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ABSTRACT

This report compares the relative improvement in reading shown by students taught by teachers trained in the diagnostic/prescriptive approach with those taught by teachers using a conventional method. Subjects were 239 control and 261 experimental students, matched in basic demographic characteristics and in IQ scores, from grades four through six. Twelve control and 12 experimental teachers each taught reading to approximately 25 students. All teachers received inservice training one hour a week, with the experimental teachers receiving an additional three hours of inservice training each week in the diagnostic/prescriptive approach. Pretests and posttests were administered to the students, while the Minnesota Teacher Attitude Test measured teachers' attitudes toward their students. Findings show that inservice teacher training produces higher levels of student spelling ability, that the same may be true of student reading ability, and that teachers' attitudes directly influence student progress. Tables of findings are included. (JM)

LEARNING INSTITUTE IN-SERVICE RESULTS

Mercedes D. Fitzmaurice

This research was conducted through a grant awarded by the New Jersey State Department of Education for the school year 1975-76. It was written in the area of affecting patterns of school organization specifically in the area of classroom individualization and in-service education. The project researched the need to instruct elementary teachers in the area of diagnostic/prescriptive approach through new in-service patterns. The outcomes of the research design and the evaluation demonstrated the value of ongoing in-depth in-service education in the area of individualization and in developing models for diffusion.

With the advent of individualization being the key to instruction, the classroom teacher must learn the specific techniques of individualization if the youngsters being instructed are to receive the most appropriate educational program.

The classroom teacher is the key ingredient in the learning process and it is her/his knowledge and ability which will make the difference between a poor or outstanding educational program. The typical pre and in-service education the teacher receives has not enhanced the chances of the child attaining the best possible education.

This "Learning Institute" project is geared at both problem areas. The first area is that of educating teachers in diagnostic/prescriptive approaches to the teaching of reading and secondly, following up in instructional methods which will enhance the chances of success. Employing the diagnostic/prescriptive approach will allow the teacher to individualize instruction utilizing a more scientific method in the classroom.

Research Design

The assessment of the effects of teacher training will be made by measuring the relative improvement in reading shown by the students taught by teachers trained in the diagnostic/prescriptive approach to the teaching of reading against those taught by teachers using a conventional method. Students provided with the diagnostic/prescriptive approach will show a significant difference in reading performance as compared to students receiving the existing reading instruction.

Reading ability assessment will be determined by the Silvaroli Individual Reading Inventory and the Iowa Test of Basic Skills. Other measures to be obtained will include an assessment of intelligence. The Cognitive Ability Test Level C, (Lordge Thorndike) will be used. We hypothesize that the relative efficiency of this program varies according to certain classifications of subjects such as: male, female, high IQ's, low IQ's, average IQ's, developmental reader, corrective reader, further we hypothesize that the relative efficiency varies according to sex of student, intelligence of student and reading level of student.

Mercedes D.
Fitzmaurice

The data analysis will be by an analysis of variance (ANOVA) to test for the main effects of: sex of student, intelligence of student, initial reading level, i.e., developmental or corrective. These three variables constitute the "between", or categorized variables. The dependent variable will be the Silvaroli I.R.I. (Form B). In addition to main effects, all interactions will be tested for significance. Whenever it would add additional information, post hoc comparisons such as the Tukey will be performed.

All calculations will be performed by Datatext and SPSS on the IBM 370 at Princeton University and operated by the State of New Jersey's Educational Instructional Services, Inc. (EIS).

Selection of Subjects:

The population of students will constitute the 600 students enrolled in the Bowe Elementary School (levels 4-6). Three hundred of these students will be selected at random. Four teams of six teachers each constitutes the teaching staff of the school. A team will consist of six teachers. Three teachers per team will be randomly selected to make up the experimental group. The experimental group therefore will consist of 12 teachers. The control group will consist of 12 teachers. Each teacher will handle approximately 25 children for reading instruction. All teachers in the building will receive in-service one hour per week. The experimental group of teachers will receive an additional three hours of in-service each week in the diagnostic/prescriptive approach.

The students will be assigned to either the experimental or control group by a random process. All children at the Bowe Elementary School will receive the Iowa Test of Basic Skills and The Cognitive Ability Test Level C, (Lordge Thorndike) in September. Early in the school year (September-October) the Silvaroli I.R.I. will be administered to all children Form A. In May the Silvaroli Form B will likewise be administered to all children.

Subsidiary analysis will include teacher attitude changes as a function of instruction. An index of degree of sharing and an assessment of diagnostic skills of teachers, an appraisal of the instructional level of skills of teachers will also be made.

This section of the report of The Learning Institute will:

First, describe the characteristics of the participating students and their teachers.

Second, describe the changes that occurred over the course of the school year.

Third, present the patterns of relationships between certain aspects of the students, and between those aspects of the students and their teachers.

Finally, certain recommendations with respect to ongoing, in-depth, in-service projects will be presented.

Basic Terminology

In order to facilitate communication, whenever we refer to the group of students taught by teachers not receiving in-depth in-service we will employ the terms "control students" or simply "controls." Whenever we want to designate those students whos teachers were receiving in-depth in-service, we will use "experimental students" or "experimentals." Their teachers will be called, respectively, "control teachers" and "experimental teachers."

All computations were performed by the Statistical Package for the Social Sciences (SPSS) on an IBM 370/168 computer. All probabilities for all statistical tests are for exact two-tailed probabilities.

Characteristics of Students and Teachers

The 500 students were randomly divided into 239 control and 261 experimental students. The control and experimental students were matched, as so far as possible, for basic demographic characteristics. Additionally, two (pretest) measures of intelligence were obtained. The individually administered Peabody Picture Vocabulary Test produced a mean I.Q. of 103.5971 for the controls and 103.7471 for the experimentals. A t-test ($t = -0.10$, $p = .920$) revealed no differences in I.Q. between these groups. See Table I for the presentation of these tests. The Lordge Thorndike, a group administered I.Q. test, produced means of 103.0054 and 102.3769 for controls and experimentals, respectively. Because the standard deviations were significantly different ($F = 2.92$, $p < 0.000$) a separate variance estimate t-test had to be employed. This t-test ($t = 0.37$, $p = 0.709$), also, showed no difference between experimentals and controls with respect to I.Q.

A Kottmyer spelling test was given twice to each group. The preprogram means for the controls and experimentals were 4.1176 and 4.1264 respectively. A t-test ($t = -0.07$, $p = 0.940$) showed no initial differences in ability to spell.

The Minnesota Teacher Attitude Test was given to the teachers of the 500 students. This test was given during the latter part of the study. Inasmuch as teachers were assigned randomly to experimental and control groups, we have no a priori reason to suspect initial differences in teacher-to-student attitudes. An ANOVA showed no significant MTA raw score differences between experimentals and controls ($F = 2.9269$, $df = 1,498$, n.s.). However, one is tempted to note the fact that the experimentals are higher and more variable than the controls. (Controls, $M = 40.105$, S.D. = 27.163; Experimentals, $M = 44.651$, S.D. = 31.818). A similar analysis was performed using the scaled MTA percentage scores. These scores are "adjusted" to account for years of teaching experience. These results are similar to the above analysis.

The above information is straightforward and indicates that according to objective measures the two groups are, indeed, equivalent. The assignment of an individual teacher to a particular group was random. Hence we did not expect the

teachers to be or to act differently. As soon as the program got under way, however, the teachers knew to which group they had been assigned. Would this knowledge make a difference in the way they perceived their students? Now, in addition of the objective tests, as above, we have three, largely subjective, measures to reading ability. All three were taken initially at the start of the program and then at its conclusion. ANOVA's were performed to test for differences in students' Independent, Instructional, and Frustration levels by the Informal Reading Inventory (IRI). Significant differences in teacher estimates of students' reading levels (beyond the .01 level) were found for all three initial reading tests. The means were (for controls and experimentals respectively):

Independent level	7.848 and 6.839	($F = 16.9744$, $df = 1,498$)
Instructional level	9.109 and 8.356	($F = 13.7641$, $df = 1,497$)
Frustration level	10.318 and 9.862	($F = 5.9049$, $df = 1,497$)

Thus, for each level the experimental teachers were "less generous" in assigning reading levels to their students. In subsequent analysis, the improvement scores (post minus pre) will be employed, as well as the differences between the experimentals and controls.

Changes that Occurred During the Learning Institute

The Kottmyer, an objective test, administered during the initial phase of the program showed no differences between the experimentals and controls (respective means: 4.1264 and 4.1176) ($t = -0.07$, $p = 0.940$). However, the Kottmyer administered at the conclusion of the program showed a large difference between experimental and control groups (respective means: 5.2538 and 4.4916) ($t = -7.38$, $p = 0.000$). While both groups "improved," the experimental group pulled substantially ahead of the control group. An additional fact was revealed by our program i.e., the variation between and among the experimentals decreased significantly over that of the controls (respective standard deviations: 0.957 and 1.305) ($F = 1.86$, $p = 0.000$).

As noted above, the I.R.I. instructional level administered as a "pretest" revealed the fact that the control teachers assessed their students higher than the experimentals teachers (respective means: 9.1038 and 8.3563) ($t = 3.71$, $p = 0.000$). The same assessment administered as a "post-test" revealed means of 10.0879 and 9.6628 ($t = 1.44$, $p = 0.150$). Both groups improved and whatever teacher expectations there were initially, disappeared over the course of the program. As in the previous paragraph, the variation between and among the experimentals (S.D. = 1.789) was significantly less than for the controls (S.D. = 4.220) ($F = 5.56$, $p = 0.000$).

Two new variables were created out of the data. These were the "difference scores" referred to above. We took for each student the difference between the post-minus the pre- (a) Kottmyer and (b) I.R.I. instructional level scores. The first new variable will give us an objective indication of change (with regard to spelling ability) over the duration of the program. The second new variable yields a somewhat subjective estimate of change (with regard to reading ability) over the course of the program.

Analyses of Variance were performed to assess whatever effect the in-service had on students with respect to these two measurements.

The first ANOVAs used the Kottmyer difference score as the dependent measure. "Group" and "Intelligence" as measured by the Peabody picture vocabulary test were the independent variables. See Table II. The F-ratios for the main effect of Group ($F = 163.916$, $p = 0.001$) and I.Q. ($F = 2.572$, $p = 0.105$) revealed the fact that the in-service group of students had significantly greater spelling scores than the control group. This superiority was not shown for those students as classified by I.Q. However, there was a significant interaction of Group by I.Q. ($F = 3.805$, $p = 0.049$). Those students of lower intelligence gained greater spelling ability with the in-service teachers than those of higher I.Q.

A similar analysis substituting the Lordge Thorndike group intelligence test for the individually administered Peabody revealed similar results. See Table III. Here, however, the F-ratio ($F = 10.513$, $p = 0.002$) for I.Q. showed that increased spelling ability is related to intelligence. Those of lower I.Q. learning more than those of higher I.Q. There was no significant interaction between Group and I.Q., here (F = less than 1,000).

The second set of ANOVAs used as the dependent measure, for each student, the difference (post minus pre) between the final and initial assessments of the Independent Reading Level of the I.R.I. Again, the independent measures were the Control-Experimental or "Group" variable and the "intelligence" variable as measured by the Lordge Thorndike or the Peabody.

The F for the main effect of "Group" was again significant ($F = 19.125$, $p = 0.001$). See Table IV. Here, the main effect of Intelligence (Peabody measure) was significant too ($F = 11.221$, $p = 0.001$). There were no significant interactions (F less than one).

Very similar results were obtained with the Lordge Thorndike measure of intelligence. See Table V.

The Minnesota Teacher Attitude Scale and Students' Learning

The Minnesota Teacher Attitude scale has been used extensively to measure the teacher's (favorable) attitude toward his or her students. This study is concerned with the possible interplay between such attitude and the effect of the Institute on spelling and reading improvement.

First of all, we found a frequency distribution of all MTA percentile scores. Table VI shows the frequency of students working with teachers of specified MTA percentiles. These percentiles are "corrected" for years of teaching experience so that the "average teacher" with any given number of years of experience will achieve a percentile of 50. A score above 50 indicates a more favorable attitude then average, and a score below 50, a less favorable attitude. Our calculations revealed that the modal MTA score is 47.746 which is approximately what could be expected according to national norms.

Using the "difference score" for spelling, i.e., the Kottmyer we did a two-way ANOVA to assess whatever effects would occur due to "Group." See Table VII. In addition, we have a very significant main effect due to teacher's attitude ($F = 9.932$, $p = 0.002$). Those students who had teachers in the upper half of the MTA distribution achieved significantly higher spelling scores than those who had teachers in the lower half. While the interaction of Group by MTA fails to achieve significance ($F = 3.060$, $p = 0.077$). We have reason, see below, to suspect some relationship between teacher characteristics, intellectual ability of students, "experimenter effect" and possibly other unknown variables.

A further ANOVA, this time employing the "difference score" for the independent reading level of the I.R.I. as a dependent measure is shown in Table VIII. Here, as before, we have a significant main effect for "Group" but not so for MTA scores ($F = 1.213$, $p = 0.271$). Further, there is no interaction between grouping and the teacher's MTA scores.

Summary and Recommendations with Regard to In-service Training

In all of the above analyses, wherever the more objective measure (spelling ability) is utilized, the results are quite clear. The "In-service Group" of children do significantly better than the others. The teachers' attitudes here, as measured by the MTA, directly influence the students' progress.

When we come to the less objective measure of the "independent reading level" we encounter less clear-cut results. Those students with In-service teachers learned significantly better than the other group; but, the effects of teachers' attitudes and students' basic ability are less clear.

Two possible explanations present themselves. First, reading qua reading is a most complex task and could be (is?) affected by variables not included in this study. In addition to measurements of intelligence of student, some measurement of "interest" in reading and education in general should be obtained. In addition, some measure of family background (interests, support for such programs, etc.) should be obtained.

The second possible explanation for these findings is that the basically subjective measure of the I.R.I. confounds the measurement of change over the program. The basic fact that the chosen students randomly assigned to either control or experimental groups and having no difference in the objective measures did show a difference when measured by the subjective I.R.I. Those experimental teachers expected, at least initially, a higher level of performance. Either this expectation "died" or affected, in some way, the performance of their charges.

The findings disclosed here dramatically show that "in-service" produces higher levels of spelling ability. The same may be true of reading ability. The teachers' attitudes interact with the students' performance and future research will shed further light on this phenomenon.

Note well that a more simple skill, i.e., spelling did show significant improvement due to the in-service, and that this improvement was "visable" in a very short period of time. What is needed is: (1) to follow up such a program over two or three years to assess more fully the effects on students and teachers; and (2) more detailed information (as stated above) on the students and on their teachers.

TABLE I

T-Tests for Tests of Differences Between Controls and Experimentals

LEARNING INSTITUTE STUDY NUMBER 1

FILE NONAME (CREATION DATE = 07/25/75)

GROUP 1 = GROUP EQ 1.
GROUP 2 = GROUP EQ 2.

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
IND	IRI PRETEST OF IND READING LEVEL												
	GROUP 1	239	7.0494	2.670	0.173	1.10	0.440	4.12	498	0.000	4.13	497.24	0.000
	GROUP 2	261	6.8391	2.805	0.174								
INST	IRI PRETEST OF INST READ LEVEL												
	GROUP 1	239	9.1088	2.282	0.148	1.03	0.841	3.71	498	0.000	3.71	492.98	0.000
	GROUP 2	261	8.3563	2.253	0.139								
FRUST	IRI PRETEST OF FRUSTRATION READ LEVEL												
	GROUP 1	239	10.3180	2.064	0.134	1.06	0.623	2.43	498	0.016	2.43	496.39	0.015
	GROUP 2	261	9.8621	2.129	0.132								
PEABODY	GROUP 1	206	103.5971	15.341	1.069	1.18	0.225	-0.10	465	0.920	-0.10	453.85	0.920
	GROUP 2	261	103.7471	16.634	1.030								
LOFTHERN	GROUP 1	185	103.0054	13.050	0.959	2.92	0.000	0.34	443	0.731	0.37	428.65	0.709
	GROUP 2	260	102.3769	22.286	1.382								
KOTT	GROUP 1	238	4.1176	1.351	0.088	1.13	0.342	-0.07	497	0.940	-0.07	485.72	0.941
	GROUP 2	261	4.1264	1.272	0.079								
KOTTPOST	KOTT POST-TEST												
	GROUP 1	238	4.4916	1.305	0.085	1.86	0.000	-7.48	496	0.000	-7.38	432.04	0.000
	GROUP 2	260	5.2538	0.957	0.059								

T - T E S T

GROUP 1 = GROUP EQ 1.
GROUP 2 = GROUP EQ 2.

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
INSTPOST IRI POSTTEST OF INST REAC LEVEL												
GROUP 1	239	10.0879	4.220	0.273	5.56	0.000	1.49	498	0.137	1.44	314.98	0.150
GROUP 2	261	9.6628	1.789	0.111								

DATA TRANSFORMATION DONE UP TO THIS POINT..

NO OF TRANSFORMATIONS 0
NO OF RECODE VALUES 0
NO OF ARITHM. OR LOG. OPERATIONS 0
THE AMOUNT OF TRANSPACE REQUIRED IS 0 BYTES

FREQUENCIES GENERAL=ALL
OPTIONS 3,8
STATISTICS ALL

NONAME (CREATION DATE = 08/20/75) ANOVA for Kottmyer Post minus Pre-Tests by Group by I.Q. (Peabody)

* * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * *

NEWVAR4
BY GROUP EXPERIMENTAL AND CONTROL GROUPS
NEWP

* *

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	68.447	2	34.224	82.325	0.001
GROUP	58.142	1	68.142	153.916	0.001
NEWP	1.069	1	1.059	2.572	0.105
2-WAY INTERACTIONS	1.582	1	1.582	3.805	0.049
GROUP NEWP	1.582	1	1.582	3.805	0.049
RESIDUAL	206.194	496	0.416		
TOTAL	276.223	499	0.554		

500 CASES WERE PROCESSED.
0 CASES (0.0 PCT) WERE MISSING.

...STITUTE STUDY NUMBER 1 TABLE III

NOVANAME (CREATION DATE = 08/20/75) ANOVA of Kottmyer Post minus Pre-Test by Group by I.Q. (L.T.)

* * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * * *

NEWVAR1
BY GROUP EXPERIMENTAL AND CONTROL GROUPS
NEWLT

* *

...CE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
...L EFFECTS	71.711	2	35.855	87.004	0.001
...ROUP	67.903	1	67.903	164.767	0.001
...EWLT	4.333	1	4.333	10.513	0.002
...AY INTERACTIONS	0.104	1	0.104	0.252	0.999
...ROUP NEWLT	0.104	1	0.104	0.252	0.999
...IDUAL	204.409	496	0.412		
...AL	276.223	499	0.554		

500 CASES WERE PROCESSED.
0 CASES (0.0 PCT) WERE MISSING.

FILE NONAME (CREATION DATE = 08/20/75) ANOVA of IRI Instructional Level by Group by Peabody I.Q.

* * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * *

NEWYARD
BY GROUP EXPERIMENTAL AND CONTROL GROUPS
NEWP

* *

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	57.125	2	28.562	14.366	0.001
GROUP	38.025	1	38.025	19.125	0.001
NEWP	22.313	1	22.313	11.221	0.001
2-WAY INTERACTIONS	0.202	1	0.202	0.102	0.999
GRO P NEWP	0.202	1	0.202	0.102	0.999
RESIDUAL	986.165	496	1.988		
TOTAL	1043.493	499	2.091		

500 CASES WERE PROCESSED.
0 CASES (0.0 PCT) WERE MISSING.

E NONAME (CREATION DATE = 08/20/75) ANOVA of IRI Instructional Level by Group by Lordge-Thorndike I.Q.

• • • • • • • • A N A L Y S I S O F V A R I A N C E • • • • • • • • • •

NEWVAR
BY GROUP NEWLT EXPERIMENTAL AND CONTROL GROUPS

• •

RCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
IN EFFECTS	65.707	2	32.853	16.727	0.001
GROUP	35.853	1	35.853	18.256	0.001
NEWLT	30.8[illegible]	1	30.8[illegible]	15.727	0.001
WAY INTERACTIONS	3.573	1	3.573	1.822	0.174
GROUP NEWLT	3.573	1	3.573	1.822	0.174
SIDUAL	974.203	496	1.964		
)TAL	1043.493	499	2.091		

500 CASES WERE PROCESSED.
0 CASES 0.0 PCT) WERE MISSING.

APCT

TABLE VI

Frequency Distribution of students' Teachers' MTA scores

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	5.	21	4.2	4.2	4.2
	10.	18	3.6	3.6	7.8
	20.	117	23.4	23.4	31.2
	30.	45	9.0	9.0	40.2
	40.	43	8.6	8.6	48.8
	50.	122	24.4	24.4	73.2
	60.	68	13.6	13.6	86.8
	70.	23	4.6	4.6	91.4
	75.	18	3.6	3.6	95.0
	99.	25	5.0	5.0	100.0
	TOTAL	500	100.0	100.0	

TABLE VII

ILE NONAME (CREATION DATE = 08/20/75) ANOVA of Kottmyer differences by Group by MTA

* * * * * * * * * ANALYSIS OF VARIANCE * * * * * * * * *

NEWVAR4
BY GROUP EXPERIMENTAL AND CONTROL GROUPS
NMTAP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	71.453	2	35.727	87.072	0.000
GROUP	59.878	1	59.878	145.933	0.001
NMTAP	4.075	1	4.075	9.932	0.002
2-WAY INTERACTIONS	1.255	1	1.255	3.059	0.077
GROUP NMTAP	1.255	1	1.255	3.060	0.077
RESIDUAL	203.514	496	0.410		
TOTAL	276.223	499	0.554		

500 CASES WERE PROCESSED.
0 CASES (0.0 PCT) WERE MISSING.

ILE NONAME (CREATION DATE = 08/20/75)

TABLE VIII

ANOVA of IRI instructional level Differences by Group, by MTA

* * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * *

BY GROUP NEWVARB EXPERIMENTAL AND CONTROL GROUPS
MTAP

* *

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	37.275	2	18.638	9.188	0.001
GROUP	36.995	1	6.995	18.237	0.001
MTAP	2.460	1	2.460	1.213	0.271
2-WAY INTERACTIONS	0.032	1	0.032	0.016	0.999
GROUP MTAP	0.032	1	0.032	0.016	0.999
RESIDUAL	1006.185	496	2.029		
TOTAL	1043.493	499	2.091		

500 CASES WERE PROCESSED.
0 CASES (0.0 PCT) WERE MISSING.