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ABSTRACT

The effectiveness of an instructional improvement project in the Greeley-Evans Schools, Colorado, was studied. Teachers were provided inservice education in a class called the Essentials of Instruction. Recognizing that receiving training was not the same as being an implementer of the innovation, the Levels of Use instrument identified teachers who were or were not users of the innovation. California Achievement Test scores were obtained for 598 fifth grade students in reading, language arts, spelling, and mathematics. Achievement gain scores were used to examine differences between males and females, Hispanics and Whites, and students taught by user versus non-user teachers. Results confirmed the achievement gains expected in one years' time. Males had much higher gains in reading, and females in spelling. Caucasians had significantly higher gains in mathematics and reading achievement than Hispanics did. In all subjects, Hispanics started with lower test scores and posted smaller gains than Caucasians. Results suggested that the benefits of use of the innovation were not fully accrued during the first year. Non-users showed slightly above average gains in language arts and mathematics, while users showed slightly above average gains in reading and spelling. (GDC)

ACHIEVEMENT GAINS OF FIFTH GRADE PUPILS TAUGHT BY TEACHERS USING THE ESSENTIALS OF INSTRUCTION: A PILOT STUDY

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School District #6 (Greeley-Evans, Colorado) and the University of Northern Colorado developed collaborative efforts to grant credit for knowledge, skill development, and application related to a staff development project labeled Success-Based Education by the school district. This instructional improvement project was began during Fall, 1983, and has continued to the present.

The staff development inservice inputs were initially the responsibility of Madeline Hunter and Sue Wells Welch. The content focus was in the areas of Instruction (Teaching/Learning Cycle) and Clinical Supervision (See Appendix A and B). Subsequently, district personnel who were trained became district trainers. Print and non-print materials (video tapes and films) related to the areas of instruction were also used as part of the dissemination and implementation processes. Additionally, a class for teachers containing the Essentials of Instruction was developed and offered. Some of the district trainers also received further instruction at non-Greeley sites with Hunter and Welch.

Initially, the evaluation plan was to assess the impact of the inservice programming, as measured by attendance logs and credits earned by teachers, on the achievement of pupils at selected grade levels. Confronted with the prospect that being trained or knowledgable was not the same as being an implementer of the innovation, the validated Levels of Use (LoU) instrument from the Concerns-Based Adoption Model (CBAM) developed by the R & D Center at the University of Texas was used to identify "users" (See Appendix C). Students' academic achievement scores (Fall, 1983 and

Fall, 1984) were obtained from the California Achievement Test Battery (CAT) in the areas of Reading, Language Arts, Spelling and Mathematics (See Appendix D).

Due to the focus and level of initial training, all fifth grade teachers were selected for this pilot study. Teachers were classified as "users" and "non-users" based on interview data which determined the level of use of the Teaching/Learning Cycle. Of the 24 teachers, 13 were identified as "non-users" (6 male, 7 female) and 11 were identified as "users" (4 male, 7 female).

Fall '83 and Fall '84 achievement sub-test scores from the CAT in reading, language arts, spelling, and mathematics were obtained for all students in the 24 teachers' classes. Sub-test gain scores were analyzed to examine differences between male and female students, differences based on ethnicity, and differences between students taught by "user" teachers and "non-user" teachers.

Pupils with the following characteristics were dropped from the study: special education designation, recipients of home-bound instruction, non-English speakers, pupils with severe non-attendance records and pupils of teachers who had severe non-attendance records.

The following primary hypotheses provided the bases for preliminary data analysis.

1. There will be a greater gain in pupil achievement in all sub-test areas for pupils taught by "user" teachers than for pupils taught by "non-user" teachers.

2. There will be no difference in pupil achievement gains in all sub-test areas for pupils taught by "user" and non-user" teachers when pupils are compared on the variable of gender.
3. There will be no difference in pupil achievement gains in all sub-test areas for pupils taught by "user" and non-user" teachers when pupils are compared on the variable of ethnicity.

Fifth Grade Subjects

There were 598 pupils in this study. The balance between male and female subjects is presented in Table 1.

Ethnicity is presented in Table 2. The most recent census data indicates that the Hispanic population in Weld County is 18 percent. A very small number of other ethnic minorities were found in the total population studies. These have been included in the Caucasian population reported in Table 2.

Test Data

The entire population of subjects studied maintained the achievement gains expected in one year's time in the four sub-test areas. This is shown in Table 3.

A review of the gain scores by sex revealed some interesting differences. A difference of approximately .20 is significant at $p = .05$ for groups of 200 to 400 subjects. (See Table 4)

While there is no available explanation of the unusual average gain made by males as compared to females in the area of Reading, and females as compared to males in the area of Spelling, the difference nevertheless is significant. Further investigation of the occurrance will be conducted as additional data become available.

In all cases the subjects showed average gains in the four subject areas, and all are nearly one years growth, except in the area of Mathematics as shown in Table 5.

In all areas reviewed, the Hispanic population started with lower test scores (1983) and posted smaller gains in each area than the Caucasian population. The largest gain area for Caucasians was Mathematics. This difference is not explicable based on the data available. A more detailed investigation of this is warranted. The next largest gain area for Caucasions was in Reading. This may be due to linguistic difference in the predominant language spoken at home. The similiarity in gains in the area of Spelling may be due to the nearly uniform curriculum and instructional methodology now being used by the school district. This imbedded instructional approach may not have been altered by the alternative instructional approach.

Mean differences of approximately .20 are significant at $p = .05$ for groups of 200 to 400. Given that the $N = 417$ for the Caucasian population and $N = 181$ for the Hispanic population (See Table 2) the differences in gains between the two populations in the area of Mathematics and Reading are significant.

Schools with the highest Hispanic populations were grouped (Group I and II) and compared to schools with three lower densities of Hispanic populations. Group Three and Four represents groupings of schools with the lowest Hispanic populations (Group III and IV). (See Table 6)

Mean differences of approximately .50 are significant for groups of approximately 50 subjects with $p = .05$.

Test scores for 1983 appear comparable within groups and ascend from the lowest scores in Group One to the highest scores in Group Four. Differences in gains from one testing period to the next follow the same pattern except for School D. School D is judged by district officials be the school with the greatest immersion in staff development for the Essentials of Instruction. The fifth grade teachers at School D were determined to be at levels IVB and V meaning they were in the refinement and integration stages of adopting the innovation (See Appendix C). When School D is compared to the other schools in Group Two the differences in gain scores are significant for School D compared to School E in the area of Reading and for School D compared to School C in Mathematics. It is also noteable that the test scores in the areas of Mathematics and Reading for School D/Group Two compare very favorably to test scores, in the same areas, attained by schools in Group Four.

Test scores for users and non-users of the Essentials of Instruction are shown in Table 7. (see Appendix C for the behavioral indices for users and non-users.) The average achievement gain per year (K-4 = 5 yrs of schooling and K-5 = 6 years of schooling) is compared to gain made during the testing period. One can find the difference between previous average gains and gain attained between 1983 and 1984. Non-users showed slightly above average gains in Language Arts and Mathematics while users showed slightly above average gains in Reading and Spelling. In no areas were the 1983-84 gains significantly different from the average gain students made over previous years of school. It is suggested that the impact of the innovation was not fully accrued during the initial year of implementation.

Table 8 displays the gain scores for the Caucasians and Hispanic populations. It is noteable that the differences in the area of Spelling are minor. Again, this may be due to the standardization of curriculum and instructional approach in the district in this area. The differences found in the area of Language Arts are also negligible. The differences in the areas of Mathematics and Reading are approaching significance. Any further attempt to stratify the population beyond sex and ethnic differences, i.e., user and non-user classrooms or group students by level of school (Group One, Two, Three, or Four) produced such small numbers of subjects in classes that such an analysis was of questionable value in the case of the Hispanic female.

While most research indicates that the female motivational level in the 5th grade is higher than that of the male, this study may be showing subject area differences are more dependent on ethnicity than on gender in the area of Reading and Mathematics. In the Caucasian population, for three of the four areas studied the opposite is true. Of course, there may be other cultural or SES differences accounting for these variances, such as the dominance of field dependence or field independent learning, family expectational differences of the learner based on gender, physiological maturational differences, and the like.

Summary

In recognition of the fact that the use of Essentials of Instruction began in Fall, 1983, it would seem plausible that the impact of such instruction had not yet fully accrued. Also, initial training was focused in schools with historically low achievement and high Hispanic ethnicity. This may well account for no differences found between users and non-users.

As far as district results are concerned, the overall achievement is one full grade level. Overall, females tend to achieve some what higher than males. This may be due to differences in motivation based on gender. Only in the area of Language Arts did most students achieved at or near grade level. It may be possible that the use of the Essentials of Instruction suppresses motivation in females and/or enhances motivation in males.

School D (Table 7) achievement gains in Reading and Mathematics are significantly higher than those of other schools in Group Two and certain schools in other (two higher) groupings. Since School D was the pilot school in which the Essentials of Instruction program should have had the greatest impact, there is sufficient encouragement to proceed with further study of the variables in this initial design.

Recommendations

1. The use of the LoU as a valid measure of the utilization of the Essentials of Instruction by teachers should be supplemented by principals' perceptions based on direct observation, and self-report by the teachers. Also, user and non-user levels may be redefined by placing the cut-point between Level III and IVA rather than III and II.
2. The similarities of scores in the area of Spelling should be investigated as to possible reasons for highly similar scores across all schools at the fifth grade level.
3. An indepth study of School D as to teachers aptitude and attitude as well as administrative leadership is merited to determine the possible variables contributing to the significant gain scores identified.
5. The case of aptitude (IQ) and learning style of pupils as additional variables is advisable. This is currently being planned.

6. Investigation should be conducted to identify reasons for the possible differences in scores between male, Hispanic and Caucasian populations in the area of Mathematics.

7. While test scores, beginning and gain scores, for the Hispanic population is noticeably lower than the same scores for the Caucasian population, longitudinal studies should be conducted to determine if relative gain scores are increasing that could be attributable to the new instructional methodology.

TABLES

Table 1

Fifth Grade Population by Sex

Sex	Frequency	Percent
Female	289	48.3
Male	309	51.7

Table 2

Fifth Grade Population by Ethnicity

Ethnic	Frequency	Percent
Caucasian	417	69.7
Hispanic	181	30.3

Table 3

Fifth Grade Test Score Gains

Fall, 1983/Fall, 1984

Variable	Mean	Gain
READ 83	5.72	
READ 84	6.89	+1.17
LA 83	5.49	
LA 84	6.62	+1.13
SPELL 83	5.34	
SPELL 84	6.36	+1.02
MATH 83	5.27	
MATH 84	6.29	+1.02

Table 4
Fifth Grade Test Score Differences by Sex
Fall, 1983/Fall, 1984

	Females (289)		Males (309)		
Variable	Mean	Gain	Mean	Gain	Difference in Gains
READ 83	5.89	+1.01	5.57	+1.29	
READ 84	6.90		6.88		(+.28 male)
LA 83	5.77	+1.21	5.23	+1.06	
LA 84	6.98		6 29		(+.15 female)
SPELL 83	5.63	+1.13	5.06	+ .92	
SPELL 84	6.76		5.98		(+.21 female)
MATH 83	5.32	+1.03	5.22	+1.00	
MATH 84	6.35		6.22		(+.03 female)

Table 5
Fifth Grade Test Score Difference
Reporting Ethnicity

	Caucasian(417)		Hispanic(181)		
Variable	Mean	Gain	Mean	Gain	Difference in Gains
READ 83	6.24	+1.26	4.53	+ .95	
READ 84	7.50		5.48		(+ .31 Cau)
LA 83	5.94	+1.16	4.47	+1.04	
LA 84	7.11		5.51		(+ .12 Cau)
SPELL 83	5.66	+1.03	4.60	+ .98	
SPELL 84	6.69		5.58		(+ .05 Cau)
MATH 83	5.46	+1.13	4.83	+ .77	
MATH 84	6.59		5.60		(+ .46 Cau)

Table 6
Fifth Grade Test Score Difference Among Schools
Group by Density of Ethnic Population

Group One

	School A			School B			
Variable	N	Mean	Diff	Mean	N	Diff	Max. Diff.
READ 83	33	4.03		4.03	65		
READ 84	32	4.93	+.90	5.07	67	+1.04	+.14 (School B)
MATH 83	33	4.65		4.73	65		
MATH 84	33	5.41	+.76	5.48	67	+.75	+.01 (School A)

Group Two

	School C			School D			School E			
Variable	N	Mean	Diff	Mean	N	Diff	Mean	N	Diff	Max. Diff.
READ 83	30	5.20		5.19	48		5.00	46		
READ 84	30	6.13	+.93	6.63	48	+1.44*	5.80	46	+.80	+.64 (School D)
MATH 83	30	5.12		4.68	48		4.96	46		
MATH 84	30	5.64	+.52	5.87	48	+1.19**	5.82	46	+.90	+.67 (School D

Group Three

	School F			School G			
Variable	N	Mean	Diff	Mean	N	Diff	Max. Diff.
READ 83	60	5.86		5.93	50		+.12 (School F)
READ 84	61	7.12	+1.26	7.07	49	+1.14	
MATH 83	60	5.48		5.19	50		+.10 (School F)
MATH 84	61	6.36	+ .88	5.97	49	+ .78	

Group Four

	School H			School I			School J			School K			
Variable	N	Mean	Diff	Mean	N	Diff	Mean	N	Diff	Mean	N	Diff.	Max. Diff.
READ 83	67	6.82		6.31	55		6.72	70		6.34	71		
READ 84	67	8.09	+1.27*	7.81	54	+1.50*	8.01	69	+1.29*	7.88	71	1.54*	+.27 (School K)
MATH 83	67	5.82		5.30	55		5.92	70		5.40	71		
MATH 84	67	7.07	+1.25**	6.49	55	+1.19**	7.17	69	+1.25**	6.70	71	1.30**	+.11 (School K)

Table 7

Comparison of Gain Scores and Average Gain Scores Between Uses and Non-Users

Non-Users

Variable	N	Mean	Diff	K-4	K-5	Diff. wrt Ave K-5 Gain
READ 83	347	6.19		1.24		
READ 84	346	7.40	+1.21		1.23	-.02
LA 83	345	5.88		1.18		
LA 84	347	7.13	+1.25		1.19	+.06
SPELL 83	346	5.61		1.12		
SPELL 84	346	6.58	+.97		1.10	-.13
MATH 83	347	5.50		1.10		
MATH 84	347	6.64	+1.14		1.11	

Users

Variable	N	Mean	Diff	K-4	K-5	Diff. wrt Ave K-5 Gain
READ 83	248	5.07		1.01		
READ 84	247	6.18	+1.11		1.03	+.08
LA 83	250	4.96		.99		
LA 84	247	5.92	+ .96		.99	-.03
SPELL 83	250	4.96		.99		
SPELL 84	247	6 05	+1.09		1.01	+.08
MATH 83	248	4.95		.99		
MATH 84	249	5.80	+ .85		.97	-.12

Table 8

Test Score Gains
by Sex and Ethnicity

Math Gain

	Caucasian	N	Hispanic	N	Diff.
Female	1.16	210	.70	77	+.46
Male	1.11	206	.78	103	+.33

Reading Gain

	Caucasian	N	Hispanic	N	Diff.
Female	1.15	210	.75	77	+.40
Male	1.42	206	1.04	103	+.38

Language Arts Gain

	Caucasian	N	Hispanic	N	Diff.
Female	1.25	210	1.12	77	+.13
Male	1.01	206	.95	103	+.16

Spelling Gain

	Caucasian	N	Hispanic	N	Diff.
Female	1.12	210	1.10	77	+.02
Male	.94	206	.85	103	+.09

A P P E N D I C E S

Appendix A
Teaching/Learning Cycle
Lesson Design

STEP ONE -- MENTAL SET
Planned activity for a lesson which introduces the objective, focuses the learner's attention on the lesson topic, or sets the learner to anticipate the lesson

STEP TWO -- RATIONALE ("Need to know")
Part of a lesson which gives learners a reason for accomplishing the objective

STEP THREE -- OBJECTIVE (Content & Behavior; To be Made Public)
A statement defining what the learner is to learn (content) and what the learner must do to demonstrate that the objective has been mastered (behavior)

STEP FOUR -- TEACH
That part of a lesson which gives the learner the information needed to master the objective.

STEP FIVE -- MODEL
The part of a lesson where a demonstration of expected learner behavior is provided. (Together, Step Four and Five uses exploration, exposition and/or demonstration)

STEP SIX -- GUIDED PRACTICE (Not graded)
The part of the lesson where the teacher is closely monitoring learner performance to determine if the skill is being practiced correctly.

STEP SEVEN -- CLOSURE (Checking for understanding)

Feedback from learners at the end of a lesson or practice to determine if learners understand the learning.

STEP EIGHT -- INDEPENDENT PRACTICE (Specific & immediate feedback)

Practice without direction or assistance after adequate guided practice.

STEP NINE -- PROGRESS CHECK

The part of the lesson where a test or check of some kind is used to determine the learner's mastery of the objective.

Appendix B
Steps in Clinical Supervision

STEP ONE: Readiness

Prepare teacher for process to be used; preparation of staff; guidelines must be known and understood by faculty; no surprises.

STEP TWO: DIAGNOSING THE TEACHING

Take notes/collect objective data; record exactly what is going on in the classroom; diagnosing instruction openly; look at objectives and mind set; then make quality judgments based on whether it is important if component was deleted or added.

STEP THREE: SELECT CONFERENCE PRIORITIES

Formative evaluation; change behavior; selection of component which will make a difference in learning; eliminate trivia; major element which will help across all lessons; limit number of change items.

STEP FOUR: PLAN CONFERENCE

Introduction

I. Questions for teachers; how do they perceive lesson taught?

II. Specific examples of strengths; rationale for why teacher should continue to utilize these strengths; obtain feedback from teacher relative to hearing what has been said.

III. Specific examples of components which need work; Do NOT try to get "blood from a turnip"; let the teacher determine options which will help lessons; supervisor can add suggestions.

STEP FIVE: CONDUCTING THE CONFERENCE

T
E
A
C
H

Must have integrated plan.

Appendix C
Levels of Use of the Innovation:
Typical Behaviors

	Level of Use		Behavioral Indices of Level
User	VI	Renewal	The user is seeking more effective alternatives to the established use of the innovation.
	V	Integration	The user is making deliberate efforts to coordinate with others in using the innovation.
	IVB	Refinement	The user is making changes to increase outcomes.
	IVA	Routine	The user is making few or no changes and has an established pattern of use.
	III	Mechanical Use	The user is making changes to better organize use of the innovation
Non-user	II	Preparation	The individual is preparing to use the innovation.
	I	Orientation	The individual is seeking information about the innovation.
	0	Nonuse	No action is being taken with respect to the innovation.

CB:M Project
Research and Development Center for Teacher Education
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Appendix D
Student Information Sheet

Name _____, _____, _____ Birth Date ___/___/___ Teacher/Grade Level/Schools
(last) (int) (int) mo da yr

Sex Female ___ Male ___ Aptitude (I.Q.) Measure ____ 1st ___/___/___ _____

Ethnicity/SES _____ Lrn. Style/Personality _____ 2nd ___/___/___ _____

3rd ___/___/___ _____

TEST DATA 4th ___/___/___ _____

Area	Fall/83	Fall/84	Spg/85	Fall/85	Spg/86	5th ___/___/___ _____
Reading ---	_____	_____	_____	_____	_____	6th ___/___/___ _____
Lang. Arts -	_____	_____	_____	_____	_____	
Spelling --	_____	_____	_____	_____	_____	
Math ------	_____	_____	_____	_____	_____	

Special Use Populations

(Check yes or no)

Yes	No	
_____	_____	Special education pupil
_____	_____	Home-bound instruction
_____	_____	Non-English native speaker
_____	_____	Severe non-attendance (pupil) (If more than 35 days of absence)
_____	_____	Severe non-attendance (teacher) (If more than 25 days of absence but not including inservice/staff development days)
_____	_____	Student receiving Chapter I assistance