of student teacher materials in the teaching of basic economic understandings and an in-service program for teachers. The sample consisted of 24 teachers and 504 second graders. Three treatment groups included group one using the conventional social studies materials; group two using the specially designed economic education materials; and group three using the same materials as group two, but whose teachers had received in-service training. The five week study began with the administration of the SRA Test of General Ability (TOGA) and the Primary Test of Economic Understanding (PTEU) and ended with a second administration of the PTEU as a post-test. Conclusions are as follows: 1) Basic economic concepts can be taught at early elementary grades and growth in students' understanding of them can be measured; 2) A close relationship exists between materials provided for teachers and students and pupil growth in economic understanding; 3) Full-scale programs in economic education for teachers may not be necessary. Eleven recommendations are included in the report. (Author/RM)

AN EVALUATION OF SECOND GRADE ECONOMIC MATERIALS

by
Donald G. Davison
John H. Kilgore

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I - INTRODUCTION

Background of Present Study

During the past decade, social studies programs produced for elementary schools have undergone extensive changes. New developments, including Jerome Bruner's emphasis on teaching the "structure of a discipline," together with the Joint Council on Economic Education's Project DEEP (Developmental Economic Education Program) and associated "Project Social Studies," have had profound effects upon the "new" programs now being published.

The "revolution" began with the publication in 1963 of Senesh's Our Working World, which he describes as an "organic curriculum" for elementary social studies. His curriculum is developmental and inter-disciplinary, containing basic concepts from not only economics, but from political science, sociology, anthropology, et al. Today, nearly all major publishers for elementary social studies materials are in the midst of publishing "new" social studies series. Such materials present elaborate scope and sequence charts to demonstrate the development of basic concepts in economics and other behavioral sciences as well as in history and geography in "inter" or "multi" disciplinary approaches to the social studies.

Another source of materials has been developed by the authors in connection with the DEEP Project in the Des Moines, Iowa, Public Schools. The Des Moines School District was involved in Project DEEP as a "pilot" school system from 1965-1968. The major thrust of Project DEEP in Des Moines has been in the area of economic education focusing on: (1) materials development, and (2) the in-service training of teachers, particularly at the elementary school level.

Close liaison was maintained by the authors with Des Moines teachers in developing economic education materials for use in the primary grades in the Des Moines Public Schools. Such a close and continuous relationship was needed for at least two important reasons. First, once the economic concepts to be taught were determined, teachers provided invaluable insights into methods of presenting them to children; and secondly, close contact with teachers provided

needed information or their own ability to grasp or handle economic concepts. Although extremely time-consuming, in-service programs involving teachers, curriculum specialists, and economists in the development of material probably are one of the best means of insuring that material developed will be presented to children in the intended manner.

The first material developed in the Des Moines DEEP Project was published by the Joint Council on Economic Education under the title GOODS, SERVICES AND PEOPLE in 1967. A further refinement of these materials resulted in the publication of the book, THE CHILD'S WORLD OF CHOICES by The University of Iowa in 1968. THE CHILD'S WORLD OF CHOICES is essentially a teacher's manual and resource book for Grades K-3, providing a spiral development of economic understandings based upon five major economic generalizations. (See Appendix A.)

Based on our experience of working with a considerable number of teachers over a protracted period of time, it seemed doubtful that the teacher who lacked formal training in economics could be expected to effectively teach economic concepts solely from a teacher's manual or resource book. Therefore, additional materials were developed which would more effectively meet the needs of such teachers. The materials, a Student Activity Book for The Child's World of Choices, Grade 2, and a Teacher's Guide to the Student Activity Book for The Child's World of Choices were prepared and published in February, 1970, by The University of Iowa.

The Teacher's Guide to the Student Activity Book provides a general framework of activities and teaching strategies to be followed in introducing the children to the key economic ideas. The material is organized under the five generalizations, with appropriate student activities designed for each. Each lesson in the Teacher's Guide contains references to appropriate sections of THE CHILD'S WORLD OF CHOICES for content background, term definitions, and child-oriented activities as well as related ideas and understandings under each generalization. As planned, THE CHILD'S WORLD OF CHOICES, the Student

Activity Book, and the Teacher's Guide to the Student Activity Book are to be regarded as a unified body of materials in the belief that their combined use will insure the most effective teaching and learning processes.

The Need for an Evaluation Instrument

The new economic education materials developed for use in the elementary social studies curriculum, then, have become increasingly sophisticated. Emphasis is placed on the development of children's understanding of basic concepts or fundamental ideas contained in the discipline of economics, with these concepts to be taught as part of the structure of the discipline. The new materials emphasizing the spiral development of concepts indicate an increased need for greater coordination of teachers' efforts at different grade levels.

Two basic assumptions have been predominant in the development of the new materials. First, the presumption has been that an examination of the ideas or concepts contained in the materials will provide a fascinating and meaningful experience for children. It also has been assumed that teachers will understand the concepts and present them in an effective manner. However, since evaluation instruments rarely, if ever, accompany the materials, no concrete evidence exists to confirm or refute these beliefs.

The almost revolutionary change in the character of the social studies indicates the overwhelming need for some evaluation instrument to determine children's ability to learn as well as teachers' ability to teach the new materials. It may be that specially designed materials are needed for children who differ sharply in their socio-economic backgrounds or in their intellectual capacities. In the past, capable teachers could be depended upon to make the necessary adjustments in the presentation of materials to compensate for differences in

students' backgrounds or abilities. However, unless many teachers are given special training, this may not be the case for the new material.[1]

Related to this need for an evaluation instrument is the need for more information on the relationship between teachers' preparation in economics and the effectiveness with which new materials in economic education are presented in the classroom. If effective teaching of the new materials requires some knowledge of formal economic content, and if these materials are to be used in the classroom, then some way must be found to provide present teachers, as well as those preparing to teach, with the needed training.

As was mentioned earlier, in recent years economics has received increased emphasis in the elementary grades. As is the case at the high school and college levels,[2] school systems need a recognized, acceptable instrument to evaluate economic understandings now being incorporated into the elementary curriculum over the nation. Preferably, evaluation instruments providing benchmarks and indicating students' economic understandings should be available for use at the completion of both third and sixth grade.[3] The following pages

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[1]If the extent of exposure to economics of Des Moines elementary teachers is typical, only a small proportion of such teachers are ever exposed to economics in either pre-service or in-service programs. A study of Des Moines elementary teachers' transcripts revealed that over 70 per cent of the teachers had zero hours in economics. Even for those teachers who had received some formal preparation in economics, generally it had been ten or more years since their last courses were taken in this area.

[2]Two major evaluation instruments measuring economic understanding have been developed for use in high schools and colleges. The first instrument, the Test of Economic Understanding, was developed by the Joint Council on Economic Education and published by Science Research Associates and has been widely used at the senior high school level. The second instrument, the Test of Understanding in College Economics (TUCE), was developed by the Joint Council and published by the Psychological Corporation in 1968. This instrument has been used to evaluate the effectiveness of methods and materials used in the principles course in economics offered by colleges and universities.

[3]An evaluation instrument, Test of Elementary Economics (sixth grade level), has been developed by David C. Crosier and others at West Springfield, Mass., West Springfield Public Schools, 1969. The results obtained from using this instrument under experimental conditions may be obtained from Peter Sloane, Director, Center for Economic Education, Clark University, Worcester, Mass.

describe the efforts of the authors in an initial attempt to develop a satisfactory testing instrument for use in the primary grades.

Development of a Testing Instrument for the Primary Grades

The development of a testing instrument for primary grade children proved a most difficult task, and several problems were encountered. First, the limited reading ability of primary grade children posed a special problem in choosing the test form. Secondly, the idea of developing a multiple-choice test consisting of pictures was tried but proved to be too time-consuming and costly an operation for this research project.

The authors then considered the use of a test with Yes-No items as well as an All-No test form. However, the Yes-No test form provides the subject with only two options and tends to have a low reliability. Test results also are difficult to interpret due to the acquiescence set of children. The All-No test has a higher reliability than the Yes-No test, but this test produces spuriously high achievement scores for children who are not acquiescent.

Of most value to us in selecting the test forms was a paper presented to the Education Section of the Utah Academy of Science, Arts, and Letters in 1968 by A. Guy Larkins and James P. Shaver, then of Utah State University entitled, "Comparison of Yes-No, Matched Pairs, and All-No Scoring of A First-Grade Economics Achievement Test."

Based on the Larkin-Shaver Study, the "Yes-No Matched Pair" format was adopted as the test form. This involves writing reversed items for each concept or bit of information tested. "Reversed" means that for every Yes-Item there is a No-Item intended to test the same content, and the "matched" items are scored as one. This technique has been devised to cope with the acquiescence-dissent biases and should cancel both effects.

While the matched-pair technique increases the number of options on each item (item = matched-pair) from two to four, it also reduces the size of the

test by half. However, according to the studies performed by Larkins and Shaver, the positive effect on reliability of doubling the options on each item outweighs the negative effects of halving the length of the test.

A serious problem was encountered in determining the number of items to be included in the test. If too small a number of test items are included, it is difficult to obtain a reliability level sufficient to justify the comparison of group means. If too large a number of test items are included, young children become excessively bored and fatigued. Administrative difficulties could be anticipated if a large test is subdivided and given to children in different periods.

The decision was made that the test should consist of approximately 30 matched-pair items or 60 individual items. It was thought that this test size would be adequate for reliability purposes and that it could be given in a thirty-minute period, which seemed appropriate to the maturity and attention span of primary grade pupils.

Prior to the development of materials, a conceptual framework had been drawn up identifying the major economic understandings, major concepts, and sub-concepts which were to be developed under each of the five economic generalizations. The conceptual framework also was used to determine test items to be included in the evaluation instrument.

Initially, a preliminary test was constructed, consisting of 69 matched-pair items (138 individual items) or more than double the number of items which were to be included in the final test. Due to the large number of items, this test was subdivided by economic generalization, and each part was administered on a weekly basis to the group of second grade children using the preliminary materials.

The tests of students whose scores fell within the upper and lower 27 per cent categories were selected for item analysis, including determination of the level of difficulty and index of discrimination for each item. This information

was used to reduce the number of test items from 69 to 39 and to determine those items to be refined or revised. Comments on each of the items also were solicited from other persons, including economists and educators familiar with the primary grades.

The next step involved contacting a public school system which used material focusing on economic concepts in the first and second grades. This arrangement provided the authors with a group of children who could be considered to be knowledgeable in primary grade economics. The school agreed to administer the test to approximately 100 second grade children. Again, an item analysis was performed on the test results. Based on this information, and on the comments of several persons, the authors reduced the size of the test from 39 to 32 matched-pairs, and additional items were revised. The 32 matched-pair items constituted the evaluation instrument which was later used in the Des Moines experiment.

II - PURPOSES OF THE EXPERIMENT

The specific purposes of this experimental study include:

First, to measure the effectiveness of the specially designed student and teacher materials in the teaching of basic economic understandings at the second grade level.

Second, to measure the effectiveness of an in-service program for teachers using the specially designed student and teacher materials.

Third, to measure the effectiveness of the economic education materials for second grade children in target and non-target schools.

Fourth, to measure the effectiveness of the materials for children who differ in characteristics such as age, sex, and levels of reasoning ability.

Statement of Basic Hypotheses

Or stated in another way, the experiment was designed to test the following hypotheses:

1. As measured by the Primary Test of Economic Understanding (PTEU), the mean change scores of the experimental groups who used special materials would be significantly different from the control group who did not use special materials.

2. As measured by PTEU, the mean change scores of experimental groups in target schools would be significantly different from the mean change scores of experimental groups in non-target schools.

3. As measured by PTEU, the mean change scores of experimental classes taught by teachers participating in the in-service program would be significantly different from the mean change scores of experimental classes taught by teachers not participating in the in-service program.

4. There would be a significant relationship between pupils' performance on the PTEU and their age and sex.

5. Pupils' scores on the PTEU would be more closely related to their scores on the TOGA reasoning test than on the TOGA information test.

III - EXPERIMENTAL DESIGN

Selection of Groups

The experimental design involved 24 teachers in the Des Moines School System and their classes at the second grade level, in experimental and control groups, and involved approximately 500 pupils. As would be expected, a truly random sample is rarely possible in public school experimental situations. Thus, the "non-equivalent control group design" described by Campbell and Stanley in Experimental and Quasi-Experimental Designs for Research in Teaching and used by Sol Spears in his dissertation, "An Evaluation of Three Economic Education Programs for First Grade" was employed. In this design, experimental and control groups could be used but pupils could not be randomly assigned to these groups. Instead, intact classrooms could be randomly assigned to control and experimental groups.

Steps to Avoid Contamination of Sample

Inasmuch as the materials to be used had been developed over a three-year period with Des Moines teachers enrolled in Project DEEP in-service classes, it was first necessary to eliminate all second grade teachers who had participated in Project DEEP, so that teachers in the experimental classes could approach the materials de novo.

Secondly, in the random selection from the teachers and classes remaining, it was necessary to make certain that no two experimental classrooms were located in the same building.

Thirdly, all testing, both "pre" and "post," was done by the principal or a consultant teacher with the regular teacher out of the room. At no time did the teachers in the experiment possess a copy of the tests used.

Target and Non-Target School Classification

A second consideration in setting up control and experimental groups was the matter of the "socio-economic level" of the pupils in the schools which participated in the experiment. The most convenient device available for making this distinction between schools was the designation of a "target" or "non-target" school as set forth in the guidelines of the U.S. Office of Education for determining a school's eligibility for financial aid under Title I of the Elementary and Secondary Education Act (E.S.E.A.). The designation of a "target-area school" means that certain criteria of socio-economic need and cultural deprivation qualify this school for special help under Title I funds.

On the assumption that second grade pupils in target area schools would show less growth in economic understanding than pupils enrolled in non-target schools, an equal number of target and non-target classrooms were included in the sample for each of the three groups under investigation.

At this point the categories to be used in the experiment might be described as follows:

CONTROL EXPERIMENTAL

	C_1 Continue with regular social studies program	C_2 Use of THE CHILD'S WORLD OF CHOICES, including Teachers' Guide and Student Activity Book	C_3 Use of THE CHILD'S WORLD OF CHOICES (as C_2) plus in-service training sessions
Target-Area Schools	4 teachers and classes	4 teachers and classes	4 teachers and classes
Non-Target Area Schools	4 teachers and classes	4 teachers and classes	4 teachers and classes

Experimental Treatment

The "treatment," shown as C_1, C_2, and C_3 above, involved varying exposure of pupils to economic education as a part of classroom social studies instruction during a five-week period of time as follows:

1. Pupils in the eight classrooms included in the control group (C_1) to continue with regular social studies program.

2. Pupils in the 16 classrooms included in the experimental groups (C_2, C_3) to use special materials in economic education including THE CHILD'S WORLD OF CHOICES and related Teachers' Guide and Student Activity Book.

In-Service Training Program

The essential difference between the two experimental group treatments, C_2 and C_3, lies in the in-service training program for teachers in the C_3 treatment group.

While pupils in both C_2 and C_3 treatment groups were to receive instruction based upon THE CHILD'S WORLD OF CHOICES and the five basic economic generalizations developed in these materials, only the eight teachers in C_3 received a weekly in-service training session during the course of the experiment. These teachers met from 3:30 to 5:30 each Monday afternoon for five weeks during the experiment to

receive special instruction on each of the five basic generalizations to be taught during the experimental unit. Each teacher received $10 per training session from local Project DEEP funds.

Measuring Instruments Used

In view of the necessity of using intact groups, the John C. Flanagan "Test of General Ability" (TOGA), Form A, K-2, (SRA 1959), was administered to all pupils in both control and experimental groups so that suspected differences in ability levels could be determined and utilized in the analysis of outcome data.

The TOGA was chosen because: (1) there were no other general intelligence test scores already available for the pupils involved and (2) TOGA is particularly suitable for testing second grade pupils since it is a test of general ability which does not require reading, arithmetic, or any other form of school achievement.

Although TOGA yields both an IQ score and a grade expectancy score, the wide range of ages found in the total sample of pupils went beyond established IQ and grade expectancy norms for the K-2 level of the test used. For the purposes of this experiment a raw score to IQ transformation would serve no purpose but would introduce error. Consequently, total TOGA raw scores were used as ability measures.

Since TOGA also yields part scores for: (1) the child's information about, or familiarity with, the world around him, and (2) the child's powers of abstract reasoning, these part scores were used to "test out" a tentative sub-hypothesis "that pupils' scores on the PTEU would be more closely correlated with pupils' scores on the TOGA reasoning test than on the TOGA information test."

The second major measuring instrument used was the Primary Test of Economic Understanding (PTEU) discussed above. It contains 32 yes-no, matched-pair items which consist of short, declarative statements, each calling for a "yes" or "no" response by the pupil. Further, for every item in which the correct response is

"yes," there is a matching item for which the correct response is "no." Both matched items must be correct to count toward the pupil's score.[4] (See Appendix B for information on difficulty and discrimination indices.)

The use of these measuring instruments in the experimental process was as shown below:

Groups	Pre-Test	Treatment	Post-Test
Control (C_1) 4 Target 4 Non-Target	TOGA & $PTEU_1$	Regular social studies curriculum (5 weeks)	$PTEU_2$
Experimental (C_2) 4 Target 4 Non-Target	TOGA & $PTEU_1$	Use of THE CHILD'S WORLD OF CHOICES materials--no-in-service training (5 weeks)	$PTEU_2$
Experimental (C_3) 4 Target 4 Non-Target	TOGA & $PTEU_1$	Use of THE CHILD'S WORLD OF CHOICES materials plus in-service training for teachers (5 weeks)	$PTEU_2$

To reiterate, in every case, the test materials (both TOGA and PTEU) were in the hands of building principals and were administered by them or consultant teachers only. (See Appendix C for list of schools, teachers, and principals involved in the evaluation experiment.)

Project Calendar

Week of March 30-April 3, 1970

1. Orientation meeting held for all teachers and principals involved in the evaluation project. TOGA and PTEU tests distributed to principals. THE CHILD'S WORLD OF CHOICES materials distributed to teachers of all experimental classes.

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[4]The reliability used in this study was derived by use of the Kuder-Richardson Formula 20. A reliability coefficient of .79 was obtained for the test. The standard error of measurement was 2.47.

2. First in-service meeting for the eight teachers in treatment C_3 held. To meet each Monday for five weeks of the project.

3. TOGA and PTEU pre-test administered to all groups, control and experimental, during this week.

4. Teaching of economic understandings from THE CHILD'S WORLD OF CHOICES materials began in experimental groups C_2 and C_3--to be taught at least 30 minutes daily, four days per week, as social studies unit.

May 4-May 6, 1970

1. PTEU post-test administered to all groups, control and experimental. End of project activities in the classroom.

2. Return of all test materials to project director at School Board office.

It should be pointed out that each teacher and principal involved had been personally contacted by the project director and the purposes and outlines of the project explained before the orientation meeting, mentioned above, was held. Inclusion in the project was not determined by administrative fiat; each teacher and principal contacted had the option of withholding participation of any class or school. However, there were no refusals to participate. In fact, eagerness to participate was the rule.

IV - ANALYSIS OF OBTAINED DATA

Schematic Organization of Data

Before consideration of the statistical analysis of data gathered from the experiment, an examination of the schematic organization of data classification as shown in Figure 1 below would be helpful.

FIGURE 1

	C_1	C_2	C_3
Target (1)	11	12	13
Non-Target (2)	21	22	23

In Figure 1, the first digit within each cell is the school classification (1 = Target, 2 = Non-Target). The second digit in each cell is treatment (C_1 = Control, C_2 = Materials, C_3 = Inservice and Materials).

Within each cell in Figure 1 there are four classrooms. The classroom is the sampling unit in the analysis. Thus each classroom contributes one score on each of the two variables, TOGA and $PTEU_1$. In this case that is the mean for the students in that classroom. Each cell, then, contains four such scores for each test. In addition, each cell has a mean (the arithmetical average of the means for the four classrooms). When the scores for all students within a cell are averaged (as opposed to averaging the means of the four classrooms), the weighted mean for the cell is obtained.

Classrooms-Within-Cell Analyses

The total number of students involved in the experiment and for whom scores on all measures (TOGA, $PTEU_1$, and $PTEU_2$) were obtained was 504. Because intact classrooms were available for the experiment, classrooms-within-cell analyses of the data were planned.

The first step in analyzing the data was to test for suspected differences among classrooms. In some situations, the classrooms-within-cells design might be used initially because differences among classrooms are suspected but not known to exist. An F-test might then be made. If this F-test proved nonsignificant, one might then, on the assumption of no classroom differences, regard this as a simple randomized design.[5]

[5]Lindquist, E. F., Design and Analysis of Experiments in Psychology and Education, Houghton-Mifflin Company, Boston, 1953, p. 173.

The F-test for significance of the classroom differences was made for TOGA and $PTEU_1$ for each cell.[6] In the present terminology, the F could be stated as the mean square for classrooms within a cell divided by the mean square for students within those classrooms. The results are summarized in Table 1.

It will be noted that, in all cases except the target-treatment 2 group (cell 12), the F was significant for TOGA or $PTEU_1$. Thus, it could be assumed that the assignment of students to classrooms had not been done randomly and that such classroom differences dictated that a classrooms-within-cells analyses be employed. As Lindquist[7] has suggested, the classroom and not the individual child was treated as the unit of sampling. This indicates that the cell did not contain a random sample of students, but more appropriately a random sample of classrooms.

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[6]The use of the F-test in this situation is relatively uncommon, and therefore it may be beneficial to describe the procedure. Consider an experiment similar to the present one, where 504 students are available for a design requiring 6 cells. Ideally, one would randomly assign 84 students and 4 teachers to each cell. Each teacher would then be randomly assigned 21 students, and there should be no significant differences among the 24 classrooms.

If, in the present case, the requirement for target and non-target schools would prohibit such a procedure--because the 504 students are already divided into target and non-target on the basis of their school's status--the ideal procedure would be random assignment of students to the classes within the cells in the target classification or to the classes within the non-target classification. If this were done, there should be no significant differences among the 12 classrooms within each classification.

In actual practice, random assignment is seldom possible. In the Des Moines experiment, 12 classrooms were available to be randomly assigned to cells within each classification. The question to be asked is "Does the makeup of the classes in the cells differ from what it would have been had students been randomly assigned to cells and then randomly assigned to teachers?" The F-test provides an index of this difference.

A large value of the F indicates that the classes are more different from one another than one would expect from randomly assigning students to classes. This is usually the result, because the students within a class come from the same school, neighborhood, etc. A student has more experiences in common with his classmates than with the other children who are assigned to the same cell.

[7]Lindquist, pp. 173-174.

Table 1

Summary for Classrooms-Within-Cell Analyses

Cell number	Degrees of freedom	F-values for TOGA	PTEU
11	3,60	.06	3.16***
12	3,65	.90	.72
13	3,68	10.63***	.95
21	3,97	7.60***	4.83***
22	3,86	2.56**	1.79*
23	3,104	1.31	9.04***

***Significant @ .05 level.
**Significant @ .10 level.
*Significant @ .20 level.

Analysis of Covariance

Since significant differences in both the TOGA and the $PTEU_1$ scores existed among classrooms, the design chosen was an analysis of covariance. This analysis employed the TOGA scores as the covariate and used the differences between the $PTEU_2$ and $PTEU_1$ score for each class as the criterion score. This resulted in an analysis of 24 classrooms, treating each classroom as an individual case.

Thus, for each classroom, the mean score on TOGA was used as the covariate and the mean change score ($PTEU_2$ minus $PTEU_1$) was used as the criterion variable. This amounts to analyzing the actual change in mean scores for classes in each treatment, adjusting these change scores to account for initial differences in ability as measured by the TOGA. Stated another way, this adjusts final scores for initial differences on both $PTEU_1$ and TOGA.

A two-way (or two-factor) analysis was performed. One factor was treatments, with the three treatments being: control, materials, and materials plus in-service. The second factor was school classification: target or non-target.

The results of the two-factor analysis of covariance is given in Table 2.[8]

Table 2

Summary of Two-Way Analysis of Covariance

	DF	Mean square	F	P less than
Within cells	17	1.858		
Treatments	2	11.854	6.379	.009
Target non-target	1	0.728	0.392	.540
Interaction	2	1.046	0.563	.580
Regression	1	9.756	5.250	.035

Check for Homogeneity of Regression

The data in Table 2 indicate that the treatment effects were significant beyond the .01 level. Neither the interaction nor the classification effect was significant which means that the amount of change and the effectiveness of the treatments in economics achievement did not differ in the target and non-target classifications. This is true even though, as shown later in Table 6, there were significant differences in the scores (not adjusted change scores) of the target and non-target students.

The findings of no significant interaction and no significant difference in the adjusted change scores for the target and non-target classifications prompted an analysis of treatment differences for the combined classifications. Thus, within each treatment, the target and non-target classrooms were combined.

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[8]It is always important to check on the condition of homogeneity of regression before interpreting an analysis of covariance. In the present case, the appropriate F-statistic for homogeneity of regression, with 5 and 12 degrees of freedom, MS among classroom regression/MS deviation of classrooms from cell regression, was equal to .32 which indicates that the condition was well satisfied. (The test for the significance of an obtained F-value is based on determining how unusual such a large value of F is; that is, the degree to which the mean square ratio exceeds 1. When the value is less than 1, the condition is better satisfied than one would expect from random sampling.)

In this instance, the condition referred to is the condition of homogeneity of regression of the change scores on TOGA total scores over the six groups. Had one randomly assigned 4 mean change scores to each cell, he would not expect to get the condition to homogeneity of regression as well satisfied as is the case here. Thus the interpretation of the analysis of covariance is justified.

Table 3

Means of Treatment Groups

	Control (C_1)	(C_2)	(C_3)	Total
Means on TOGA ($\bar{X}$)	50.3820	46.3054	49.1090	48.5988
Means of Change Scores ($PTEU_2 - PTEU_1$) ($\bar{Y}$)	.5795	2.1175	2.4055	1.7008
Means of Adjusted Change Scores ($\bar{Y} - .2027\ (\bar{X} - \bar{\bar{X}})$)	.2180	2.5824	2.3021	1.7008

Table 3 presents the means of the treatment groups used in this analysis. The adjusted mean change score for each group was computed by the formula $\bar{Y} - b\ (\bar{X} - \bar{\bar{X}})$, where

$\bar{Y}$ is the mean change score for that group;

$\bar{X}$ is the mean TOGA score for that group;

$\bar{\bar{X}}$ is the overall mean TOGA score; and

b is the mean regression coefficient, a within-group beta.

For example, the computation of the mean adjusted change score for treatment group 1 is as follows:

$$.5795 - .2027\ (50.3820 - 48.5988) = .2180$$

These adjusted change scores can be interpreted as estimates of the actual amount of change that would have resulted if the treatment groups had equal TOGA scores. These adjusted change score means for the three treatments were compared via t-tests. The results of the t-tests are presented in Table 4.

From the analysis in Table 4, it is indicated that both experimental treatments were signficantly more effective than was the control method, and there is no indication of superiority for either experimental method.

Relationships Among Variables

Table 5 is presented to indicate the relationships found among the variables. Such a table is helpful in understanding what is measured by the economic tests,

Table 4

Significance of Treatments

Comparison	T value (df = 20)*	Significance
C_1 with C_2	3.35	.01
C_1 with C_3	3.14	.01
C_2 with C_3	-.41	.70

*Adjusted mean square used as the common error term. This error term contains the variance from three sources in Table 2: within cells, interaction, and regression.

Table 5

Correlations Among the Variables
(n = 504)

	Age	TOGA Info.	TOGA Reas.	TOGA Total	$PTEU_1$	$PTEU_2$
Sex	.09	.15	.08	.03	-.01	.01
Age		-.06	-.07	-.08	-.06	-.01
TOGA Information			.50	.85	.42	.53
TOGA Reasoning				.88	.36	.45
TOGA Total					.45	.57
Pre-test ($PTEU_1$)						.69
Post-test ($PTEU_2$)						

$PTEU_1$ and $PTEU_2$. One interesting finding reported in this table concerns the correlations between the economics test and the part scores on the TOGA. The correlation between TOGA-information and $PTEU_2$ is .53, while the correlation between TOGA-reasoning and the $PTEU_2$ is .45. These correlations are (statistically) significantly different, which means that PTEU is more closely related to information (as measured by TOGA) than reasoning.

The data contained in Table 5 also indicate a very low correlation between children's scores on the economic achievement test and children's age and sex. While the correlation between PTEU scores and age was statistically significant, this relationship is of no practical significance. The child's sex is of even less importance for explaining his or her achievement on the economics test.

In order to permit the reader to better determine the generalizability of the findings, data are presented in Table 6 describing the performance of the students who participated in the present study. Table 7 presents unweighted group means on relevant variables.

Table 6

Means (with standard deviations in parentheses) of Pre-test Scores ($PTEU_1$) for All Students

	C_1	C_2	C_3
Target	10.0 (4.2)	9.8 (3.9)	9.3 (3.9)
Non-target	15.8 (4.7)	11.2 (4.0)	13.2 (4.7)

Means (with standard deviations in parentheses) of Post-test Scores ($PTEU_2$) for All Students

	C_1	C_2	C_3
Target	10.5 (4.8)	10.9 (5.1)	11.7 (4.9)
Non-target	16.3 (4.3)	14.4 (4.6)	16.3 (4.9)

Table 7

Mean* TOGA Scores for All Classes

	C_1	C_2	C_3
Target	47.4	42.1	45.9
Non-target	53.4	50.5	52.3

Mean* Unadjusted Change Scores ($PTEU_2$ minus $PTEU_1$)

	C_1	C_2	C_3
Target	.50	1.1	2.4
Non-target	.50	3.2	3.1

Mean* Change Scores, Adjusted on TOGA

	C_1	C_2	C_3
Target	0.8	2.7	2.4
Non-target	-0.6	2.7	2.1
Treatment means	+ .1	2.7	2.25

C_1 is control

C_2 is materials

C_3 is materials and in-service training

* is unweighted average of class means

V - SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The Problem

1. To measure the effectiveness, over a five-week period, of specially designed teacher and student materials to be used in the teaching of selected economic concepts to children at the second grade level.

2. To measure the effectiveness of an in-service program for teachers using the specially designed student and teacher materials.

3. To measure the effectiveness of the economic education materials for second grade children in non-target as well as target schools.

4. To measure the effectiveness of the materials for children who differ in such characteristics as age, sex, and levels of reasoning ability.

The Procedure

To evaluate the effectiveness of the materials, three treatment groups--C_1, C_2, C_3--were used. Group C_1 used the conventional social studies materials already in the classrooms. Group C_2 used the specially designed economic education materials for students and teachers. Group C_3 was furnished the same materials as Group C_2, but teachers in C_3 were also involved in a five-week, or ten-hour, in-service program.

The sample selected for the study was drawn from existing second grade classrooms from the sixty elementary schools in the Des Moines school district except that teachers who had formerly participated in Project DEEP in-service programs were initially excluded from the sample. Twenty-four classrooms and teachers were included in the final sample, and complete data were compiled on a total of 504 pupils.

Of the twenty-four classrooms, eight were included in each of the three treatment groups. Further, to obtain data relevant to effectiveness of the materials for children of differing socio-economic backgrounds, an equal number

of target and non-target classrooms were included in the sample for each of the three groups under investigation.

The study was conducted for a period of five weeks beginning with the administration of the SRA Test of General Ability (TOGA) and the Primary Test of Economic Understanding ($PTEU_1$) and ending with a second administration of the PTEU as a post-test ($PTEU_2$).

Findings and Conclusions

On the basis of the data analyzed in this research, the following findings were obtained:

1. The mean change scores of the experimental groups using the specially designed student and teacher materials were statistically significant and higher than the control group who did not use the special materials.

The first hypothesis of this research predicted that this difference would result; that both the experimental treatments would prove more effective than would the control method. This hypothesis was upheld by the data; the difference between experimental and control group mean change scores on the PTEU, after adjustment for ability differences as measured by TOGA, proved statistically significant at the .01 level.

2. There are statistically significant differences in the scores on $PTEU_1$ and $PTEU_2$ between target and non-target classifications.

Pupils in target schools scored significantly lower on both PTEU pre- and post-tests than pupils from non-target schools in this study. However, statistical analysis of mean change scores ($PTEU_2$ minus $PTEU_1$), when adjusted for differences in pupil ability as measured by TOGA, showed no statistically significant difference between the target and non-target classification. That is to say, when change scores were adjusted to assume that both treatment groups had equal TOGA scores, the amount of change between the administration of $PTEU_1$ and $PTEU_2$ was no longer statistically significant between target and non-target experimental groups.

The data clearly shows that pupils from non-target areas scored higher on both the Test of General Ability and the Primary Test of Economic Understanding and that these same pupils achieved higher change scores as measured by the PTEU post-test. However, pupils from the target area classes also showed improvement in economic understanding as measured by the PTEU post-test. Thus, the use of the special materials in both target and non-target classes proved effective; but any valid measurement of the extent of that difference must first take into account the significant degree to which target pupils differ from non-target pupils in general ability as measured by TOGA.

3. No statistically significant differences were found in the adjusted mean change scores for experimental classes taught by teachers involved in the in-service programs as compared with scores obtained by experimental classes of teachers not involved in the in-service program.

There is no indication of superiority for either experimental method; however, the adjusted mean change scores obtained by both experimental treatment classifications proved to be statistically significant when compared to results obtained by the control groups. This would indicate that the specially prepared materials for teachers and students were a major determining factor in the marked differences in achievement of experimental groups over the control groups.

The original hypothesis that the in-service program would make a statistically significant difference was not supported by the obtained data.

4. A very low correlation was found between children's scores on the economic achievement test and the children's age or sex.

While hypothesis 4 of this research predicted significant differences resulting from these two variables, they were found to be of such low correlation with economic understanding as to be of little or no practical significance in terms of their prediction value concerning the use of the special materials or acquisition of economic understandings.

5. Pupils' scores on the Primary Test of Economic Understanding were found to be more closely related to the TOGA part score on information than to the TOGA part score on reasoning.

Hypothesis 5, which predicted that there would be a higher correlation between PTEU and the TOGA part score on reasoning, was not supported by the data.

While a student's score on PTEU pre-test appears to be the best predictor of what he will achieve on PTEU post-test (correlation coefficient .69), it should be noted that the correlation coefficient of .57 between $PTEU_1$ and TOGA total as shown in Table 5 (page 19) would indicate that PTEU and TOG.. do not just measure the general ability level of the student. By squaring the correlation coefficient .57, one finds that only about 32 per cent of a student's score on $PTEU_2$ can be attributed to his TOGA score. The remainder of the score apparently depends mainly upon his understanding of economic content or is attributable to measurement error.

Conclusions

1. Basic economic concepts can be taught at early elementary grades and growth in students' understanding of them can be measured.

2. A close relationship exists between materials provided for teachers and students andpupil growth in economic understanding.

3. To the extent that elementary teachers are provided with sufficient background on economic content in teachers' materials, the necessity for full-scale programs in economic education for teachers may not be necessary.

Recommendations

1. This particular research design should be replicated at the same grade level to determine the universality of the Des Moines findings.

2. This particular design could be replicated by using the same materials at the third grade level to measure any possible effects of greater student maturity in acquiring economic understanding.

3. To provide additional information needed for material and test revision, this particular research design should be replicated at the third grade level in school systems where presently the social studies program for grades 1-3 already incorporates economic understandings.

4. Teacher and student materials should be developed for grades 1 and 3 to ensure a planned sequential development of the five economic generalizations from THE CHILD'S WORLD OF CHOICES.

5. Further data on the test should be obtained from upper level students in grades 4-6 where programs contain planned lessons in economic understandings.

6. Since the materials are designed to be used in a spiral fashion over the primary grades, research designs are needed to measure the cumulative effects of spiral treatment of these five economic generalizations.

7. While this study revealed no measurable advantage of in-service sessions for teachers, indices of discrimination arrived at through item analysis reveal that several test questions pertaining to central or basic economic concepts were missed almost universally. This would indicate that those concepts were not developed properly in the student-teacher materials, or through teacher presentation, or were beyond the maturity level or developmental stage of most pupils. Before a revision of either the test or materials is undertaken, it would seem desirable that these concepts might be more fully developed as focal points in an in-service program for teachers.

8. More research should be done in the area of teaching economic concepts to socio-economically disadvantaged students. This study showed that such students could achieve growth in economic understanding through the use of special material. But information is needed on the degree to which teachers have to make adaptation in materials and teaching strategies in order to achieve greater economic understanding on the part of such pupils.

9. Similar research should be undertaken in another social science discipline to see if the same general results are obtained in terms of target and

non-target groups and in terms of control and experimental groups. Evaluation instruments are needed to measure pupil growth in cognitive aspects in other behavioral sciences as well as in economics.

10. A study is needed of the relationship between the amount of time students are directly engaged in studying economics and their achievement in economic understanding.

11. A study should be made of the effects of teacher familiarity with special materials. This study could be replicated using the same teachers but using next year's class of students. This would provide a measure of the effect of teachers' familiarity with materials on student achievement in economic understanding.

Appendix A
Developmental Framework for Five Economic Generalizations

ECONOMIC GENERALIZATION I: *Because of limited income, consuming units must choose which of their many wants for goods and services they will satisfy through purchases in the marketplace.*

Major Economic Understandings

1. Households have many wants for goods and services.
2. Most household wants for goods and services are satisfied through purchases in the marketplace.
3. Household purchases of goods and services in the marketplace require the use of money income.
4. Household money income is limited, relative to the kinds and amounts of goods and services desired.
5. Households must decide what goods and services will be purchased with their limited money income.
6. Decisions by households to purchase certain kinds of goods and services mean that they must forego other kinds of goods and services.

Major Concepts

Scarcity
- *wants*
- *income*

Choice making
- *income*
- *tastes*
- *prices*

Opportunity cost

Sub Concepts

Consuming unit
Consumer
Consumer good
Consumer services
Economic goods
Free goods
Business unit
Marketplace
Money income

ECONOMIC GENERALIZATION II: *Scarce resources are required for the production of goods and services.*

Major Economic Understandings

1. There are not enough resources to produce all the goods and services people want. Consumption is limited by the scarcity of resources.

   a. Production must precede consumption.
   b. Production requires the use of scarce resources.

2. Resources are versatile.

   a. A resource may be used in the production of many different goods or services.
   b. Most goods and services may be produced with different combinations of resources.

3. The use of resources involves choice making.

   a. Choices must be made between the various goods and services which could be produced.
   b. Choices must be made between the various combinations of resources which could be used in the production of a good or service.

4. The use of a resource in the production of one good or service precludes its use in the production of others.

Major Concepts

Scarcity
Versatility
Choice making
Opportunity cost

Sub Concepts

Production
Resources--land, labor, capital
Business firm--it is the responsibility of persons within business firms to make decisions concerning the use of scarce resources

ECONOMIC GENERALIZATION III: *Households earn money income by selling the services of their productive resources to businesses and, in turn, use household income to purchase goods and services from businesses.*

Major Economic Understandings

1. **Households earn money income through the sale of the services of their productive resources to businesses.**

   a. **Private ownership of productive resources.**
   b. **Production mainly carried on within business organizations rather than within households.**

2. **The amount of income earned by households mainly depends upon the amount and kinds of resources sold to businesses.**

3. **The amount of consumer goods purchased by households from businesses mainly depends upon the amount of income earned by households from the sale of their resources to businesses.**

4. **Money is constantly flowing from households to businesses and from businesses to households as households buy goods from businesses (product market) and sell the services of their productive resources to businesses (factor market).**

Major Concepts

Marketplace
   product
   factor
Factor ownership
   private property
Business firm
   buyer of services of productive factors
   producer of consumer goods and services
   seller of consumer goods and services
Production--combining of factors (see Economic Generalization II)
Household
   buyers of consumer goods (spending of income)
   sellers of services of productive resources (income earning)
Money income

Sub Concepts

Barter
Factors
Factor payment (expenditures, price, income)
Money - medium of exchange
      - standard of value
Prices

ECONOMIC GENERALIZATION IV: *Some of people's wants for goods and services are satisfied through government.*

Major Economic Understandings

1. Government, as well as businesses, provides goods and services to households.

   a. Government provides some goods and services which would not be provided by private businesses.
   b. Government provides goods and services which individuals can purchase in the marketplace, but which many households would not purchase in the quantities which society considers adequate.

2. Goods and services provided through government require the use of scarce resources in their production.

   a. Some goods and services which government provides are produced directly by government, using resources which government must purchase.
   b. Some goods and services which government provides are produced by private businesses and purchased by government.

3. Government requires money income to purchase resources and goods and services.

   a. The major source of government's money income is taxes.
   b. Taxes permit government to provide some goods and services to households, but leaves less money income in households for direct purchases from businesses.

4. The provision of government goods and services involves choice making.

   a. Choices must be made between the various public and private goods and services which could be produced.
   b. Choices must be made between the various public goods and services which could be produced.

5. The opportunity cost of the use of resources in the production of government goods and services is the other goods and services, both public and private, which could have been produced.

Major Concepts

Government provision of goods and services
Government in the marketplace
Government's need for money income
Scarcity
Choice making
Opportunity cost

Sub Concepts

Public goods and services
Taxes

ECONOMIC GENERALIZATION V: *Households may save part of their money income.*

Major Economic Understandings

1. Saving is another alternative use of household income.

2. Household saving is that part of household income which remains after the payment of taxes and the purchase of consumer goods.

3. When households save part of their income this means that they must presently forego some of the goods and services which they, otherwise, could have purchased.

4. When households save part of their current income this means that their purchases can exceed their household income (in the future).

Major Concepts

Disposition of household income
Taxes, consumption, saving

Household saving
S = HH - (Tx + C)

Choice making
C vs. S
Present vs. future consumption

Opportunity cost of saving

Appendix B
Difficulty and Discrimination Indices for
Final Test, PTEU[1]

Item	Index of difficulty	Index of discrimination	Item	Index of difficulty	Index of discrimination
1-33	68	.53	17-49	39	.56
2-34	41	.43	18-50	33	.31
3-35	56	.46	19-51	67	.62
4-36	46	.58	20-52	35	.60
5-37	12	.01	21-53	23	.15
6-38	69	.34	22-54	49	.68
7-39	43	.44	23-55	34	.45
8-40	34	.48	24-56	39	.37
9-41	42	.70	25-57	51	.52
10-42	48	.56	26-58	8	.08
11-43	35	.40	27-59	31	.30
12-44	54	.38	28-60	25	.34
13-45	44	.36	29-61	14	.13
14-46	62	.59	30-62	51	.48
15-47	88	.31	31-63	67	.53
16-48	52	.50	32-64	17	.03

[1]The data include test scores for students failing in the upper and lower 27 per cent of the total group, consisting of the 16 experimental classes.

Appendix C

The following information identifies the schools, teachers, and principals participating in the Des Moines evaluation study

School	Teacher	Principal
Byron Rice	Dana Gaylord	Patience Guthrie
Brooks	Rosamond Ramsey	Donald Williams
Douglas	Lucille Peterson	Marjorie E. Schwien
Dunlap	Mary Shaffer	Dale Jacobus
Findley	Edith Hand	Nadine Machesney
Garton	Marjorie Sergeant	Lorraine McFadden
Grant	Sara Marguardt	Bernard Miller
Hillis	Virginia Smith	Eleanor Singer
Hoyt	Marcia Pollock	Ruth Collins
Logan	Angelyn King	Donald D. Shaw
Lucas	Peggy Good	James Mitchell
"	Vivian Lucas	
Mann	Berniece Wright	Violet Coldren
Madison	June Malliet	Kathryn B. Christian
McKee	Elizabeth Ruess	James Daugherty
"	JoAnn Vestal	
McKinley	Blanche Rinehart	Snowden Moon
Monroe	Roberta Waldo	Loretta Patrick
Moulton	Marsha Clark	Cecil Leonard
"	Jeraldine Kubicek	
Park Avenue	Virginia Armentaro	Irene Perkins
Scott	Marchie Gillman	Marion Pritchard
Wallace	Myrna Hines	Lester R. Rees
"	Sadye Jones	