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ABSTRACT

The question dealt with in this report is whether a general and introductory principles of economics class can be conducted without traditional lectures and yet achieve the goals of the survey course at least as well as the typical lecture approach, while continuing to be at least as attractive to undergraduate students enrolled therein. The assumption herein is: if the experimental group does at least as well as the control section and is at least as attractive to students when the instructor is freed from the traditional lecture, then the instructor is limited in the total number of students he can handle only by strictures of discussion group size. In this context, the instructor is freed to use the scheduled classroom time to innovate and mitigate particular groups and individuals in the class. Results indicate that lecturing is not always the best way to conduct introductory survey courses composed of large numbers of students meeting a requirement, particularly in disciplines where adequate content materials are available. Communicating information and motivating inquiry, however, is an important dimension of any such course. It is felt that valuable faculty time and energy should be reserved for dealing with students when the students feel that they need help or are inspired to move beyond goals that have been established for them. (Author/HS)

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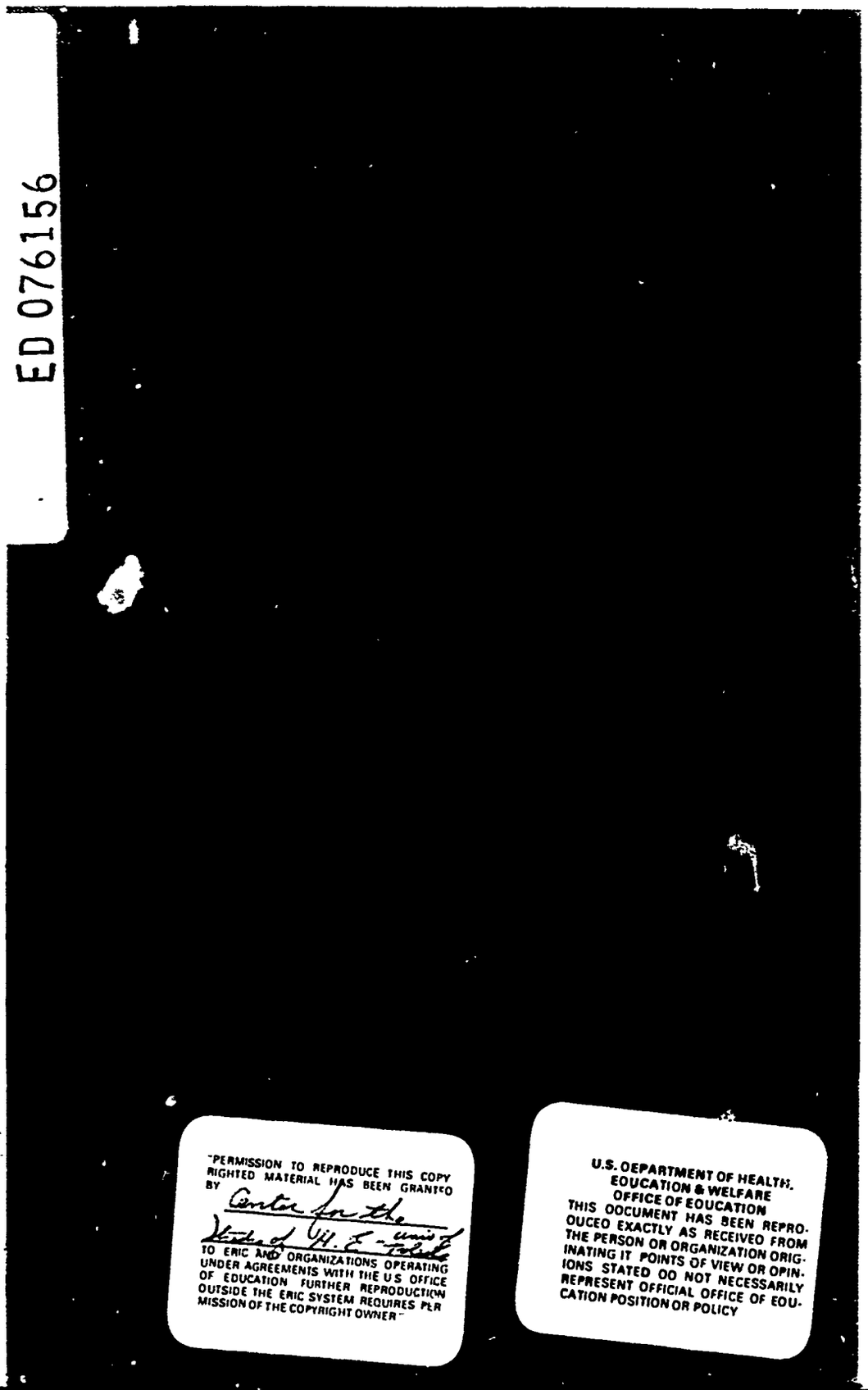

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Economic Principles II:

A General Survey Course

Without Lectures

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ECONOMIC PRINCIPLES II:

A General Survey Course Without Lectures†

W. FRANK HULL IV* AND DONALD J. YANKOVIC**

"Teaching the course without lectures left the choice of learning up to the student. Don't you think that is what college should be all about?"

"The only good thing about the course was that without the lectures, you did not have to come. It was awful boring."

As described in the College of Arts and Sciences *Bulletin*, Economics 202 is the second general course for undergraduates covering "analysis of cost, supply and demand curves, functional distribution of income, international trade, and growth and development." Students taking the course in the Winter Quarter, 1971, however, found that the typical pattern of a large lecture with some opportunity for questions at the end, objective exams, and assigned readings was altered in one section. Some students were confused, others elated; but generally students seemed to do equally as well as, if not slightly better than those enrolled in a second, traditionally taught section.

One of the problems that almost every institution of higher learning faces in the decade of the seventies is the need to handle increased enrollments in basic courses in such a way that students' cries for "relevance" and individual attention can be satisfied. At the same time, faculty, who are increasingly reluctant to teach large basic survey courses, should be provided with the chance to deal in an other-than-general way with their subject. The administrator, caught within this dilemma, all too often must also be concerned

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with the need to produce high student-faculty staffing ratios in order to give sound financial support to the total program of the institution. Several approaches to the situation are increasingly being tried:

1. Interdisciplinary survey courses, utilizing the approaches of more than one discipline related to a central theme, attempt to bring fresh insight and, hopefully, spark renewed interest within the course.

2. An instructor thought to be an exceptional lecturer is often sought out to handle the large class.

3. Some institutions offer a single instructor to lecture to the large class and then supplement him with various smaller discussion groups led by advanced students or teaching assistants, in order to individualize instruction.

4. Independent study for students who have proven their academic ability by their past grade performance is thought not only to provide individual instruction, but also to allow a student to specialize further in the subject than is possible within a large section. This option, however, typically is not available within the introductory survey course on most campuses because of the unavailability of sufficient faculty to oversee it.

5. A system whereby the student may take an exam to place himself beyond the survey course, thus meriting the opportunity to select a more advanced course, is successful in several institutions.

6. Various technological media "innovations" complementing the instructor, and hopefully making the course "better" for larger classes, are continuing to be developed and improved—i.e., TV sections, the use of tape recording devices to permit the student immediate access to the lecture at any time of the night or day, teaching machines for the student requiring remedial or individualized advanced instruction, etc.

All of the above notwithstanding, in most institutions

the lecture system continues to reign as the most common means of conveying a specified body of knowledge to a large mass of lower-level undergraduate students. This remains true even though many students exposed to these courses continue to express dissatisfaction with the method, particularly when the sections are large and examinations are of the multiple-choice, objective form.

In general, research to this point has substantiated the faith many instructors place in the lecture system. It is efficient, and on many variables is as effective as any other researched means of convening a specified body of information to a student. Lectures can be very effective as an integrating device in the absence of a common text or to present materials beyond the level of the text in use. The virtues of the lecture method become open to serious question, however, when one realizes, on the one hand, that publishers are providing efficient materials for covering the informational content of survey courses, and on the other hand, that educators are becoming more and more concerned today about achieving goals quite beyond the sheer communication of information.

Precisely at this point, one of the leading authorities on college teaching research concludes:

> "We have seen fairly convincing evidence that differing teaching methods do make a difference in learning if one analyzes the different goals of education. Other things being equal, small classes are probably more effective than large, discussions more than lectures, and student-centered discussions more than instructor-centered discussions, for the goals of retention, application, problem-solving, attitude change, and motivation for further learning."[1]

All of our modern technology has failed to solve one crucial problem in college teaching: "We have no device that

[1]Wilbert J. McKeachie, "Research on College Teaching: A Review," ERIC Clearinghouse on Higher Education, Report No. 6 (November, 1970), 13.

allows a teacher to listen or respond to more than one student at a time."[2] Most teachers find that "time" is the one thing they are short on, especially when it comes to a large lower-level introductory class. There is little reason to assume that much has changed significantly since research in 1967 concluding that introductory general education courses consist mainly of routine lectures culled from commonly available material, and that students quite typically were totally uninterested.[3]

The question dealt with in this report is whether a general and introductory "principles of economics" class can be conducted without traditional lectures and yet achieve the goals of the survey course *at least as well as* the typical lecture approach, while continuing to be *at least as attractive* to undergraduate students enrolled therein. The assumption herein is: if the experimental group does *at least as well as* the control section and is *at least as attractive* to students when the instructor is freed from the traditional lecture, then the instructor is limited in the total number of students he can handle only by strictures of discussion group size. If, to go further, group participation is not required of students, and the class is still successful in the terms listed above, then the responsibility to learn has been placed squarely on the shoulders of the students. Hence, the instructor is freed to use the scheduled classroom time to innovate and motivate —either classically or experimentally—particular groups and individuals in the class or, in simpler terms, the instructor is freed to individualize instruction.

Procedure:

Two instructors at The University of Toledo were selected to participate in this research. Both were assistant professors of economics in the final stages of completing their own doctoral dissertations. Both had been with the University since 1968, and both were of comparable age and experience with lecturing. Both were reported by students to be

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[2]Ibid., 13.
[3]Lewis B. Mayhew, Innovations in Collegiate Instruction: Strategies for Change, Atlanta: Southern Regional Education Board, 1967.

"better than average" lecturers, but neither had the reputation of attracting "students by the thousands" to hear their lectures. Both were vitally and sincerely anxious to make their course of value to their students; and finally, both were already scheduled to instruct a section of Economics 202 in the Winter Quarter, 1971.

Upon consultation, both instructors agreed to use identical materials[4] for the course, and to give identical objective examinations.[5] Student evaluations, perceptions, and comments were collected at three points: (1) at the beginning of the first class session through a paper-and-pencil questionnaire (Appendix I), (2) during the eighth week through a telephone random sample of 20% of both the experimental and control sections (Appendix V), and (3) after the final examination by both a paper-and-pencil questionnaire (Appendix VI) and an unstructured personal interview. All collection of data was accomplished through the facilities of The Center for the Study of Higher Education, The University of Toledo, by research assistants unrelated to the course or its grading in any way, to insure students anonymity and freedom to respond.

The control section met at noon, Tuesdays and Thursdays while the instructor carried on his normal lectures but took care to allow time regularly for questions. The experimental section, on the other hand, was divided into *optional* discussion groups (all meeting at 9 a.m. either on Mondays, Tuesdays, Wednesdays or Thursdays). The first three meetings each week were devoted to dealing with questions generated by students concerning the core analytical material within the assigned textbook chapters. The Thursday periods focused on the relevance of the textbook material to current social and economic problems, *ad hoc* discussions, special lectures, and other presentations (including an appearance by

[4]Textbooks for the course were: Paul A. Samuelson, Economics, New York: McGraw-Hill, 1970, 8th ed.; Romney Robinson, Study Guide to Accompany Samuelson: Economics, 8th edition, New York: McGraw-Hill, 1970.

[5]Exam questions were drawn from test banks tailored to Samuelson's and other introductory texts. Most of the items selected had been used in previous quarters for this course.

the university debating team on "wage-price controls"). All testing in both the control and experimental sections was conducted on identical Thursdays. In short, the actual formal contact hours that the students had in the presence of the instructor were drastically diminished for the experimental group students — if they so wished, they were given the freedom to take only the exams and not to see the instructor at all!

The course Economics 202 itself is part of the basic core curricular requirements for various colleges at the university. It is required for all students in the College of Business Administration, social science majors in the College of Education, and some students in the College of Engineering. The first half of the course sequence (Economics 201) is recommended for the distribution requirements in the College of Arts and Sciences. The course, in brief, is designed in theory to serve the needs of a diverse undergraduate population.

On the descriptive side, instructors of Economics 202 strive to convey to the student a correct perception of the facts of economic reality through presenting and discussing particular data and describing the legal, philosophical and institutional framework within which economic activity occurs. On the analytical side, the instructors' aim is to familiarize the student with the vocabulary of the discipline and to introduce him to a set of laws or principles which have been identified as underlying economic phenomena. Perhaps more importantly, instructors try to cultivate in the student a particular analytical way of considering economic and social issues, while encouraging some appreciation of the work of economists at the more esoteric levels of the discipline; i.e., asking the students to take the discipline seriously.

The institution in which the research was carried out is part of the state system of higher education, located in a metropolitan community of 690,000. In more ways than not, the institution is typical of many public urban campuses that

have found enrollments increased through a general population growth and a policy of "open admissions." About 93% of its approximately 14,410 students are commuters, and most can be characterized fairly as more "vocationally oriented" than "knowledge-for-knowledge's sake" motivated. Many of its students are employed outside the university. Consequently, when this experiment was undertaken, some faculty wondered if students would not use their newly discovered freedom to disregard the course entirely.

Quantitative Data:

During the first week of the quarter, data were gathered[6] from all enrolled students on the variables listed in Table 1. Items X1 through X18 include normal demographic data that were to be considered. Items X19 through X31 were used to analyze any possible correlations between prior instructors or grade earned in the previous course (Economics 201) with performance in the present course. Item X32 is based on prior research[7] attempting to separate two distinctive attitudes which students may hold toward higher education that might be correlated with their attitudes or performance within this research. Item X37 differentiates between members of the experimental and control sections, and Items X33 through X36 are the actual scores on examinations during the course. The statistical summary of the data is found in Table 2.

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[6]cf. Appendix I for a copy of the instrument used.

[7]FORTUNE—Yankelovich, "What They Believe," Fortune (January, 1969), 70-71, 179-181. As the institution in which this present research was conducted consists primarily of commuting students, prior theory on the commuting student would lead one to assume that the sample would contain a high proportion of "practical-minded" students who might be expected to do less well in the experimental section, since most carry outside employment responsibilities. The particular statements used in this item are:

"Please check which of the following statements you tend to agree with:

_____A. For me, college is mainly a practical matter. With a college education I can earn more money, have a more interesting career, and enjoy a better position in society. [scored "practical"] OR

_____B. I'm not really concerned with the practical benefits of college. I suppose I take them for granted. College for me means something more intangible, perhaps the opportunity to change things rather than make out well within the existing system. [scored "forerunner"].

Table 1

Variables for Data Collection with Coding Used

Independent Variables:

X1	age, in years
X2	1 = married; 0 = single
X3	1 = enrolled in College of Arts & Sciences; 0 = other
X4	1 = enrolled in College of Business; 0 = other
X5	1 = enrolled in College of Education; 0 = other
X6	1 = enrolled in College of Engineering; 0 = other
X7	1 = Freshman; 0 = other
X8	1 = Sophomore; 0 = other
X9	1 = Junior; 0 = other
X10	1 = Senior; 0 = other
X11	Grade Point Average (0.0 - 4.0)
X12	1 = reside at home with parents; 0 = other
X13	1 = reside in off-campus apartment; 0 = other
X14	1 = reside in dormitory; 0 = other
X15	average hours employed per week during term
X16	1 = took Economics 201 previous quarter; 0 = other
X17	1 = took Economics 201 previous year; 0 = other
X18	1 = took Economics 201 more than one year previously; 0 = other
X19-X27	Dummy variables indicating instructor in Economics 201
X28-X31	Dummy variables indicating letter grade in Economics 201
X32	1 = forerunner; 0 = practical
X37	1 = experimental section; 0 = control section

Dependent Variables:

X33	score on first examination (0 - 35)
X34	score on second examination (0 - 35)
X35	score on third examination (0 - 50)
X36	total score on all examinations (0 - 120)

The data were initially examined by applying the X_2 or t-tests as appropriate in order to determine if the students in each section were unbiased samples drawn from the same population. As is indicated in Table 2, there was no evidence of significant differences in the composition of the two sections with respect to age, marital status, year in school, overall grade point average at the beginning of the term, hours worked per week, when the student took the prior course (Economics 201), his grade or instructor in that course, or the mix of "practical" and "forerunner" students.

Table 2

List of mean values or percentage figures of variables and grouped variables for the experimental and control groups with test significance

	Variable	Mean value of variable in experimental group	Mean value of variable in control group	% of students represented by variable within experimental group	% of students represented by variable within control group	t-test value for difference in mean scores	X_2 value for difference in groups of variables
X1	Age	20.6	20.9	—	—	.724	—
X2.0	Single	—	—	87.0	87.7	—	.0147
X2.1	Married	—	—	13.0	12.3	—	
X3	Arts & Science	—	—	14.3	11.1	—	13.507**
X4	Business	—	—	40.3	65.4	—	
X5	Education	—	—	22.1	17.3	—	
X6	Engineering	—	—	23.4	6.2	—	
X7	Freshman	—	—	15.6	16.0	—	2.684
X8	Sophomore	—	—	45.5	53.1	—	
X9	Junior	—	—	27.3	25.9	—	
X10	Senior	—	—	11.7	4.9	—	
X11	Grade Pt. Av.	2.31	2.41	—	—	1.318	—
X12	Resides at Home	—	—	75.3	70.4	—	8.492*
X13	Resides off campus	—	—	7.8	22.2	—	
X14	Resides on campus	—	—	16.9	7.4	—	
X15	Average hrs. of employment	16.62	16.39	—	—	.133	—
X16	Took Econ 201 prior quarter	—	—	63.6	74.1		—
X17	Took Econ 201 prior year	—	—	19.5	13.6	.668	—
X18	Other	—	—	16.9	12.3		—
X19	Instr for Econ 201	—	—	11.7	19.8	—	

Table 2 (Continued)

List of mean values or percentage figures of variables and grouped variables for the experimental and control groups with test significance

	Variable	Mean value of variable in experimental group	Mean value of variable in control group	% of students represented by variable within experimental group	% of students represented by variable within control group	t-test value for difference in mean scores	X_2 value for difference in groups of variables
X20		—	—	36.4	28.4	—	
X21		—	—	9.1	12.3	—	
X22		—	—	3.9	1.2	—	
X23		—	—	1.3	2.5	—	8.13
X24		—	—	10.4	12.3	—	
X25		—	—	3.9	6.2	—	
X26		—	—	0	2.5	—	
X27		—	—	23.4	14.8	—	
X28	Grade in 201	2.22	2.43	16.9	9.9	1.473	3.391
X29				23.4	17.3		
X30				45.5	58.0		
X31				14.3	14.8		
X32.0	"Forerunner"	—	—	20.6	26.2	—	.615
X32.1	"Practical"	—	—	79.4	73.8	—	
X33	Exam 1	23.05	22.46	—	—	.713	—
X34	Exam 2	21.86	21.46	—	—	.530	—
X35	Exam 3	32.21	30.33	—	—	.026*	—
X36	Total exam score	77.12	74.25	—	—	1.373	—

** significant at .01 level
* significant at .05 level
N = 158, Nexp = 77, Ncontrol = 81

Table 2 does, however, exhibit that there were significant differences in the two sections with respect to the colleges in which the students were enrolled and their place of residence. These two variables then, aside from indicating a slightly non-random distribution on the two variables, presented a further problem. It is possible that the score attained on the examinations was related to both of these variables. Furthermore, the experimental section contained more engineers who usually attain higher scores on the examinations (cf. the regression equation analysis below); the control section, more business students and also students residing in off-campus apartments who usually attain lower scores on the examinations (cf. the regression equation analysis below). In other words, the experimental section could be expected to attain higher scores through no influence of the experimental teaching method but rather because of the above composition factors.

An examination of the expected scores for the observed distribution of students in the experimental and control sections produced no significant difference between expected and attained scores on examinations from what would be expected if a purely random sample were present with regard to place of residence and college of enrollment (cf. Appendices II and III). This is consistent with the finding that "Grade Point Average" and "Hours of Employment," both of which are directly related to scores attained on examinations, were more randomly distributed between sections.

To move into a more detailed assessment of the determined effects of the experimental method of conducting the class on the students' grasp of the core analytical and descriptive content of the course, the data were analyzed to determine differences in students' performance on the three examinations and the total examination score (Table 2, variables X33, X34, X35, X36). With the exception of the third examination (Table 2, variable X35), the difference in scores on the examinations were within the range of differences that could reasonably be attributed to chance; i.e., there was at least a 95% probability that the students were randomly

selected from the same population. The third examination will be discussed below.

It is possible, of course, that the experimental section actually did poorer than the control section; but even considering the smaller proportion of business students and larger proportion of engineering students in the experimental section, the overall averages of the examination scores were slightly higher in the experimental section. Note, for example, that an analysis of student performance by college does indicate a slight difference in the performance of Engineering and Arts and Sciences students, on the one hand, with Business and Education students, on the other (Table 3, cf. Appendix IV, Table C).

Table 3

Student Attainment on
Total Examination Score (X36) by College of Enrollment

	Experimental	Control	Total	F
Arts & Sciences	84.91	80.11	82.75	1.10
Business	70.79	73.96	72.54	1.20
Education	78.00	67.93	73.54	4.25*
Engineering	83.67	84.40	83.83	.17

* Significant at the .05 level

With the exception of education students, the analysis of variance does not indicate any significant differences between students by college of enrollment as to whether they were in the experimental or control section of Economics 202. In other words, there is no evidence that students by college of enrollment earned less total points on examinations if they happened to be in the experimental section where there were no lectures.

Students enrolled in the College of Education, however, who happened to be in the experimental section did do significantly better in regard to the total number of examination points earned than those in the control section where lectures were held (Table 3, cf. Appendix IV, Table C). A careful

check of the overall grade point averages and hours worked (shown below to be important in explaining overall performance in the course) by education students in each class showed no significant differences (Table 4).

Table 4

COLLEGE OF EDUCATION STUDENTS: Grade Point Average (X11) and Hours Employed Per Week (X15) in Control and Experimental Sections

	Experimental	Control	F
Grade Point Average (X11)	2.55	2.33	.33
Hours Employed Per Week (X15)	19.47	22.60	.38

Further analysis indicated the following supplementary trends (Appendix IV). There was no significant difference in total examination points earned between control and experimental sections with regard to the following variables: marital status of students (Appendix IV, Table B), entering "Grade Point Average" of students (Appendix IV, Table E), place of residence (Appendix IV, Table F), hours of employment per week (Appendix IV, Table G), "forerunner" versus "practical" orientation of students (Appendix IV, Table I). However, twenty-one-year-old students attained significantly better on total test points earned in the experimental section than in the control section (Appendix IV, Table A). College of Education students attained significantly better in the experimental section (Appendix IV, Table C). Students classed as "Juniors" attained significantly higher in the experimental section (Appendix IV, Table D). Finally, students who had received a "D" grade — "passing but below the quality expected" — in their first economics course, Economics 201, attained significantly higher in the experimental section in comparison to those in the control section (Appendix IV, Table H).

None of the above, to add a word of caution, should be interpreted as hard "proof." There is always the possibility of divers complications—for example, all the twenty-one-year-olds in the experimental group might have high "grade point

averages" whereas all the twenty-one year olds in the control group might have all the low "grade point averages." On the other hand, as no evidence exists to support such reasoning at this point. analysis along these lines seems unfruitful. What is to be seen in the above, however, is a clear band of certain subgroups attaining significantly higher in the experimental section over the control section, subgroups which, from an educational perspective, would not have been expected to do so.

Concerning the third examination (Table 2, variable X35), the experimental section clearly attained higher scores than the control section. There are two possible explanations for this result.

The third examination, given during finals week, contained thirty-five questions directly related to the material in the text chapters covered over the preceding three weeks, and fifteen questions which both instructors judged that anyone who had been through twenty weeks of economics should be able to handle.[8] It is possible, though not likely, that the approaches taken by the two instructors to the broader issues of economic analysis and policy were different enough to give students in the experimental section an advantage on these questions. Both instructors, however, agreed that all of the questions were appropriate ones to appear on the final examination for both sections.

Secondly, it is possible that some form of "learning mechanism" was at work; i.e., it may have taken students in the experimental class until the last few weeks to become reconciled to the idea that they could not rely on the instructor to "spoon-feed" the material to them in the form of lectures, and for those students to begin to rely on their text and supplementary materials for their thinking. In other words, it is likely that students in the experimental section without lectures needed several weeks; i.e., until the third

[8] e.g., students were asked to choose appropriate sendings to such statements as "When in economics we say that goods are scarce, we mean . . ." or "In the social sciences, theories are usually rejected when . . . ."

examination, to learn the modes and processes of economic thought before their more individualized thinking began to actually produce a significantly higher score on the examination, in comparison with the control section. Such an explanation certainly is in line with most educational theories of learning and is to be preferred in terms of this research at this point.

In view of the fact that some differences did exist in the composition of the two sections and the performances of the students, several regression equations were tested in order to attempt to locate the variable which best seemed to explain students' performance on the examinations.

Regardless of which combination of independent variables (Table 1) were used to explain the total score examination performance (X36), the overall grade point average at the beginning of the quarter (X11) and average number of hours employed per week (X15) were the most important. These two variables alone can successfully account for about 35% of the variation in examination scores.[9] Given the student's grade point average and hours of work, being in one section or the other made no difference to the expected value of his score. Similar results were obtained in equations run to explain performance on each of the examinations separately.

The regression equation described in Table 5 relates total examination score and fifteen other characteristics of all 158 students. The fifteen variables explain about 45% of the variation in the exam scores. Given the other characteristics of a student, age and marital status seem to have had little effect on performance. The coefficients of the variables indicating in which college students were enrolled, confirmed the previous observation that engineering students do much better in the course than business students (note that the co-

[9] $X36 = 45.09 + \underset{(1.74)}{13.83^{**}}\,(X11) - \underset{(.06)}{.16^{**}}\,(X15) + \underset{(1.74)}{1.37}\,(X37)$

$R^2 = .3302 \qquad F = 25.31^{**}$

Table 5

Total Examination Score (X36) vs. Independent Variables

Variable	Mean	Standard Deviation	Correlation X vs. Y	Regression Coefficient	Std. Error of Reg. Coef.	Beta† Coef.	Variable
X1	20.74	2.744	.068	.098	0.373	.020	Age
X2	0.12	0.333	.052	4.623	2.943	.117	Marital Status
X3	0.126	0.333	.206	1.074	2.998	.027	Arts & Science
X5	0.196	0.398	—.084	—2.327	2.476	—.070	Education
X6	0.146	0.354	.257	7.123**	2.752	.191	Engineering
X7	0.158	0.366	—.198	—3.905	2.490	—.108	Freshman
X9	0.266	0.443	.160	3.485	2.171	.117	Junior
X10	0.082	0.276	0.092	0.929	3.490	.019	Senior
X11	2.358	0.504	.544	13.245**	1.820	.506	Grade Point Average
X13	0.152	0.360	—.096	—5.940**	2.446	—.162	Reside in Apartment
X14	0.120	0.326	.207	3.174	2.983	.078	Reside in Dormitory
X15	16.506	14.089	—.205	—0.132*	0.065	—.141	Hours of Employment
X17	0.165	0.372	.056	1.614	2.381	.046	Took Economics 201 69/70 School Year
X18	0.146	0.354	—.003	—2.365	2.637	—.063	Took Economics 201 Before 69/70
X37	0.487	0.501	.109	—1.040	1.783	—.040	Section
Dependent							
X36	75.646	13.170					

Intercept = 43.979
R2 = .4455 F = 7.61**
Standard Error of Estimate = 10.31

†Beta coefficients are calculated by multiplying each regression coefficient by the ratio of the standard deviation of the independent variable to the standard deviation of the dependent variable. This has the effect of expressing each multiple regression coefficient in terms of standard deviations of the independent variable and in many instances permits us to compare the relative importance of each independent variable in explaining variations in the dependent variable.

efficients describe deviations from the performance of business students). The signs of the coefficients relating year in school and performance are consistent with the observation that freshmen do less well and that juniors do better than sophomores.

In brief, (1) the grade point average (GPA) seems to have been the most important variable. As the Beta coefficient indicates (Table 5), on the average, a student with a 2.85 GPA (2.35 + .50) would be expected to score about six or seven points (.51 x 13.17) above a student with a GPA of 2.35. (2) The coefficients of the variables of place of residence strongly indicate that students living in off-campus apartments performed less well than students living at home with parents or in dormitories on campus. (3) Hours of employment per week were important. The Beta coefficient indicates that, on the average, a student who works thirty hours (16.51 + 14.08) will score about two points lower (.14 x 13.77) than a student who works sixteen hours a week. (4) When the student took the first half of the course (Economics 201) seemed to have little effect on performance in Economics 202. Finally, (5) since the last variable (X37), indicating in which section the student was enrolled, is not significantly different from zero, it is entirely reasonable to conclude that the experimental method of instruction, without lectures, had little positive or negative influence on the ability of students to master the examinations.[10]

Another factor which could be thought to have biased the experimental findings is that some students may have dropped the course because of the way it was taught. However, a check with the particular students indicated that six students "dropped" the course who had been enrolled in the experimental section; ten, who had been enrolled in the control section. These students report that their decision to "drop" Economics 202, in either the control or experimental

[10]The equation does not contain variables indicating grade or instructor in Economics 201 (X19 — X31) or the mix of practical and forerunner students; the first two for conceptual reasons and the last for technical reasons. In no instance when these variables were included in the equation did the fit improve.

sections, was caused by a conflict of time schedules and/or pressure from outside employment responsibilities. No evidence was discovered that would support the view that students "dropped" Economics 202 because of the nature of either the experimental or control sections.

In short, in certain specific ways and with certain subgroups of the class, the experimental section did exhibit significantly higher indices of performance. The clearest way in which the conclusion can be put, considering all factors, is that students performed equally well if not slightly better within the experimental section where there were no lectures and attendance was voluntary. It is, therefore, the conclusion of this quantitative investigation that the absence of lectures from the experimental section of Economics 202 in the Winter Quarter, 1971, for the particular students involved, did not either lessen these students' attainment or increase it on examination scores as compared with students in a control section.

Qualitative Data:

Were this report to terminate here, one would be left with sufficient data upon which to ponder, but with grossly insufficient understanding of this experiment's wider implication. The first stated aim of the faculty whose students were the subjects for this study is "to provide . . . students a liberal education." As such, it is imperative that serious attention be directed to the more subjective reactions of the students who were the object of the instruction in Economics 202.

Professor Yamamoto has reminded us that "to teach is to touch someone else's life in progress";[11] but as everyone is aware, it is difficult at best to determine when this has occurred. There is, however, a recognized body of thought within the social psychological sciences arguing that the clearest and surest way to determine the views of a non-psychologically disturbed population is simply to ask them—

[11]Kaoru Yamamoto, **Teaching**, Boston: Houghton Mifflin Company, 1969, viii.

in other words, "self report." This seemed the best way to complement the above statistical data.

Students within both the experimental and control groups were made aware on the first day of class that their opinions —objective or otherwise—as to the way in which the course was being conducted, were of interest; and they were encouraged to express their reactions to the evaluators, who, it was stressed, had nothing to do with grading in the course (cf. Appendix I). This was to insure that the student would not be hesitant in making comments that might be misinterpreted and result in a lower course grade.

In order to cultivate some feel for the way the total course was proceeding mid-point, a 20% random subsample of both the experimental and control sections was drawn. Students at this point were interviewed via phone as to their perceptions. The actual interviewing was timed to take place following the second of the three examinations (at the beginning of the eighth week) in order to tap opinion at the point when students would be most likely to be feeling the pressures of producing on the traditional multiple choice examination regardless of the particular section in which they were being instructed. The semi-structured interview schedule is to be found in Appendix V.

As was expected, the majority of the students were found to be enrolled in Economics 202 because the course was "required for graduation." As to why the student was enrolled in his particular section, 100% of the respondents in the control group and 92.9% of the experimental group indicated that the time the section was offered was the crucial factor. Only 7.1% of the subsample in the experimental section gave any indication that the type of section influenced their enrollment.

A higher percentage of students within the experimental section reported that they had been reading the appropriate chapter from the text prior to the time the material was covered in class (Table 6).

Table 6

Subsample: Students Reporting Reading Text Chapters Prior to Coverage within the Course

	Experimental (N = 15)	Control (N = 14)
Yes	43.8%	36.3%
Sometimes	25.0%	9.2%
No	31.2%	54.5%

Since it was the opinion of the instructors of the course that it was desirable for the students to have read the appropriate chapter prior to its coverage within the course itself, some time was directed toward discovering why students in the experimental section were more likely to fulfill the instructors' wishes in this regard. The reason why the control section did not read the chapter prior to the class session was quite simple: it was easier to pick out the "necessary" material after the instructor had outlined the chapter for them in his lecture.

The student's perception as to how well he was doing under the method of instruction which eliminated required lectures in comparison with how well he thought he might be doing if the section were given in the more traditional manner is illuminating. Twenty-five per cent of the students within the experimental section indicated that they thought they were doing better, 50% of the students thought that they were doing about the same, and another 25% felt they were not doing as well. Recalling that these data were collected immediately following the return of the scores from the second objective examination within the course, the results clearly indicate that among the subsample from the experimental section, there was no evidence that students were reacting unfavorably to the method of instruction at that point.

The majority of the subsample from within the experimental section continued to express pleasure with the way in which the section was being taught, but the students' evaluations indicated some refined caution: "It is a good idea if it stays within the Humanities, but if it gets into the

sciences, it would not be good;" "It would be better if the college were residential and the student had more chance in just meeting the instructor here and there;" "It is alright—it forces a student to participate and you understand it better."

To summarize, the subsample from within the experimental section at the eighth week of the quarter was not unanimous in praise for the experimental method of instruction. They were, however, seemingly excited about the course and were much more likely than those from the control section to be optimistic about the course, the method of instruction, and their ability to perform within this experimental method. Some students in the control section did indicate that they would have enrolled in the experimental section had they "known about it." It is equally interesting to note that at this point students in the experimental section tended to couch their evaluative comments in terms of how much material they thought they and their peers would "comprehend" rather than merely "success" in terms of a grade.

Finally, a higher percentage of the randomly selected subsample within the experimental section indicated that they considered their instructor "superior" to prior instructors they had experienced within college, than those in the control subsample. There was, unfortunately, no way of separating how much of this feeling was directly attributable to the instructor and how much to the methodology of instruction under which he was operating. In both sections, though, the majority rating of each instructor was "above average." (Table 7)

Table 7

Student Subsample Ratings of the Instructors: the Eighth Week

	Excellent	Above ave.	Average	Below ave.	Poor
Experimental	14.3%	64.3%	21.4%	0.0	0.0
Control	0.0	63.6%	27.2%	9.2%	0.0

In order to amplify the information provided by the mid-course interviews all students were given the opportunity to comment on and evaluate their section after the final

examination. Two interviewers were present to speak personally with individuals as they left the examination room. The information gathered at this time suggested important issues that need to be considered in coming to an opinion concerning the total effort.

The particular paper and pencil questionnaire was made available to every student on the day of the final objective examination (Appendix VI). Referring to Table 8, a significant difference (.05) in response was identified between experimental students and control students' reply to the question, "There is a better way of learning Economics 202 than the method we used this quarter." Students within the experimental section were significantly more likely to disagree with this statement whereas students with the control section were more likely to agree.

Table 8

Final Student Response: "There is a better way of learning Economics 202 than the method we used this quarter."

		Experimental	Control
Strongly disagree		3	0
Disagree		20	17
Agree		30	52
Strongly Agree		14	10
N = 146	Total	67	79

X_2 test significant at .05 level

Within the experimental and control sections no significant difference was found in the students' ratings of their instructor in comparison to other instructors within their experience.

A significant difference was also found in the students' response to the item, "Do you think that this course should be taught the same way next quarter?" As Table 9 indicates, students were exceptionally more positive in suggesting that the teaching methodology of the experimental section be repeated. Students from the control section, more traditionally taught, were more of the opinion that that section's methodology should not be repeated.

Table 9

Final Student Responses: "Do you think that this course should be taught the same way next quarter?"

		Experimental	Control
Yes		28	8
Indifferent		15	30
No		23	39
N = 151	Total	66	77

X_2 test significant at .0005 level

In short, both the final evaluation questionnaire and the reams of qualitative comments of the students completing the course overwhelmingly supported the conclusion that these students were much more likely to be supportive of the experimental methodology and convinced that they, themselves, were able to comprehend more within this experimental methodology. None of the above is to claim that student feeling was unanimous—it clearly was not—but the trend evident strongly supported the notion that the vast majority of the students were much more satisfied within the experimental section. Clearly in the students' opinions, the experimental section might require some further refining, but it was the preferable form of instruction for this course.

In Conclusion

> "A classroom that works is one where both the learning process and outcomes occur as intended, and where the qualities of social interaction between students and teacher and among students are as designed."[12]

Did the experimental section "work" in the sense that Harrison suggests? What can be concluded from the experience?

In general, the findings within this research have complemented prior research on teaching methods. Once again it has been shown how exceptionally difficult it is to attribute

[12]Richard Harrison, "Classroom Innovation: A Design Primer," Philip Runkel et al. eds., The Changing College Classroom, San Francisco: Jossey-Bass, Inc., 1969. 302.

"success" or "failure" of a course (as defined by specified educational objectives) to a pedagogical method.

One recent discussion of teaching research has concluded:

> ". . . there can be a dramatic decrease in dispensing content in the prized ways in the classroom—the paramount activity of instructors for hundreds of years—without any decrease in quality of learning."[13]

The present experiment firmly supports this conclusion. The absence of traditional lectures by the instructor in this course had little effect, positively or negatively, on the performance of students on the multiple-choice examinations.[14]

Many of the particular findings were to be expected: in both sections students living in off-campus apartments did less well than those living in dormitories or at home, students who were employed did less well than those who were not, and the overall grade point average remained the best predictor of success within the course.

Some of the findings were, perhaps, surprising and merit further study: students registered in the College of Education did better in the experimental section than those in the control group, as did juniors (third-year students) and twenty-one-year-old students. Most interestingly, students who received a "D" grade in Economics 201 attained better in the experimental section than in the control section. If such continues to be the case as the experimental method is used in succeeding years, another review would be in order. Clearly students' attitudes indicated that they preferred the teaching method used in the experimental section.

From the point of view of the instructor of the experi-

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[13]Ohmer Milton. "Teaching or Learning?" Research Report Number 6. Washington, D.C.: American Association for Higher Education (May 1, 1971). 6.

[14]What these examinations actually tested for could be the subject of another lengthy essay. The fact that this research was only able to explain 45 per cent of the variation in exam scores with the fifteen variables in Table 5 suggests that the exams may not have been constructed as well as they might have been. The instructors insist, however, that the exams were as good as those that are offered otherwise in this course.

mental section the experience was both rewarding and frustrating. The most difficult part of instructing without lectures was, as expected, motivating a group of largely lower division students to begin to study and learn on their own. Many writers have reminded us over and over again that it is difficult at best for students to adjust to non-orthodox methods of instruction after having been "spoon-fed" through the first twelve years of public education.[15] The authors, believing that there is something fundamentally unsound in a university system committed to verbalizations of the informational content of courses through lectures, have come to feel strongly about this issue throughout this research project. Most of our students are within three years of the end of their formal education experience; surely faculty have some obligation to prepare them to learn on their own, primarily with the aid of books and without relying on lectures.

The difficulty is compounded when the students are also enrolled in other courses where the more traditional modes of instruction are employed or implied. Some students were confused at first. One reported, "Since you talked about something different every day, I had to attend every class." Other students, a small group to be sure, initially resented being confronted with a situation where something different from what they had anticipated was required.

The instructor for the experimental section reports that it was relatively simple to keep a fifty-minute period of student-initiated discussion on economics moving. There were times, of course, when he had to take the initiative; this was to be expected. About half of the time seemed to have been devoted to questions generated by the workbook problems; the remainder of the time to considering real-world applications and the social significance of the principles presented within the textbook. To be sure, the instructor was frustrated occasionally by the realization that many of the

[15]cf. J. H. Hexter. "Publish or Perish — a Defense," The Public Interest, n. 17 (Fall, 1969), 72.

topics which normally he would treat at length in a lecture situation never came up for discussion. This frustration, though, was countered by the realization that the topics that were discussed were of particular interest to the students, i.e., the topics reflected the basic problems that they had in mastering the analytical content of the course. In many instances the topics that the students raised were reported by the instructor to be much more interesting and intellectually challenging than the ones that he usually presented.

About thirty students, representing a cross section of abilities, attended the daily discussion groups; about two-thirds of the class showed up at least once each week. This suggests that as long as the instructor continues to control the grading process, students will seek out his help in mastering the material, at least to the extent that *they* consider it necessary. Perhaps instructors using this particular no-lecture technique might want to schedule more examinations to give the student (and the instructor) a more current assessment of the individual student's mastery of the material?

Often the instructor of the experimental section had to restrain his prior habits of lecturing and complete domination of the classroom. He believes, however, that any reasonably skilled instructor should be able to conduct a class following the principles used.

One final word. This research suggests that students can be expected to rely on their textbooks and workbooks to learn material when given the opportunity to draw on the instructor for help when needed. This is an important conclusion particularly in a world where, on the one hand, there is a great deal of pressure to increase student-faculty ratios, and on the other hand, where more and more time is required to convince students of the "relevance" and applicability of particular subject matter. Too often an instructor fails to trust the texts he has carefully selected to put the basic informational content of a lower division course across. More and more carefully designed books, workbooks, programmed learning aids, and other materials are available today, not to

mention film and videotape materials which often can be produced at relatively low cost while using facilities available today on most campuses.

In short, lecturing is not always the best way to conduct introductory survey courses composed of large numbers of students meeting a requirement, particularly in disciplines where adequate content materials are available. Communicating information and motivating inquiry, however, *is* an important dimension of any such course. Let us reserve valuable faculty time and energy for dealing with students when the students feel that they need help or are inspired to move beyond goals that have been established for them. Let us begin to help faculty move beyond the pure communication of information and free them to teach today's undergraduates, in all that that implies.

APPENDIX I

Questionnaire: Data Collection During the First Week of the Quarter To All Students Enrolled In Economics 202

THE UNIVERSITY OF TOLEDO / TOLEDO, OHIO 43606 / (419) 531-5711

The Center for the Study of Higher Education

30 December, 1970

As you are already aware, much of today's undergraduate education is coming under increased criticism from both students and the community. In this particular course in which you have enrolled, several of us at The University of Toledo are interested in your opinions and how you feel such a course could or should be improved.

Kindly fill out the attached sheet as carefully as possible. Your opinions are confidential and will only be available to your instructor on an anonymous basis. Your name will never be reported. In no way will any of your opinions here effect your grade.

Feel free to come to speak to me personally concerning this at any time. Again I stress, we are interested only in your feelings about this course and how the total course related to your reasons for being here.

Sincerely,

W. Frank Hull IV
Director

THE CENTER FOR THE STUDY OF HIGHER EDUCATION
THE UNIVERSITY OF TOLEDO

PLEASE PRINT PLEASE PRINT

1. Name:.....
2. Student Number:..... 3. Age:.....
4. Marital Status: Single..... Married.....
5. College:..... Major:.....
6. Term Standing:..... Cumulative Grade Point Average:.....
7. Place of Residence (Check one):

   A. Live with family and commute:.....

   B. Live apart from family and commute:.....

   C. Live on campus:.....

8. Local Address:.....

   Local Phone:.....

9. Approximate number of hours employed per week:.....
10. When did you take Economics 201?

    Quarter:..... Year:.....

11. Who was your instructor for Economics 201?.....
12. What was your grade in Economics 201?.....
13. If you are willing to speak with a staff member of the Center for the Study of Higher Education concerning this course, please check here:.....
14. Please check which of the following statements you tend to agree with:

    ..... A. For me, college is mainly a practical matter. With a college education I can earn more money, have a more interesting career, and enjoy a better position in society.

    ..... B. I'm not really concerned with the practical benefits of college. I suppose I take them for granted. College for me means something more intangible, perhaps the opportunity to change things rather than make out well within the existing system.

Thank you! We will look forward to your comments on your course as the quarter moves on.

APPENDIX II

Analysis of Variance of the Expected Scores, the Observed Scores, and the Total Mean Scores for the Residency Variable

		Mean Score		Standard Deviation	
		Exper.	Control	Exper.	Control
1)	Expected score	76.24	75.15	3.1	2.5
2)	Observed score	77.12	74.25	13.3	12.8
3)	Total mean score (N = 158)	75.65	75.65	14.2	14.2
4)	Mean of Nos. 1, 2 and 3	76.66	75.17		
5)	F-test value	.64	.34		

The expected score is the score one would predict given the ratio of students residing at home, in the dormitory, or off campus but not home, and the mean score of the students falling into each category. The observed score is the mean score of all students in each section. The total mean score is the mean score of all students in both sections. The analysis of variance was designed to determine if there was any difference between the scores of column 1, 2 and 3. The F-test showed no significant difference in either section, indicating that the difference in ratio of students between sections residing at home, in the dormitory, or off campus but not home, did not have the effect of raising the expected score value to a significant degree.

APPENDIX III

Analysis of Variance of the Expected Scores, the Observed Scores, and Total Mean Score for College Enrollment

		Mean Score		Standard Deviation	
		Exper.	Control	Exper.	Control
1)	Expected score	76.64	74.54	5.2	4.0
2)	Observed score	77.12	74.25	13.3	12.8
3)	Total mean score (N = 158)	75.65	75.65	14.2	14.2
4)	Mean of Nos. 1, 2 and 3	76.26	75.01		
5)	F-value	.83	.89		

The expected score is the score one would predict given the ratio of students in the different colleges and the mean score of the students in each college. The observed score is the mean score of all students in each section. The total mean score is the mean score of all students in both sections. The analysis of variance was set up to determine if there was any difference between the scores of column 1, 2 and 3. The F-test showed no significant difference in either section, indicating that the difference in ratio of students between sections found in the different colleges did not have the effect of raising the expected score value to a significent degree.

APPENDIX IV

Variable Analyses

This appendix offers a breakdown of the scores in each of the two sections with respect to nine variables. This is done for the purpose of determining if either of the two methods of teaching are particularly well adjusted to a certain type of student.

Table A. Mean value of the total of the three tests for each section in each age group with test for significant difference between sections.

	Experimental			Control			
Age	N1	Mean Score of Tests	SD1	N2	Mean Score of Tests	SD2	t
18	5	77.0	18.3	9	70.7	7.0	.86
19	19	75.5	12.1	24	76.5	11.8	.28
20	22	78.5	13.6	17	74.5	13.5	.88
21	14	78.7	13.3	16	69.4	15.4	1.71*
22	5	76.6	7.8	5	72.2	12.4	.60
22	12	75.6	13.0	10	80.3	9.3	.91

*significant at .05

Table B. Mean value of the total of the three tests for each section for married and single students with a test for significant difference between each section.

	Experimental			Control			
Marital Status	N1	Mean Score of Tests	SD1	N2	Mean Score of Tests	SD2	t
Single	67	76.7	13.3	71	74.1	12.4	1.18
Married	10	79.8	12.8	10	75.1	15.5	.70

Table C. Mean value of the total of the three tests for each section in each college with test for significant difference between sections.

	Experimental			Control			
College	N1	Mean Score of Tests	SD1	N2	Mean Score of Tests	SD2	t
Arts & Sciences	11	84.9	13.6	9	80.1	10.9	.86
Business	31	70.8	11.1	53	74.0	13.3	1.13
Education	17	78.0	15.3	14	67.9	10.7	2.19*
Engineering	18	83.7	12.1	5	84.4	8.6	.13

*significant at .05

Table D. Mean value of the total of the three tests for each section in each year with test for significant difference between sections.

Year	Experimental N1	Mean Score of Tests	SD1	Control N2	Mean Score of Tests	SD2	t
Freshman	12	70.9	13.8	13	68.5	7.6	.54
Sophomore	35	74.9	11.3	43	75.1	13.6	.08
Junior	21	84.2	13.7	21	74.1	12.7	2.42**
Senior	9	77.6	11.5	4	84.5	9.8	.96

**significant at .01

Table E. Mean value of the total of the three tests for each section in each grade point average grouping with a test for significant difference between each section.

G. P. A.	Experimental N1	Mean Score of Tests	SD1	Control N2	Mean Score of Tests	SD2	t
0-2.00	18	65.5	10.4	26	65.4	13.2	.02
2.01-3.00	49	79.3	11.9	49	77.3	10.1	.90
3.01-4.00	10	87.4	10.0	6	87.8	6.0	.09

Table F. Mean value of the total of the three tests for each section in each residence group with a test for significant difference between each section.

Residence	Experimental N1	Mean Score of Tests	SD1	Control N2	Mean Score of Tests	SD2	t
Home with Parents	58	75.4	13.7	57	74.7	12.1	.30
Off Campus Apartment	6	80.8	9.3	18	69.9	15.6	1.57
Dormitory	13	83.2	11.9	6	82.5	7.9	.13

Table G. Mean value of the total of the three tests for each section in each grouping of hours of employment per week with a test for significant difference between each section.

Hours of Employment	Experimental N1	Mean Score of Tests	SD1	Control N2	Mean Score of Tests	SD2	t
0	24	81.1	11.9	29	79.6	12.7	.44
1 - 20	27	73.9	11.6	24	71.2	11.3	.82
21 - 40	26	76.8	15.1	28	71.4	12.5	1.42

Table H. Mean value of the total of the three tests for each section to each grade in the previous course (Economics 201) with test for significant difference between each section.

Grade in 201	Experimental N1	Mean Score of Tests	SD1	Control N2	Mean Score of Tests	SD2	t
A	13	83.2	11.8	8	84.9	16.6	.25
B	18	80.7	14.2	14	80.5	8.9	.05
C	35	74.0	13.2	47	72.9	11.5	.39
D	11	74.0	8.9	12	65.2	10.3	2.10*

*significant at .05

Table I. Mean value of the total of the three tests for each section in each of the forerunner and practical groups with test of significant difference between each section.

Forerunner — Practical	Experimental N1	Mean Score of Tests	SD1	Control N2	Mean Score of Tests	SD2	t
Practical	57	76.3	13.7	53	73.2	11.7	1.25
Forerunner	15	78.1	10.8	19	76.1	14.1	.43

APPENDIX V

Semi-Structured Interview Schedule: Eighth-Week Random Subsample of Experimental and Control Sections

Code Number.....

Experimental and Control Sections	Why are you taking economics? ..... Elective ..... Required ..... I like it ..... Other
Experimental and Control Sections	How about this particular course? ..... Elective ..... Required ..... I like it ..... Other
Experimental and Control Sections	Was there any particular reason why you chose this section? ..... Time ..... Type of class ..... A friend is in it who will help me ..... Other
Experimental and Control Sections	Have you been reading the chapter before you came to class? ..... No ..... Yes If not, why not?
Experimental and Control Sections	Do you feel that the teacher is available enough to you for help?
Experimental Section	How well do you think you are doing in this course as compared to what you would normally expect to do in other lecture courses of this size? ..... Better ..... Same ..... Not so good

Experimental Section	What do you think of the way this course is being taught?
Experimental and Control Sections	How would you rate your instructor as a teacher in comparison with others you have experienced throughout your college education?

..... Superior

..... Same (So-so)

..... Same (Great)

..... Same (Poor)

..... Below

Additional comments:

APPENDIX VI

Student Course Evaluation

Economics 202 Course Evaluation — Winter, 1971

In order to improve this course in future quarters, your frank opinions on the following questions are necessary. Please do not include your name. Your comments are being collected by The Center for the Study of Higher Education and will be reported as group data, rather than individually, to the Economics Department. Any further comments, criticisms, or suggestions that you care to make would be appreciated. You may either make these comments on the back of this sheet or to any of the Center's staff.

1) Please respond to the following statement by circling the option closest to your feelings about the following statement:

   "There is a better way of learning Economics 202 than the method we used this quarter." CIRCLE ONE

   A) Strongly Disagree

   B) Disagree

   C) Agree

   D) Strongly Agree

2) If you were to rate your teacher in this course, in comparison to other teachers you have experienced, which of the following would you select? CIRCLE ONE

   Excellent Above Average Average Below Average Poor

3) Please list the two strongest points about this course.

   1)

   2)

4) Please list the two weakest points about this course.

   1)

   2)

5) Do you think that this course should be taught the same way next quarter? CIRCLE ONE

   Yes Indifferent No

6) If you do not think it should be taught the same way, in what specific ways would you change the course if you were to teach it?

THANK YOU FOR YOUR COMMENTS