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ABSTRACT

A group of 34 experimental and 45 control teachers provided data on 1,866 pupils in 75 different classrooms in 24 communities in the United States to determine the extent to which the workshop training provided for recipients of the Sears-Roebuck Foundation Fellowships in the summer of 1972 affected the economic understanding of their pupils. Pupils in grades 2, 3, and 4 took the Primary Test of Economic Understanding while students in grades 5 and 6 took the Test of Elementary Economics. All students took a form of the Flanagan Test of General Ability. After teachers had completed their units in economics, the economics tests were administered again. Change scores were computed for each pupil; mean pre-test, post-test, change scores and mean scores were computed for each class. Each workshop group was tested separately. The results from the Des Moines group indicated that pupils studying under workshop teachers learned significantly more than similar pupils. In seven of the eight other workshop groups, the pupils of the workshop teachers learned more than similar pupils under teachers who had not attended workshops. (Author/KSM)

THE IMPACT OF ECONOMICS WORKSHOPS FOR ELEMENTARY SCHOOL TEACHERS ON THE ECONOMIC UNDERSTANDING OF THEIR PUPILS

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The Joint Council on Economic Education

with the cooperation of

The Iowa Council on Economic Education

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SUMMARY OF REPORT

This summary has been prepared for those interested only in the overall findings of the study and a brief discription of the research design.

The purpose of this study was to determine the extent to which the workshop training provided for recipients of The Sears-Roebuck Foundation Fellowships in the summer of 1972 affected the economic understanding of their pupils. Fellowship recipients from nine workshops were selected for participation in the study. For each Fellowship recipient selected, one or more control teachers were chosen. Each control teacher had to be teaching at the same grade level, in the same general geographic area (but in a different school), and be of the same sex as the experimental teacher (Fellowship recipient). Efforts were made to match experimental and control teachers in terms of age, teaching experience, and economics backgrounds, except for the fact that the experimental teachers had attended 1972 summer workshops in economics. Although some of the teachers were unable to follow through as planned, a total of 34 experimental and 45 control teachers did follow through and did provide usable data on 1,866 pupils in 75 different classrooms in 24 communities in various parts of the United States.

Early in the fall semester of 1972, all pupils at the second, third, and fourth grade levels took the Primary Test of Economic Understanding (a standardized test developed by the Iowa Council on Economic Education) and the appropriate form of the Flanagan Test of General Ability. All pupils at the fifth and sixth grade levels took the Test of Elementary Economics (developed by the West Springfield, Massachusetts, Developmental Economic Education Project) and the appropriate form of the Flanagan Test of General Ability.

The tests were administered by paid proctors, so that the experimental and control teachers would not be inclined to "teach to the test" and prejudice the results. Test papers were sent to the Joint Council on Economic Education and to the Iowa Council on Economic Education for scoring and analysis.

After the experimental and control teachers had completed their units in economics (or toward the end of the school year in the case of those reportedly integrating economics into the curriculum throughout), the economics tests were again administered to the pupils. Change scores (the difference between the pre-test score and the post-test score) were computed for each pupil. Mean pre-test scores, mean post-test scores, mean change scores, and mean scores on the Test of General Ability were computed for each class. Mean change scores were adjusted to account for differences in pupil ability as measured by the Test of General Ability. In the case of teachers from the Des Moines workshop (17 of the experimental teachers), the possible impact of different textbook materials being used by the pupils was also taken into account.

Because each workshop was different in terms of content and approach, each was analyzed separately. The Des Moines group accounted for about half of the teacher and pupil population sample involved in the study and presented the best situation from the point of view of control. The results in Des Moines indicated that pupils studying under workshop teachers learned significantly more than similar pupils, using the same materials, and being taught by teachers with similar backgrounds but without the workshop experience. In seven of the eight other workshop groups, the pupils of the workshop teachers learned more than similar pupils studying under teachers who had not attended workshops.

Although the experimental teachers were not selected at random, they appear to have been representative of the entire group of Fellowship recipients,

at least as measured by performance on the SRA Test of Economic Understanding. The SRA test was administered to all Fellowship recipients both before and after the workshops. The mean post-test score and standard deviation for the experimental teachers was practically identical with the mean post-test score and standard deviation of the Fellowship recipients as a whole.

It is possible, of course, that the superior results obtained by the Fellowship recipients are accounted for by motivation or some other factor not considered in this study. Recognizing the difficulty of measuring motivation and other possibly significant variables, the researchers tentatively conclude that the workshop training provided during the summer of 1972 for recipients of The Sears-Roebuck Foundation Fellowships did have a positive impact on the pupils of those teachers and did result in greater learning as compared with similar pupils, in similar situations, taught by similar teachers without workshop training.

ACKNOWLEDGMENTS

A study as complex as this one requires the cooperation of a great many people. With deep appreciation, we should like to acknowledge the assistance and support that made this evaluation possible.

Dr. M. L. Frankel, President and Director of the Joint Council on Economic Education, and Dr. George L. Fersh, Associate Director, provided continuing advice, support, and encouragement. Mr. Stephen Buckles of the College and University Program of the Joint Council provided valuable advice on the research design and statistical analysis.

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Mr. William Whitsitt of The Sears-Roebuck Foundation suggested this evaluation in the first place and offered continuing support, advice, and assistance. We are indebted to The Sears-Roebuck Foundation for financing this research project.

It is not possible to mention the name of every individual who assisted in some way or another. We would have to list scores of classroom teachers, principals and other school administrators, and the directors or other staff members of several Councils and Centers for Economic Education. To all of these we give our heartfelt thanks, but we assume responsibility for any errors, weaknesses, or shortcomings found in this study.

G.G.D.
D.G.D.

Introduction

In the spring of 1972 the Joint Council on Economic Education submitted to The Sears-Roebuck Foundation a proposal for evaluating the effectiveness of the Fellowship Program for Elementary School Teachers. A two-phase evaluation scheme was developed. Phase One was designed to answer the question: "What was the impact of the workshop training on the teachers?" This included the administration of a standardized test of economics (the Test of Economic Understanding published by Science Research Associates, Inc.) on a pre-test and post-test basis to determine the extent to which teachers increased their knowledge of basic economics, a specially designed questionnaire to enable the teachers to evaluate their workshop experiences, and evaluation of projects and materials prepared by the Sears Fellows for use in their schools (this evaluation being made by economic education specialists not involved in the Program), and formal and informal evaluations of the teachers by educational administrators (such as principals) in a position to observe their efforts to teach economics. The results of this Phase of the evaluation (reported separately) indicated that the Sears Fellows generally learned about as much in their workshops as college students learn in a full-semester course in principles of economics, that the materials they developed were better than might be expected of teachers with similar backgrounds and experience, and that the overwhelming majority had made sincere and effective efforts to increase and improve the teaching of economics in their schools. Phase Two, which will be the subject of this report, was designed to answer the question: "To what extent did the workshop training of the teachers affect the economic understanding of their pupils?"

The basic approach was to select a group of teachers from among the Sears Fellows and compare the changes in economic understanding achieved by their

pupils with the changes achieved by the pupils of similar teachers who did not have the workshop training. The Primary Test of Economic Understanding (PTEU) developed by Donald Davison and John Kilgore at The University of Iowa was selected for use at the second, third, and fourth grade levels. The PTEU had been administered to over 500 second graders and nearly 5,000 third graders; it had a reliability coefficient (Alpha/KR 20) of 0.78 (which is good for a test of this length), and norming data were available.[1] The authors' claim of content validity was based upon their many years of personal contact with primary level teachers and a careful examination of textbooks and materials developed by school systems. Because the PTEU had not been tried with fourth graders, there were some doubts about the wisdom of using it in this evaluation with fourth grade pupils. These doubts proved to be unfounded, however. The PTEU was found to have a reliability coefficient of 0.75 when used as a pre-test with fourth graders, and 0.80 when used as a post-test. (The recommended reliability coefficient is 0.70.) In short, this test appears to have been adequate for purposes of this study.

The Test of Elementary Economics (TEE) developed by the West Springfield, Massachusetts School System, was selected for use with pupils in grades five and six. This test had been tried with nearly 2,500 pupils in nine school systems and norming data were available. We were uncertain, however, that the norming sample was truly representative, and therefore decided to rely most heavily on the PTEU. Indeed, fifth and sixth grade teachers were included in the evaluation initially only because of the fear that we might not get the 20 experimental teachers needed from among those serving in grades two, three,

[1] See Donald G. Davison and John H. Kilgore, "A Model for Evaluating the Effectiveness of Economic Education in Primary Grades," The Journal of Economic Education, Fall, 1971, and Examiner's Manual: Primary Test of Economic Understanding (Iowa City: The University of Iowa, 1971) for details.

and four. However, a reliability coefficient of 0.77 was obtained at the sixth grade level and 0.68 at the fifth grade level when the TEE was used as a post-test.* Item analyses suggest that the TEE may not be as reliable as the PTEU, but it does seem to have been adequate for purposes of this study, especially in view of the fact that we actually did obtain sufficient data from over 20 teachers using the PTEU.**

Flanagan's Test of General Ability (TOGA)[2] was selected to determine the academic ability of the pupils. The appropriate form for each different grade level was to be administered to all pupils in both the experimental and control classrooms. Differences in ability levels would then be taken into account in analyzing pupil change scores on the PTEU or TEE. In the next section, the actual setting up of the evaluation program is described and explained.

Setting up the Testing Program

The original plan was to select 20 of the Sears Fellows for participation in the pupil testing program. These teachers would be known as the experimental teachers, and their classes would be called experimental groups or experimental classes. For each experimental teacher and experimental class it was originally planned that there would be two control teachers and two control groups. Control group number one was to be made up of the pupils of teachers who were attempting to include economics in the elementary curriculum, but who had not attended a summer workshop in economic education. The controls were to be in different schools in the same district or areas as the experimentals, they would be at the same grade level as the experimentals, and generally of the

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[2] Published by Science Research Associates, Inc.

* See Appendix A for reliability coefficients of the PTEU and TEE.

** See Appendix B for difficulty and discrimination indices for PTEU and Appendix C for difficulty and discrimination indices for TEE.

same socio-economic background.[3] Control group number two would consist of the pupils of teachers who were not attempting to include economics in the curriculum, and who had not attended a summer workshop. In every way possible, this group would be similar to the others. An effort would also be made to find teachers who were similar in terms of age, background, and experience. The experimental and control teachers would also be of the same sex.

It was realized from the beginning that a random sample of teachers could not be obtained. Instead, a "convenience sample" would be used--a factor which is undesirable but unavoidable under the circumstances. Of necessity, the experimental teachers would have to be those who could give some reasonable assurance that the testing could be carried out in their schools and that control teachers and control classes of the type desired could be obtained. It was also considered imperative that the Joint Council's Director of Research meet personally with each experimental teacher. Since it was impossible for the Director to go to every workshop which had Sears Fellows among the participants, the experimental teachers had to be selected from among those which he was able to visit.

During his visits to the workshops, the Director of Research would meet privately with the Sears Fellows, obtain information from them about their backgrounds, interests, and teaching assignments, and give them a fairly detailed explanation of the research design. After pointing out that each experimental teacher would receive an honorarium (going as high as $100), he would ask for volunteers for the testing program. Of course, the fact

[3] For example, if the experimental class was in a small school in a rural area, the control classes would also be in small, rural schools. Inner-city ghetto children would be matched with other inner-city ghetto classes in different schools.

that the experimental teachers were volunteers presents the possibility of a biased sample, because one might expect these to be educators who were more interested in the program and who had a greater feeling of confidence in their ability to teach economics. On the other hand, the prospects of a fairly generous honorarium might have offset any feeling of insecurity on the part of those teachers who had doubts about their abilities to teach economics or who were less enthusiastic about the program. Furthermore, anonymity was promised. The teachers were told that the results of the testing would probably be published, but that the identity of each pupil and teacher would be kept secret.

After a teacher had agreed to participate, the Director of Research would obtain the name and address of her principal, superintendent, or other administrator whose permission might be necessary or who ought to be apprised of the project as a matter of courtesy. Detailed letters were then written to these individuals, explaining the background and purposes of the project, the tests that would be used, and the research design to be employed.

When the necessary permissions had been obtained, tests were ordered and sent to the individual who would be responsible for test administration and reporting in each area. This might be a district official (such as district social studies coordinator or elementary education supervisor), a principal, or a teacher not otherwise involved in the evaluation project. Each such person received a detailed set of instructions on administering the tests and returning the answer sheets. Repeatedly, everyone involved was warned that neither the experimental nor the control teachers should see the economics tests before the time came for post-testing. This, of course, was an attempt to avoid the possibility that they would "teach to the test." Arrangements

were made to have someone other than the experimental and control teachers administer the economics tests, and each proctor was paid a modest fee for this service ($10 for each test session administered). After all of the testing and reporting had been completed, an effort was made (through a questionnaire or a personal follow-up letter to a responsible person in the school district involved) to determine whether or not any teacher had indeed examined the economics tests at any time before the post-tests were given.

Before all of his visits were completed, the Director of Research learned that one part of the research design was not practical. The purpose of control group number two was to account for pupil maturation. That is, some children may do better on the post-test than on the pre-test although they have not had economics instruction, simply because they have matured. If we found that three points (for example) had been gained by pupils in control group number two, as compared with seven points for those in classes receiving economics instruction, we would (all other things being equal) tend to assume that the gain attributable to economics instruction was only four points rather than seven--three of the seven-point gain being accounted for by maturation. Control group number two was abandoned for two reasons. First, the Director of Research discovered that some teachers include economic concepts in their lessons without realizing it. During an interview with the Director, one of the Sears Fellows stated that she had been teaching some economics to her fourth graders but was not aware of it until she attended the workshop. The Director examined (line by line) the social studies textbook this teacher had been using and found that it did indeed contain several of the economic concepts included in the Primary Test of Economic Understanding. Of course,

it would have been impossible for the Director of Research to examine every piece of material being used by every teacher participating in the experiment to ascertain the extent to which those materials contain economics. Second, several of the teachers planned to confine their teaching of economics to short units of about three weeks--a period that is probably too short for maturation to be a factor.

The expectation that some teachers originally agreeing to participate would fail to follow through caused the Director of Research to obtain commitments from more than 20 Sears Fellows. This proved to be a wise move, for several teachers (usually through no fault of their own) were not able to carry on as planned. Not counting the group from Des Moines, 17 Sears Fellows and 25 control teachers participated.[4] (For reasons to be explained later in this report, some of these had to be dropped from consideration when the data were processed). In addition, 22 school administrators or other teachers assisted by proctoring tests or in other ways overseeing portions of the projects in their areas. (Again, this excludes Des Moines.)

The teachers in the Des Moines workshop presented a different situation. Here, through a special arrangement with the workshop director, each of the 22 participants would be considered Sears Fellows, and each would be involved in the testing program. This greatly increased the number of teachers the Joint Council had originally agreed to include in the evaluation component of the Fellowship Program. Furthermore, the Des Moines group provided the best situation from the point of view of uniformity and control. Two staff members

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[4] Several teachers who had not been asked to participate administered tests to their pupils anyway and submitted the results. Although these showed substantial gain scores, they were not accepted for inclusion in the study, because they had not followed our procedures, lacked adequate controls, and were in other ways of questionable validity.

of the Des Moines workshop (Donald Davison and John Kilgore) were the authors of the Primary Test of Economic Understanding, and they had had considerable experience in administering the test and analyzing the results, they could guarantee a uniform way of test administration and reporting, and they were engaged in a detailed examination and analysis of the social studies textbooks that the teachers would be using. The entire evaluation scheme could not be based upon the Des Moines group, however, because it could not be asserted with confidence that they were representative of all the Sears Fellows. Indeed, the Des Moines workshop was one of the few made up entirely of elementary level teachers, and the approach being used was substantially different from that found in other workshops. (The usual method is to give the participants instruction in basic economics, and then give some sort of lessons or exercises in how to teach the subject at the pre-college level. At Des Moines, however, the teachers examined the textbooks they would be using to discover the economics content and were then given instruction in the economic concepts they would be expected to teach.).

Returning to the question of the representativeness of the selected teachers, there is some reason to believe that the experimental group was indeed as heterogeneous and, at least in some respects, as varied in knowledge and ability as one might expect to find in a randomly chosen group of teachers. For example, when the Des Moines teachers took the Test of Economic Understanding on a pre- and post-test basis, their gain scores ranged from a low of zero to a high of nine, and their post-test scaled scores from 17 to 30. The mean scaled score gain, however, was slightly higher than that of the Sears Fellows as a whole (4.27 as compared with 3.84) and than that of a group of 376 teachers enrolled in economics courses other than the workshops (4.27 as compared with

3.75). Similarly, the experimental teachers from workshops other than Des Moines had gain scores ranging from one to nine and post-test scaled scores ranging from 19-31. Their mean gain score was 4.88 scaled score points. The mean post-test scaled score for all experimental teachers who had had no previous economics instruction was 23.86--not significantly higher than the 23.44 achieved by all Sears Fellows with no previous training in economics.[5] The median and mode were identical (24.00) for both of these groups. Furthermore, the experimental teachers appear to have been about as heterogeneous as the whole group in terms of economic knowledge. Their standard deviation was 3.42 as compared with 3.44 for the entire group. The average deviation from the mean was 2.77 and 2.68 respectively. As far as measurable understanding of economics is concerned, the experimental group appears to have been fairly representative of all Sears Fellows who had no previous economics. When we compare the experimental teachers with the group of 376 teachers enrolled in economics courses other than the workshops, we find that their mean scaled score on the post-test was not quite as good, for those 376 teachers achieved a mean of 26.00. We do not know, however, how many of those teachers had had previous economics instruction, nor do we know how many were secondary level teachers. In any event, it is clear that the teachers selected for the experiment were no better (in terms of measurable economic understanding) than other Sears Fellows and other teachers taking economics courses for whom data are available.

Throughout the 1972-73 school year, the Director of Research kept in touch with all educators participating in the evaluation program. This was

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[5] An effort was made to confine the experimental group to teachers who had had no economic instruction before attending the workshops. A similar, but less successful, effort was made in regard to control teachers.

done through personal letters, memoranda. telephone calls, and (in a few cases) personal visits. Participants were given stamped envelopes addressed to the Director of Research and were told to telephone him collect if they had any questions or problems. The participants had been asked to indicate when they planned to have the pre-tests and post-tests administered, and in advance of these periods the Director would send reminders and again specify the procedures to be followed. After the testing was completed, efforts were made to find out if there had been any departures from the prescribed procedures. Where such departures were found (as in the case of one experimental teacher who set up control groups in her own school), and where the deviation would have raised questions about the validity of the data, the results were omitted from the study.

We insisted that the Test of General Ability be administered as early in the school year as possible, and most teachers complied. Unfortunately, aside from the Des Moines group, it was impossible to achieve uniformity in the administration of the economics tests because of the wide variety of approaches being used. Some teachers integrated economics into the elementary curriculum throughout the school year, and thus administered the pre-test early in the fall and the post-test late in the spring. Others confined their economics instruction to a single semester and gave the tests accordingly. Some taught economics only in units of three or four week duration.[6] We also

[6]Researchers have found that two weeks of instruction (one hour a day) is sufficient to provide between-group differences for topics in the social studies. See Ned A. Flanders, "A National Coordinated Program of Research on Teaching Effectiveness" in How Teachers Make A Difference (Washington: U.S. Office of Education, 1971), p. 106.

found a great variety of textbooks, other reading materials, audiovisual aids, and teaching techniques being used.[7] It was not possible to control these factors. In the next section, we shall examine the results of the study in Des Moines.

The Results in Des Moines

As pointed out earlier, the Director of the Des Moines workshop agreed to involve all of the participants in the Phase Two evaluation, and promised a better controlled situation than was possible elsewhere. Note, again, that the Des Moines teachers did not differ significantly from the Sears Fellows as a whole in terms of their economic knowledge. Another positive factor in the Des Moines situation was that new social studies textbooks were being adopted for the elementary grades and that each contained some economic concepts. Three different series were being adopted. Series "A" was for grades one through six; Series "B" was for grades one through three; and Series "C" was for grades four through six. Des Moines elementary schools were permitted to make choices among combinations of textbook series. The economic content of the approved series provided the focal point for the Des Moines workshop. In Des Moines, then, the text material as well as the workshop experience could be taken into consideration.

Of the 22 teachers attending the Des Moines workshop, 17 participated in the Phase Two evaluation.* (Two were omitted because they were kindergarten teachers and no economics test was available at that level; two were given

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[7] An examination of nearly 1,000 studies analyzing differences between media revealed that few resulted in significant improvement in the effectiveness of instruction. See Lawrence M. Stolurow, "Learning Environments or Rooms For Thought" in How Teachers Make A Difference, pp. 136-137.

*One teacher had two classes, so that 18 experimental classrooms were involved.

different assignments and could not participate; and a control classroom could not be established for another.) Twenty control teachers were selected for this study. No control teacher was selected from a school housing an experimental teacher of the same grade level. Table 1 shows the distribution of the 38 experimental and control classrooms by grade level and by textbooks used.

Table 1

Experimental and Control Classrooms, by Grade and Textbook

Grade	Text A		Text B		Text C	
	E	C	E	C	E	C
2	1	1				
3	1	2	1	2		
4					4	5
5	4	3			1	1
6	4	4			2	2

There were 1,091 pupils in the 38 control and experimental classrooms. Because of incomplete data, however, 175 children were eliminated from the study. Thus, a total of 916 pupils were used for the Des Moines evaluation. All test materials (the PTEU, the TEE, and the TOGA) were handled only by principals or consultants appointed to administer the tests. Teachers were not permitted to examine them.

The criterion variable was the individual change score (post-test score minus pre-test score) adjusted for differences in ability by the use of the individual TOGA scores as the covariate. Since two different economics tests

were used in two blocks of grades, 2 through 4 and 5 through 6, the results obtained in each of these blocks will be analyzed separately.

Grades Two through Four.

Complete data were gathered on 408 pupils in seven experimental and ten control classrooms for these grades. The data included individual pupil test scores on TOGA and PTEU (pre and post) and were analyzed using the regression analog of the analysis of covariance as described by Schilling.[8] The individual student's TOGA score was used as the covariate in an attempt to remove from the final analysis any effects due to differences in individual ability. Since a three-factor analysis (grade x textbook x treatment) was not possible because the design was not crossed with respect to textbook (i.e. all texts were not used at all grades), the data were analyzed in a two-factor (block x treatment) design. The blocks used in the design were: 1) grade two, Text "A"; 2) grade three, Text "A"; 3) grade three, Text "B", and 4) grade four, Text "C". Fortunately, one test of the simple effect of textbook was possible between Block 2 and Block 3. A Scheffè procedure for multiple comparisons[9] was used to test the hypothesis that within grade three the "A" and "B" textbooks are equally effective in increasing economic understanding as measured by the criterion instrument.

The results are presented in Table 2 for the 17 classrooms in grades two through four. TOGA and pre-test and post-test means on the PTEU are shown. The mean change score is the difference between the pre-test and post-test PTEU classroom scores. The adjusted classroom mean change scores are the

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[8] C. E. Schilling, The Relationship of Analysis of Variance to Regression. Paper presented at the Sixteenth Annual Technical Conference, American Society for Quality Control, Knoxville, Tennessee, October 19, 1972.

[9] A. L. Hays, Statistics for Psychologists, (New York: Holt, Rhinehart and Winston, 1963).

Table 2

CLASSROOM MEANS

DES MOINES
2-4

GRADE	CONTROL (C) EXPERIMENTAL (E)	TXBK	PRE-PTEU[a] $PTEU_1$	POST-PTEU $PTEU_2$	UNADJUSTED MEAN CHANGE SCORE $PTEU_{2-1}$	TOGA[b] TOGA	ADJUSTED MEAN CHANGE SCORE $PTEU_{2-1}$
2	C	A	9.739	12.000	2.261	28.261	2.471
2	E	A	6.938	11.688	4.750	27.125	4.977
3	C	B	12.265	16.324	4.059	38.794	4.114
3	C	B	15.529	16.941	1.412	40.706	1.438
3	E	B	11.118	15.176	4.059	37.824	4.128
3	C	A	17.179	18.179	1.000	40.607	1.028
3	C	A	12.654	14.192	1.538	41.308	1.556
3	E	A	13.417	15.417	2.000	35.417	2.105
4	C	C	17.750	22.321	4.571	46.357	4.514
4	C	C	17.080	19.640	2.560	47.120	2.492
4	C	C	11.864	13.636	1.773	42.500	1.773
4	C	C	17.261	20.391	3.130	45.348	3.088
4	C	C	16.800	19.520	2.720	48.720	2.628
4	E	C	17.621	21.897	4.276	49.483	4.173
4	E	C	18.519	22.741	4.222	48.926	4.127
4	E	C	17.818	22.455	4.636	49.364	4.535
4	E	C	15.409	19.136	3.727	46.545	3.667
	OVERALL MEANS		15.194	18.672	3.108	42.928	3.108

408 Students

17 Classrooms

a) Primary Test of Economic Understanding
b) Test of General Ability

means by classroom of the individual change scores adjusted for individual TOGA differences. Adjusted classroom mean change scores, by blocks and by treatment, are presented in Table 3, and the results of the regression analog of the analysis of covariance are reported in Table 4.

As shown by the summary table for the analysis of covariance in Table 4, the adjusted mean change score for students studying under workshop teachers was significantly higher (at the .01 level of confidence) than for those whose teachers had not attended the workshops. This suggests that pupils studying under workshop teachers learn more economics as measured by the PTEU. This assumes random selection of pupils.

It was possible in Blocks 2 and 3 to examine the relative effectiveness of Texts "A" and "B" because both were used at the third grade level. However, the Scheffé procedure did not produce a significant difference between these two Blocks. The critical difference was 2.128 and the actual difference was 1.909, indicating no significant difference in the relative effectiveness of the two textbooks at grade three.

Grades Five and Six

In these two grades, TOGA and TEE data were gathered from 508 students in 21 classrooms--11 experimental and 10 control. TOGA and pre-test and post-test means for the fifth and sixth grades are reported in Table 5. The adjusted mean change classroom scores by treatment, grade, and text are reported in Table 6. The results of the regression analog of the analysis of covariance are reported in Table 7.

It was possible to use a three-factor analysis (grade x textbook x treatment) for analyzing the fifth and sixth grade data because at each of

Table 3

Adjusted Mean Gain Scores
By Block & By Treatment

Group	Mean	N
	BLOCK 1	
Experimental	4.9772	16
Control	2.4713	23
Combined	3.2821	39
	BLOCK 2	
Experimental	2.1046	24
Control	1.2593	54
Combined	1.4872	78
	BLOCK 3	
Experimental	4.1279	17
Control	3.1765	51
Combined	3.3971	68
	BLOCK 4	
Experimental	4.2200	100
Control	3.0163	123
Combined	3.5561	223

Table 4

Analysis of Covariance by Blocks
for Grades 2-4

Source	df	SS	MS	F
Treatment	1	136.2051	136.2051	9.123**
Blocks	3	230.2176	76.7392	5.140*
Treatment x Block	3	19.5241	6.5080	.436
Within Cells	399	5,956.8187	14.9294	
Total (Adjusted)	406	6,342.7655	15.6226	
TOCA (Covariate)	1	34.4894	34.4894	
Total	407	6,377.2549		

** p < .01

* p < .05

df = Degrees of Freedom

SS = Sums of Square

MS = Mean Square

F = F-test

Table 5

CLASSROOM MEANS

DES MOINES
5-6

GRADE	CONTROL (C) EXPERIMENTAL (E)	TXBK	PRE-TEE[c] TEE_1	POST-TEE TEE_2	UNADJUSTED MEAN CHANGE SCORE TEE_{2-1}	TOGA[d] TOGA	ADJUSTED MEAN CHANGE SCORE TEE_{2-1}
5	C	A	11.857	13.952	2.095	43.143	2.902
5	C	A	13.077	17.423	4.346	55.462	4.478
5	C	A	14.167	14.083	-0.083	49.500	0.375
5	E	A	13.897	20.103	6.207	60.759	6.048
5	E	A	11.043	16.261	5.217	51.304	5.577
5	E	A	13.147	17.941	4.794	57.882	4.793
5	E	A	15.636	19.545	3.909	53.364	4.156
5	C	C	11.973	14.568	2.595	48.405	3.113
5	E	C	11.130	14.739	3.609	47.739	4.163
6	C	A	18.034	20.379	2.345	62.241	2.105
6	C	A	17.870	22.957	5.087	63.391	4.784
6	C	A	15.900	18.500	2.600	63.150	2.310
6	C	A	13.346	17.077	3.731	58.038	3.721
6	E	A	16.481	21.815	5.333	57.593	5.348
6	E	A	21.800	28.267	6.467	72.133	5.685
6	E	A	17.107	22.071	4.964	61.857	4.745
6	E	A	15.133	18.933	3.800	63.600	3.486
6	C	C	16.207	22.069	5.862	67.448	5.337
6	C	C	15.154	17.538	2.385	60.462	2.242
6	E	C	15.385	19.346	3.962	59.000	3.899
6	E	C	13.429	15.571	2.143	58.786	2.092
OVERALL MEANS			14.667	18.618	3.951	57.862	3.951

508 Students
21 Classrooms

c) Test of Elementary Economics
d) Test of Gereral Ability

Table 6

Mean Gain (Adjusted) by Treatment, Grade, & Text
Grades 5-6

Grade	Workshop	No Workshop
	SERIES A	
5	5.2818	3.0309
6	4.8803	3.2044
	SERIES C	
5	4.1634	3.1128
6	2.9623	3.8739

Table 7

Analysis of Covariance
Grades 5-6

Source	df	SS	MS	F
Treatment	1	149.5226	149.5226	4.962*
Text	1	46.7085	46.7085	1.550
Grade	1	90.6420	90.6420	3.008
Treatment x Text	1	92.5203	92.5203	3.071
Treatment x Grade	1	42.9728	42.9728	1.426
Text x Grade	1	00.0156	00.0156	0.005
Treatment x Text x Grade	1	10.0204	10.0204	0.333
Within Cells	499	15,035.4515	30.1312	
Total (Adjusted)	506	15,421.1452		
TOCA (Covariate)	1	380.6245	380.6245	
Total	507	15,801.7697		

* $p < .05$

df = Degrees of Freedom
SS = Sums of Square
MS = Mean Square
F = F-test

these grades there were both experimental and control classrooms and use of each of the textbooks "A" and "C". For grades five and six the F value for treatment was significant at the .05 level, indicating that the students studying under workshop teachers learned more economics as measured by TEE. Again, a random selection of students has been assumed.

As shown in Table 7, no significant results were found for the text or grade. Evidently, no significant difference occurs whether the text used is from either series "A" or "C" at either grades five or six; and this is the case whether the children are in experimental or control classrooms.

The Results in Other Areas

In the areas outside Des Moines, 17 of the Sears Fellows and 25 of the control teachers who had agreed to participate in the study did follow through and submit data. Five had to be eliminated, however. One Sears Fellow arranged for three control classes in her own school and one control class in another school in the same area. The data obtained from the three classes in the same school were excluded from the analysis. Two control teachers from another area failed to provide TOGA scores, so their economics tests were not included in the study. Table 8 lists the eight workshops outside Des Moines from which experimental teachers were obtained, and shows the number of experimental and control classes in each of these areas.

Because there were substantial differences among the workshops, each is being analyzed separately. (The workshop courses differed in terms of overall length, economic content covered, teaching methods employed, the extent to which pedagogy as well as economics was included, make-up of the participants, and the like.) Table 9 indicates the way in which the 37 classrooms for which data were analyzed were distributed by workshop and by

Table 8

Experimental and Control Classrooms
by Workshop (Grades 2-6)

WORKSHOP*	CLASSROOM E	C
A	2	4
B	2	4
C	1	2
D	4	3
E	2	3
F	1	1
G	1	1
H	3	3
TOTAL	16	21

*Because all teachers were promised anonymity, the workshops they attended will be identified only by letter.

Table 9

Experimental and Control Classrooms by
Workshop and by Grade, 2-6

	Grade									
	2		3		4		5		6	
WORKSHOP	E	C	E	C	E	C	E	C	E	C
A	1	2	1	2						
B			1	2	1	2				
C	1	2								
D	1		1	2	2	1				
E	1	1			1	2				
F			1	1						
G	1	1								
H			1	1			1	1	1	1
TOTAL	5	6	5	8	4	5	1	1	1	1

Information on the sample population*

*Data gathered on 42 classrooms (5 of 42 classrooms dropped)

*Data analyzed for 37 classrooms (33 classrooms, grades 2-4
4 classrooms, grades 5-6)

*1,102 students in 42 classrooms originally involved

*950 students in 37 classrooms retained in the study

*Complete data on 752 students in 37 classrooms

*Eight workshops in seven states involved

*16 experimental groups, grades 2-6

*23 communities and 37 schools involved

grade level. The 37 classrooms had a total of 950 pupils, but 198 of these were dropped because of incomplete data. (For instance, some took the pre-test but not the post-test, some failed to take the TOGA, and so on.) A total of 752 pupils were included in the analysis. Seven states, 23 communities, and 37 different schools are represented by this population. The task of providing for uniform procedures and reporting was monumental.

The t-tests of the difference between treatment group means were calculated separately for each workshop. Table 10 shows the unadjusted mean gain for the entire group outside Des Moines. The pupils of Sears Fellows achieved a mean gain of 5.23 points, as compared with 2.78 for the pupils of control teachers.

Table 10

Mean Gain (Unadjusted) By Treatment Group
Grades 2-4

Group	Mean	SD	N
Experimental	5.23	5.35	294
Control	2.78	4.34	364
Total	3.87	4.97	658

Because of the differences among workshops, and the great differences in participating schools and classrooms, the data in Table 11 and Table 12 are probably more meaningful. Table 11 indicates that, with the exception of one workshop, the pupils of the Sears Teachers made significantly greater gains. Five of the mean gains were significant at the .01 (one-tailed) level, and two at the .05 (one-tailed) level. Table 12 shows that the gains made by fifth and sixth grade pupils of Sears Fellows were significantly greater

Table 11

Summary of t-tests for Grades 2-4

Workshop	Experimental			Control			t
	Mean	SD	N	Mean	SD	N	
A	4.55	4.75	38	1.53	5.14	53	2.98**
B	2.11	3.38	19	3.19	3.80	21	-0.77
C	5.34	5.27	41	2.53	3.99	57	2.26*
D	4.00	5.83	79	2.55	4.37	60	1.75*
E	5.81	5.52	53	2.75	4.44	96	3.93**
F	10.46	8.38	13	5.85	3.73	33	2.33**
G	4.27	4.38	26	0.30	3.50	20	3.55**
H	7.40	3.95	25	2.08	3.94	24	5.27**

* $p < .05$

** $p < .01$

Table 12

Summary of t-tests for Grades 5-6

Workshop	Experimental			Control			t
	Mean	SD	N	Mean	SD	N	
H	7.05	5.34	43	2.29	2.66	51	4.48**

** $p < .01$

than those made by control pupils at the .01 level. (This involved only one fifth grade experimental and one fifth grade control, and one sixth grade experimental and one sixth grade control.)

Although the workshops outside Des Moines were very varied, and although the researchers could not exercise as much control over test administration as desired, the findings generally support those obtained in Des Moines. That is, at every grade level the pupils of Sears Fellows tended to achieve significantly higher gain scores than those of teachers who had not had workshop training, after adjusting for differences in student ability as measured by the TOCA.[10]

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[10] As expected, there were many individual differences. In the few instances in which control groups achieved greater gains than experimental classes, one can only speculate as to the reasons. Table 13 gives a breakdown of the results for each experimental teacher having one or more control groups providing usable data. Note that the second control group for the third grade experimental teacher from Workshop A achieved a gain of 5.043 while the experimental class achieved a mean gain of 2.764. Follow-up questionnaires to the teachers, and communications with an official of the school district, revealed that the pupils of that control teacher had been exposed to economics instruction from kindergarten on up, that the control teacher had examined the PTEU (contrary to instruction), that she had had an economics course in college, and that she had nearly twice as many years of teaching experience. Any one of these factors (probably the first), or some combination of them, might explain the superior performance of her pupils. (It was also reported that those pupils were of higher academic ability and had higher reading scores.) Moving to Workshop B, we find that the control class achieved a slightly higher gain score, although this was not statistically significant. Follow-up study revealed no explanation for the failure of the experimental group to do better, except for the possibility that they were less talented academically. There are few clues as to why the fourth grade experimental teacher from Workshop C got poorer results than her second control teacher. Perhaps the fact that the control teacher taught economics as a separate unit while the experimental teacher attempted to integrate economics in the regular curriculum was a factor, or perhaps it was because the control teacher had had 11 years of experience as compared with only one year for the Sears Fellow. The situation in regard to the third grade teacher from Workshop D cannot be explained. Except for the fact that the second control group teacher had had economics in college and a bit more experience than both the experimental teacher and the first control teacher, these classes and teachers were almost perfectly matched. In any event, these few exceptions (although they raise tantalizing questions--as do nearly all research results) do not negate the overall result--the pupils of workshop teachers generally do significantly better.

Table 13
CLASSROOM MEANS

WORKSHOPS	CLASSROOMS	PRE-PTEU $PTEU_1$	POST-PTEU $PTEU_2$	UNADJUSTED CHANGE SCORE $PTEU_{2-1}$	TOGA TOGA	ADJUSTED CHANGE SCORE Adj. $PTEU_{2-1}$
A-Grade 2	E	7.864	13.682	5.818	29.545	5.870
	C	13.000	10.100	-2.900	31.300	-2.859
	C	12.429	15.429	3.000	35.143	3.016
A-Grade 3	E	17.125	19.938	2.813	45.188	2.764
	C	14.444	14.278	-0.167	40.667	-0.187
	C	15.333	20.444	5.111	48.000	5.043
B-Grade 3	E	9.895	12.000	2.105	37.263	2.107
	C	10.095	13.286	3.190	40.238	3.173
C-Grade 2	E	10.400	18.520	8.120	35.962	8.131
	C	12.813	14.063	1.250	35.125	1.266
C-Grade 4	E	16.125	17.125	1.000	41.125	0.977
	C	15.217	16.870	1.652	51.522	1.561
	C	15.833	20.611	4.778	45.778	4.725
D-Grade 3	E	11.696	14.174	2.478	35.304	2.493
	C	10.524	12.905	2.381	35.095	2.397
	C	12.059	15.765	3.706	35.118	3.722
D-Grade 4	E	16.684	19.158	2.474	41.211	2.450
	C	13.864	15.682	1.818	42.727	1.785
E-Grade 3	E	9.500	19.042	9.542	36.167	9.551
	C	12.389	15.833	3.444	34.333	3.465
	C	10.095	16.333	6.238	35.857	6.249

WORKSHOPS	CLASSROOMS	PRE-PTEU $PTEU_1$	POST-PTEU $PTEU_2$	UNADJUSTED CHANGE SCORE $PTEU_{2-1}$	TOGA TOGA	ADJUSTED CHANGE SCORE Adj. $PTEU_{2-1}$
E-Grade 4	E	12.414	15.138	2.724	37.276	2.726
	C	9.034	10.167	1.133	33.400	1.160
	C	9.926	11.296	1.370	35.667	1.382
F-Grade 2	E	12.615	23.077	10.462	36.462	10.469
	C	8.400	14.400	6.000	34.133	6.022
	C	8.056	13.778	5.722	31.500	5.761
G-Grade 2	E	8.808	13.077	4.269	26.500	4.341
	C	9.650	9.950	0.300	30.250	0.348
H-Grade 3	E	11.167	18.792	7.625	37.250	7.627
	C	11.125	13.208	2.083	40.833	2.062

WORKSHOPS	CLASSROOMS	PRE-TEE TEE_1	POST-TEE TEE_2	UNADJUSTED CHANGE SCORE TEE_{2-1}	TOGA TOGA	ADJUSTED CHANGE SCORE Adj. TEE_{2-1}
H-Grade 5	E	12.900	21.400	8.095	52.810	9.046
	C	12.793	14.552	1.759	60.448	1.662
H-Grade 6	E	13.773	19.818	6.046	60.864	5.892
	C	16.955	19.955	3.000	64.318	2.373

Conclusions and Recommendations

As Rosenshine points out, there has been a "paucity of classroom research on how teachers make a difference." He notes that of the 1,000 papers presented at the 1971 meeting of the American Educational Research Association, no more than 15 focused on how teachers make a difference on measured by pupil gains.[11] In the area of economic education, we know of only three studies which have attempted to measure the impact of the teacher's workshop training on his or her pupils, and these were extremely limited in scope.[12] In a sense, then, this study represents a pioneering effort.

Flanders has stated that: "The consequences of teaching and learning can never be completely determined and attempts to measure them are merely estimates based upon partial information." Nevertheless, he goes on to suggest that data should be collected "in order to make the best possible guess about whether more was learned in one treatment compared with the other."[13] These statements apply to our study, and it is recognized from the beginning that this attempt at evaluating the impact of economics education workshops would encounter many difficulties, provide only partial information, and leave many questions unanswered. The inability to exercise

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[11] Barak Rosenshine, "New Directions for Research on Teaching," How Teachers Made a Difference, p. 67. Also see his statements on pp. 68-73.

[12] See Robert J. Highsmith, A Study to Measure the Impact of In-Service Institutes on the Students of Teachers Who Have Participated. Unpublished paper. St. Cloud, Minnesota: St. Cloud State College, 1971. Also, Dennis M. O'Toole, Evaluation of an Economics Institute for Secondary School Teachers. Unpublished paper. Richmond, Virginia: Virginia Council on Economic Education, 1971. A third study, unpublished and untitled, was made by William Luker of the Texas Council on Economic Education, Denton, Texas, in 1971.

[13] In How Teachers Make a Difference, p. 110.

complete control over test administration outside Des Moines, and the lack of complete information on such things as differences in teaching techniques employed in the various classrooms, are inherent weaknesses.

As measured by the Primary Test of Economic Understanding (PTEU) and the Test of Elementary Economics (TEE), the students of workshop teachers did significantly better than those of control teachers who had not attended the workshops. This was the case after scores had been adjusted for differences in pupil ability as measured by the Flanagan Test of General Ability (TOGA). The findings apply to every grade level from two through six. In the Des Moines situation, where pupil textbooks being used were also considered, no textbook was found to be better than any other in terms of pupil gains on the economics tests. Outside Des Moines, so many different books and materials were being used by the experimental and control classes that it was not possible to analyze their impact.

Of course, one cannot overlook the possibility that other conditions might have had some bearing on pupil achievement. It is possible that the Sears Fellows did better because they were more capable teachers than the controls, and that they had these capabilities even before their workshop training. After all, they were selected from among several hundred teachers who applied for the grants, and their records were considered during the selection process. On the other hand, those picked for participation in the study were found to be no better in terms of economic understanding (as measured by the Test of Economic Understanding published by Science Research Associates, Inc.) than the group of Sears Fellows as a whole, and there is some fragmentary evidence that they were no better in this respect than other teachers who have completed workshops or economics courses. The Des Moines teachers did not

appear to be better than the average teacher from that area, according to members of the workshop staff who base this judgment on many years of experience with Des Moines teachers in workshops and in daily classroom contacts. In short, the researchers did not "stack the cards" by choosing teachers known to be more capable than their colleagues.

Perhaps the experimental teachers were more highly motivated than the control teachers. The fact that they gave up part of their summer vacations to attend workshops might be considered evidence of motivation and interest in economics, but this could be offset by the possibility that the money offered to Sears Fellows served as a primary inducement. (Several teachers interviewed by the Director of Research stated that the money rather than an inherent interest of economics served as the motivation to attend, or at least to attend the economic education workshop rather than some other.) In the questionnaire sent to all teachers (control as well as experimental) after all the testing and reporting had been completed, every respondent indicated the belief that economics can and should be taught at the elementary level. Whatever their interest and motivation prior to attending the workshop, however, most Sears Fellows gave evidence that the experience served to convince them of the need for economic education at all levels. Unfortunately, there is simply no way of comparing the motivation of the Sears Fellows with that of the control teachers.

The so-called "Hawthorne Effect" should also be taken into account. The Sears Fellows knew they were part of an experiment and that their pupils were being pre- and post-tested. This, alone, might have induced them to make an unusually strong effort to teach economics. On the other hand, the control teachers also knew that they were part of an experiment, that their pupils

were being tested, and that the results would be compared with those of the experimental classrooms. Thus, if the Hawthorne Effect was indeed a factor, it applied to both the experimental and control groups and therefore should not nullify the results of this study.[14]

Other things that might have accounted for the superior performance of the experimental pupils, at least in part, are the methods used by the Sears Foundation Fellows, better rapport between pupils and teachers, more support from the school administration, follow-up assistance provided by the workshop staff, and the use of materials given to Sears Foundation Fellows but not to control teachers. In view of the large number of teachers involved, however, it is probable that these factors applied in some cases but not in others, and that any such factor prevailing in one situation was balanced by its being absent in another. (For example, some Sears Foundation Fellows reported that their administrators became very much interested in economic education and provided considerable support, while others stated that they were unable to arouse the interest of anyone else in their schools or systems.) It must also be taken into account that where such factors as the use of more creative teaching methods, better administrative support, and follow-up assistance from economic education specialists existed, they might have been the results of the follow-up assistance, a service that was promised to each recipient of the Sears Foundation Fellowships.

[14] Controlled experiments designed to determine whether or not the Hawthorne Effect is a significant factor in educational research involving elementary pupils have failed to show that it has any impact. See Desmond Cook, The Impact of the Hawthorne Effect on Experimental Designs in Educational Research (Columbus: The Ohio State University, 1967), and Robert H. Bauernfeind and Carl J. Olson, "Is the Hawthorne Effect in Educational Experiments a Chimera?" Phi Delta Kappan, December, 1973, pp. 271-273.

The follow-up study made after all testing and reporting had been completed revealed that the teachers who attended the workshops were more likely to make a conscious effort to include economics in the curriculum, and that they felt more adequately prepared to teach economics than did the control teachers. Of course, this is not surprising. It was also found that the workshop teachers were more likely to present economics as a separate unit as opposed to (or in addition to) integrating the concepts into the regular elementary curriculum.

Although we can conclude with considerable confidence that the training received by the elementary teachers in economic education workshops had a significant impact on their pupils, several recommendations should be considered if similar studies are to be made in the future. Future studies might be undertaken only if more adequate controls are possible. The well-controlled Des Moines situation as described earlier in this report should be the rule rather than the exception. Further research is needed on the possible effects of textbooks and other materials. Although this study found that one textbook series was just as effective as any other being used in the Des Moines situation, it must be realized that those materials had just been adopted. It is possible that after a year or two of experience with the new materials, some difference might be found. (That is, other things being equal, one textbook might prove to be more effective than another in improving the economic knowledge of the pupils.) The books used in Des Moines were relatively good in terms of economic content.[15] A future study might compare the impact of these materials with those known to have less economics content.

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[15] See Donald G. Davison, John H. Kilgore, and Larry C. Sgontz, Economics in Social Studies Textbooks: An Evaluation of the Economics and the Teaching Strategies in Social Studies Textbooks, Elementary Grades (1-6). (New York: The Joint Council on Economic Education, 1973.)

Research is needed to determine whether or not a given method of teaching is superior to other methods. For example, do children using economics games and simulations learn more than those being taught by more traditional methods? Is it better to teach economics in separate units, or do pupils learn as much if the same content is integrated in the elementary curriculum throughout the semester or school year? To what extent do children retain what they have learned? How much will they remember a year or two later?

Does the design of the workshop make a difference? Is it better to stress teaching techniques and materials, as was done in Des Moines, or to continue with the traditional approach of stressing economic principles (as in a regular college introductory course) with pedagogy as a secondary consideration.[16] Further, are workshops more effective if they contain elementary level teachers only, or is the usual procedure of mixing elementary with secondary teachers just as good?

To what extent does teacher knowledge of economics make a difference? Other things being equal, does the teacher who achieved a high score on the Test of Economic Understanding (or some other standardized instrument) get better results than the teacher whose score was low? (An attempt was made to answer this question in this study, but the data were not adequate to justify a firm conclusion.)

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[16] Although very limited in scope, two recent studies suggest that teachers achieve higher gain scores on a standardized economics test when they take a course especially designed for elementary teachers in which instruction in how to teach economics in the elementary grades is combined with instruction in basic economic principles. See Loren Guffey and Charmayne Cullom, A Note on Increasing Economic Understanding. Unpublished paper. (Conway, Arkansas: State College of Arkansas, 1973) and Dennis O'Toole and Ann Coates, An Experiment in Open Economics. Unpublished paper. (Richmond: Virginia Commonwealth University, 1973).

Do children do better if they have had an organized, sequential exposure to economics from first grade (or kindergarten) on up? Or is it just as effective to concentrate economics at one grade level? Intuitively, we would be inclined to choose the former, and some fragmentary evidence from this study supports that view. Nevertheless, controlled research is needed on this point. Furthermore, if pupils are given a sequential exposure to economics over a period of years, what concepts should be taught at each grade level? What is the best scope and sequence?

How important is administrative support, or a centrally guided economics program? Will better results be obtained if there is a school-wide or district economics program, or can a teacher do just as well working in isolation.[17] These and many other questions call for research. This evaluation confirms the many previous studies which have shown that elementary level children can indeed learn some basic economic concepts. It suggests very strongly that workshop training for teachers does "pay off" in terms of improved pupil learning. But, like nearly all educational research, it raises more questions than it answers. If we now "know" that children can learn economics, and that economic education workshops are indeed effective in increasing the economic understanding of the pupils of the participants, we still need to know more about how to improve the existing procedures and practices.

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[17] Some of the Sears Foundation Fellows whose pupils achieved the greatest gain scores reported that they had been able to "turn on" their colleagues and get good administrative support. Some affected their entire districts as well as their own schools.

Appendix A

Reliability Coefficients *

PRE-PTEU

Grade	Reliability Obtained	Recommended	Standard Error Measurement
2	.69	.70	2.32
3	.80	.70	2.45
4	.75	.70	2.44

POST-PTEU

2	.72	.70	2.49
3	.75	.70	2.48
4	.80	.70	2.25

PRE-TEE

Grade	Reliability Obtained	Recommended	Standard Error Measurement
5	.58	.70	2.82
6	.63	.70	2.93

POST-TEE

5	.68	.70	2.92
6	.77	.70	2.89

The reliability used in this study was derived by use of the Kuder-Richardson Formula 20.

*PTEU data obtained from 17 classrooms in Des Moines.
TEE data obtained from 21 classrooms in Des Moines.

Appendix B
Discrimination & Difficulty Indices, Pre & Post PTEU*
For Grade Levels 2-4

ITEMS	LEVEL 2				Level 3				Level 4			
	DISCRIMINATION		DIFFICULTY		DISCRIMINATION		DIFFICULTY		DISCRIMINATION		DIFFICULTY	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST
1	.47	.19	56	74	.43	.33	65	74	.39	.31	70	85
2	.16	.38	14	38	.39	.69	40	60	.56	.46	67	79
3	.53	.44	33	47	.50	.15	44	39	.31	.28	51	59
4	.37	.50	29	43	.48	.51	57	55	.44	.43	66	74
5	-.05	.06	7	9	.07	.21	6	16	.26	.56	18	31
6	.42	.31	33	55	.48	.36	56	65	.53	.23	65	86
7	.05	.25	18	38	.45	.36	39	42	.32	.49	55	48
8	.26	.50	21	52	.52	.62	48	53	.48	.52	54	81
9	.42	.56	26	43	.57	.67	57	60	.53	.44	65	77
10	.63	.44	36	43	.45	.56	30	46	.49	.55	46	62
11	.47	.31	21	43	.43	.44	33	43	.52	.60	41	63
12	.42	.00	31	48	.41	.33	41	55	.43	.59	51	68
13	.21	.31	18	36	.48	.41	39	48	.43	.39	61	80
14	.42	.63	63	64	.57	.41	72	77	.35	.23	85	90
15	.37	.25	79	84	.30	.15	84	92	.09	.06	95	98
16	.32	.56	38	50	.32	.44	54	48	.46	.55	56	73

*Data obtained from 17 classrooms in Des Moines, Grades 2-4.

Appendix B
Discrimination & Difficulty Indices, Pre & Post PTEU
For Grade Levels 2-4

ITEMS	LEVEL 2 DISCRIMINATION PRE	LEVEL 2 DISCRIMINATION POST	LEVEL 2 DIFFICULTY PRE	LEVEL 2 DIFFICULTY POST	LEVEL 3 DISCRIMINATION PRE	LEVEL 3 DISCRIMINATION POST	LEVEL 3 DIFFICULTY PRE	LEVEL 3 DIFFICULTY POST	LEVEL 4 DISCRIMINATION PRE	LEVEL 4 DISCRIMINATION POST	LEVEL 4 DIFFICULTY PRE	LEVEL 4 DIFFICULTY POST
17	.26	.63	32	41	.66	.67	48	64	.71	.54	68	82
18	.16	.38	10	21	.14	.13	17	29	.35	.54	25	37
19	.53	.50	29	69	.57	.36	66	79	.33	.25	81	92
20	.26	.38	26	26	.61	.33	35	37	.38	.32	35	59
21	.00	.06	24	19	.18	.03	21	16	.18	.11	29	33
22	.05	.50	33	50	.52	.44	55	68	.45	.34	73	83
23	.47	.38	26	31	.45	.44	43	42	.31	.38	53	53
24	.16	.31	15	41	.55	.51	43	52	.40	.44	52	69
25	.42	.63	26	53	.68	.59	54	65	.53	.47	63	80
26	.05	.13	7	12	-.02	.26	7	20	.11	.33	7	18
27	.79	.44	38	36	.43	.38	43	55	.40	.32	58	68
28	.32	.44	35	28	.50	.41	41	53	.38	.43	51	62
29	.11	.00	6	10	.07	.10	15	14	.08	.23	10	18
30	.16	.44	26	31	.61	.38	45	62	.45	.43	52	70
31	.68	.19	32	53	.61	.31	64	68	.38	.29	75	85
32	.16	.13	18	17	.05	.13	13	10	-.06	.21	11	20

Appendix C
Discrimination & Difficulty Indices, Pre & Post TEE*
For Grade Levels 5-6

ITEMS	Level 5				Level 6			
	DISCRIMINATION		DIFFICULTY		DISCRIMINATION		DIFFICULTY	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST
1	.22	.41	54	65	.18	.30	61	78
2	-.12	.22	8	22	-.04	.51	13	35
3	.24	.28	30	40	.39	.13	39	35
4	.26	.34	32	47	.23	.30	39	57
5	.16	.03	19	17	.10	.28	25	28
6	.40	.59	34	55	.51	.42	56	67
7	.47	.64	41	61	.42	.25	57	80
8	.47	.55	52	66	.51	.35	59	80
9	.22	.29	32	45	.18	.28	45	45
10	-.12	.19	24	27	.14	.32	28	34
11	.16	.10	22	23	.10	.32	27	33
12	.41	.41	25	36	.38	.48	32	55
13	.31	.48	45	44	.28	.33	48	54
14	.36	.47	33	53	.29	.57	52	60
15	.41	.29	29	37	.38	.51	33	52
16	.48	.40	42	53	.44	.38	56	57
17	.22	.16	32	39	.27	.46	36	45
18	.12	.41	18	36	.33	.32	28	46
19	.17	.34	18	30	.22	.52	34	40
20	.34	.36	21	38	.30	.41	36	44

* Data obtained from 21 classrooms in Des Moines, Grades 5-6.

Appendix C
Discrimination & Difficulty Indices, Pre & Post TEE
For Grade Levels 5-6

ITEMS	Level 5 DISCRIMINATION PRE	Level 5 DISCRIMINATION POST	Level 5 DIFFICULTY PRE	Level 5 DIFFICULTY POST	Level 6 DISCRIMINATION PRE	Level 6 DISCRIMINATION POST	Level 6 DIFFICULTY PRE	Level 6 DIFFICULTY POST
21	.38	.31	38	40	.15	.24	38	43
22	.50	.41	38	58	.47	.39	55	67
23	.12	.02	22	22	.19	.23	21	20
24	.19	.34	37	45	.41	.62	42	53
25	.34	.34	54	74	.37	.49	71	78
26	.38	.41	33	39	.53	.53	52	62
27	.28	.41	33	46	.54	.39	43	52
28	.05	.10	19	18	.10	.37	19	26
29	.24	.07	21	26	.22	.14	31	27
30	.09	.12	29	38	.15	.15	32	37
31	.41	.55	39	52	.52	.41	58	59
32	.36	.50	38	50	.44	.59	43	57
33	.09	.10	34	35	.16	.06	30	35
34	.14	.02	24	24	.03	.10	28	28
35	.24	.31	24	29	.24	.57	25	41
36	.24	.22	32	46	.29	.47	48	60
37	.22	.38	29	42	.42	.51	40	49
38	.48	.67	39	48	.46	.59	46	62
39	.33	.03	48	60	.19	.29	56	61
40	.10	.38	21	34	.38	.03	39	37

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