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ABSTRACT

The purpose of this project was to produce materials that would foster favorable teacher attitudes toward the philosophy behind mastery learning. One other purpose was to help teachers acquire the skills needed to use mastery learning in their classrooms and to determine the effects on pupils when mastery learning techniques were used. Forty-four teachers and interns from four Indianapolis schools were equally divided into groups according to race and sex. The material developed was a Mastery Teaching module which included an introduction and six sections. A slide/tape accompanied each of the seven parts. An accompanying manual contained objectives, practice exercises, and feedback. The manual also included self-tests with answers for each section, a pre-test on prerequisites, and a project section. Pre- and post-treatment measures were administered to the teachers and interns on both cognitive and affective variables. The results indicated that teachers and interns acquired the mastery teaching skills and used them to the degree that pupils perceived differences in their teaching. Teacher attitudes toward the mastery teaching philosophy were generally positive, and students' attitudes and achievement were favorably altered because of their teachers' use of mastery teaching. (DT)

The Consequences of Training Teachers to Use Mastery Learning*

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Overview

The project described in this report was undertaken to aid teachers in using the strategies Bloom (1968) set forth in his paper on mastery learning. A training program was developed to help pre- and in-service teachers learn skills for implementing mastery learning in their classrooms. The instructional program was used by 44 teachers and interns from four urban schools. Pre- and post-treatment measures were administered to the teachers and interns on both cognitive and affective variables. After the teachers were trained, they implemented mastery learning in their classrooms and data were collected from students on both cognitive and affective variables.

RATIONALE

Bloom (1968) has hypothesized that most students can do high quality work in school if given enough time and appropriate instruction. He describes a mastery learning strategy to accomplish this goal that places heavy emphasis on frequent assessment of student progress followed by additional instruction for those students that need it.

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A wide range of studies have shown Bloom's strategy to be effective (cf. Block, 1973). But the use of a new instructional strategy by teachers requires that they have both the willingness to use it and the skills to make the strategy effective.

It was the purpose of this project to produce materials that would foster favorable teacher attitudes toward the philosophy behind mastery learning. A second purpose was to help teachers acquire the skills needed to use mastery learning in their classrooms and determine the effects on pupils when they used them.

METHODOLOGY

Under contract with the Teacher Corps, an instructional module on mastery learning was prepared for use by pre- and in-service teachers. Because the instruction was for teachers, the materials were entitled Mastery Teaching (Okey and Ciesla, 1975). The module includes an introduction and six chapters or sections. A slide/tape (or filmstrip/tape) accompanies each of the seven parts. An accompanying manual contains objectives, practice exercises, and feedback. Included also in the manual are self-tests with answers for each section, a pre-test on prerequisites, and a project section. The project is intended to link theory and practice--as teachers study the audio, print, and visual materials to learn how to use mastery teaching they simultaneously plan, carry out, and evaluate a classroom teaching project.

To complete the entire Mastery Teaching module requires from seven to ten hours. The time varies according to the amount of

discussion that may result when people study together and because of the differing amounts of time persons require to complete the project activities.

Conducting the Training

The Mastery Teaching module was tested in Indianapolis, Indiana where four urban elementary and middle schools were involved in a Teacher Corps project. Teacher Corps schools typically have one experienced teacher designated as a team leader whose responsibility it is to coordinate on-site instruction of Teacher Corps interns and to work with the regular staff in the school. These four team leaders were the first to complete study of the Mastery Teaching module in five sessions of about ninety minutes each.

Following their training, the team leaders each returned to their schools with all the materials and conducted training sessions with the five interns and five teachers from each building (for a total of 20 interns and 20 teachers). These training sessions usually lasted from forty-five minutes to an hour. The total training time ranged from six to eight hours. Most often the interns received instruction as a group, then relieved teachers from classes so the teachers could study as a group. About three weeks were needed to complete all training sessions.

The 20 interns in the four schools were nearly equally divided by sex and race (black and white). Most already held baccalaureate degrees and were seeking an advanced degree and certification. At

the time they participated in this study the interns had been working in schools part-time for about a year. The 20 teachers were predominantly women and nearly equally divided by race (black and white). Their teaching experience ranged from about three to 15 years.

Questions and Instruments

To determine the effects of the training on the attitudes and skills of both teachers and pupils, several instruments were developed to answer specific questions. The questions asked and descriptions of the instruments and procedures used to answer them are given in Figure 1. Some additional details of how the data were collected will be given in the next section as the results are presented.

Insert Figure 1 about here

RESULTS

Knowledge of Mastery Teaching

The Mastery Teaching Posttest (MTP) was completed by all teachers and interns as soon as study of the module was complete. It was used to test skills that were assessable in a paper and pencil format; classroom interactive skills associated with mastery teaching were assessed in another way. The results are given in Table 1.

QUESTION	Instrument	Description	Validity and Reliability*	Procedures for use
1. Do teachers acquire the background knowledge associated with mastery teaching as a result of studying the training module?	Mastery Teaching Posttest	Criterion referenced paper and pencil test on the objectives of the training module	Judged by panel to be a valid test of objectives, reliability of 0.64	Completed following study of the training module, 30-40 minutes
2. Do teachers acquire or maintain favorable attitudes toward the mastery teaching philosophy as a result of studying the training module?	Mastery Teaching Questionnaire	32-item Likert scale on tests, grades, and diagnostic teaching	Validated by a panel, Spearman-Brown reliability of 0.68	Completed before and after studying the training module, 15-20 minutes
3. Can teachers follow a mastery teaching plan in their classrooms after studying the mastery teaching materials?	Classroom Observation Form	Observation instrument used to examine teachers' plans (10 items) and teaching practices (12 items)	Validated by a panel against the skills in the mastery module, no reliability data available	Self or peer observation of a teacher interacting with students and examination of plans and materials, 30-40 minutes
4. Do pupils perceive a difference in their teachers' classroom practices after the teachers study the training module?	Student Questionnaire-Perceptions	10-item Likert format, students check the frequency of occurance of certain teacher behaviors	Validated by a panel against the practices advocated in the mastery module, reliability of 0.40	Administered by a teacher at the end of a unit, 5-10 minutes
5. Does pupil performance improve as a result of teachers using a mastery teaching plan?	Summative Test Record	Teacher made criterion-referenced tests of objectives	Varies with the tests prepared	Administered by teachers at the end of units, 20 to 40 minutes
6. Does the use of mastery teaching affect the attitudes of pupils?	Student Questionnaire-Attitudes	10-item Likert format, students check faces that portray how they feel	Validated by a panel, reliability of 0.80	Administered by teachers at the end of units, 5-10 minutes

Figure 1. Questions asked in the study and instruments used to answer them.

*The instruments used in this study were developed and validated by Professor Dorothy Gabel, the author, and 14 graduate students in a seminar on research and evaluation procedures at Indiana University.

TABLE 1

RESULTS ON THE MASTERY TEACHING POSTTEST

Skills	Possible Score	Mean Score	% of Possible Score
Listing and explaining the five steps in mastery teaching	10	8.6	86
Writing objectives and test items	10	7.8	78
Identifying practices associated with mastery teaching	6	5.3	88
Checking diagnostic tests	2	1.9	93
Analyzing reasons for failure and prescribing for students	6	5.3	88
Critiquing the use of mastery teaching	10	7.9	79
TOTALS	44	36.6	83

Overall achievement on the MTP was high. A few problems related to preparing objectives and test items and in a critique of the use of mastery teaching were identified.

Attitude Toward Mastery Teaching

Pre- and posttest scores were obtained on the 32-item Mastery Teaching Questionnaire (MTQ). Scores on the MTQ could range from a low of 32 (negative attitude toward mastery teaching) to a high of 160 (positive attitude). A score of 100 was considered to be a neutral attitude. In Table 2 the results for teachers and interns are given.

TABLE 2

ATTITUDES TOWARD MASTERY TEACHING BEFORE AND AFTER STUDYING THE TRAINING MODULE

	Before the Study $\bar{X}$	S.D.	After the Study $\bar{X}$	S. D.	t	p
Teachers	113.1	7.1	128.3	15.2	2.7	0.02
Interns	113.4	7.3	122.0	6.9	2.4	0.03
TOTAL	113.2	7.0	124.9	11.5	5.4	0.001

The attitudes of teachers and interns toward tests, grades, and diagnostic teaching were moderately positive and similar before they studied the Mastery Teaching training program. Both groups had significantly more positive attitudes after studying the materials, the effect being somewhat more pronounced with teachers.

Classroom Teaching Practices

The Classroom Observation Form (COF) was developed as a tool for assessing whether persons who studied the training module could use mastery teaching skills when planning and conducting lessons. Because of time constraints, data were not systematically collected with this instrument. Instead, pupil perceptions of the procedures teachers used were taken as measures of classroom teaching practices. Those data are presented in the next section.

Student Perceptions

Eight teachers (two from each of the four schools) administered the Student Questionnaire-Perceptions (SQP) for two successive two-week units--one unit when they had attempted to follow a mastery teaching strategy and another unit when they had not. Two teachers were unable to complete the data gathering so the results are from the students of the remaining six teachers. Students were to analyze activities in their classroom by indicating whether their teachers always (3 points), sometimes (2 points), or never (1 point) did certain things. The mean scores on the various activities for mastery and non-mastery classes are shown in Table 3.

Insert Table 3 about here

The responses indicate that pupils perceived substantial differences in how their teachers conducted instruction during the two blocks of time. In all cases, the behaviors associated with mastery teaching were used to a greater extent in the mastery classes according to the perceptions of the pupils. The mean difference for all items was about one-half unit on a 2-unit scale. The greatest differences between the two classrooms, according to the students, was in knowing the objectives for the units, being allowed to study different amounts of time, and having the opportunity to repeat tests.

Student Cognitive Achievement

The 20 teachers and 20 interns involved in the study were paired into 20 teacher-intern teams. Each team was instructed to select a

TABLE 3

PUPIL PERCEPTIONS OF PRACTICES FOLLOWED BY TEACHERS IN MASTERY AND NON-MASTERY CLASSROOMS

	Mastery* Classroom	Non-Mastery* Classroom	Difference
1. The teacher told us at the beginning of the unit what we were supposed to learn	2.89	2.08	.81
2. The tests for the unit covered what the teacher said we needed to learn	2.78	2.12	.66
3. The teacher gave me tests during the unit and the grades did not count	2.08	1.65	.43
4. I learned what the teacher expected in this unit	2.76	2.52	.24
5. Students could repeat tests during this unit if they needed to	2.38	1.64	.74
6. Students studied different amounts of time during the unit in order to do well	2.46	1.64	.82
7. The teacher told me how well I was doing several times during the unit	2.53	2.01	.52
8. The teacher gave students special help during the unit if they needed it	2.47	1.92	.55
9. I'm satisfied with my achievement on this unit	2.72	2.51	.21
10. Students were encouraged to help one another during this unit	2.24	1.78	.46
Mean for all responses	2.53	1.99	.54

*The numbers represent the mean response on a 3 point scale: Students responded whether the teacher always (3 pts.), sometimes (2 pts.), or never (1 pt.) followed the practice.

four-week unit in either mathematics or language arts and develop performance or behavioral objectives for it. The unit and the objectives were then arbitrarily divided into two, roughly equal, two-week units. Each classroom of students was divided with the teacher teaching the entire four-week unit to half the group and the intern to the other. While the teacher followed his or her regular teaching practices with half the group during the first two weeks, the intern was using mastery teaching with the other half. Then during the following two weeks the teacher and intern would switch roles--those who used mastery teaching at the start now followed regular teaching practices and vice-versa.

Classrooms were split by using alphabitized class rosters and assigning every other student to either the teacher or intern for the four-week block of time. Approximately equal numbers of teachers and interns used mastery teaching during each of the two-week segments to nullify experience effects.

Both the teacher and the intern worked with the same group of students throughout the four-week unit and both of them gave the same summative test at the middle of the unit and at the end. This plan of splitting classes allowed forty comparisons of mastery with non-mastery teaching. A total of 27 such comparisons are given in Table 4. Failure to report data, use of different tests, small numbers of students, and failure to follow the rules for the study led to dropping 13 of the comparisons.

TABLE 4

MEAN COGNITVE ACHIEVEMENT OF STUDENTS IN MASTERY AND NON-MASTERY CLASSES

Condition	Mastery Classes*	Non-mastery Classes*	t	p
Intern using mastery teaching, teacher using non-mastery	$\bar{X}$ = 79.36 S.D. = 11.82	$\bar{X}$ = 79.46 S.D. = 9.13	.03	.97
Teacher using mastery teaching, intern using non-mastery	$\bar{X}$ = 83.71 S.D. = 12.20	$\bar{X}$ = 69.64 S.D. = 17.94	4.18	.001

*Each mean score is a grand mean for either 13 or 14 classes. The average class size was 14 students. Thus each mean score represents the achievement of about 180 students.

In every instance, the pupils in the mastery classes outperformed the non-mastery pupils when the teacher followed the mastery plan. When the intern used mastery procedures, this was true only about half the time (in 6 of 13 cases). The experienced teachers apparently were able to combine mastery teaching skills with those they already used to significantly alter pupil achievement. Interns (with much less experience) were less often able to do this. Another way to explain the results is to say that the less experienced interns were able to bring about pupil achievement as well as regular teachers if they (the interns) used the mastery strategy and the teachers did not.

Figure 2 provides another way of examining the cognitive achievement of pupils studying in mastery and non-mastery classrooms. Both teachers and interns are able to bring about higher achievement with pupils when they follow a mastery teaching strategy. For interns the difference is pronounced, for teachers the effect is smaller.

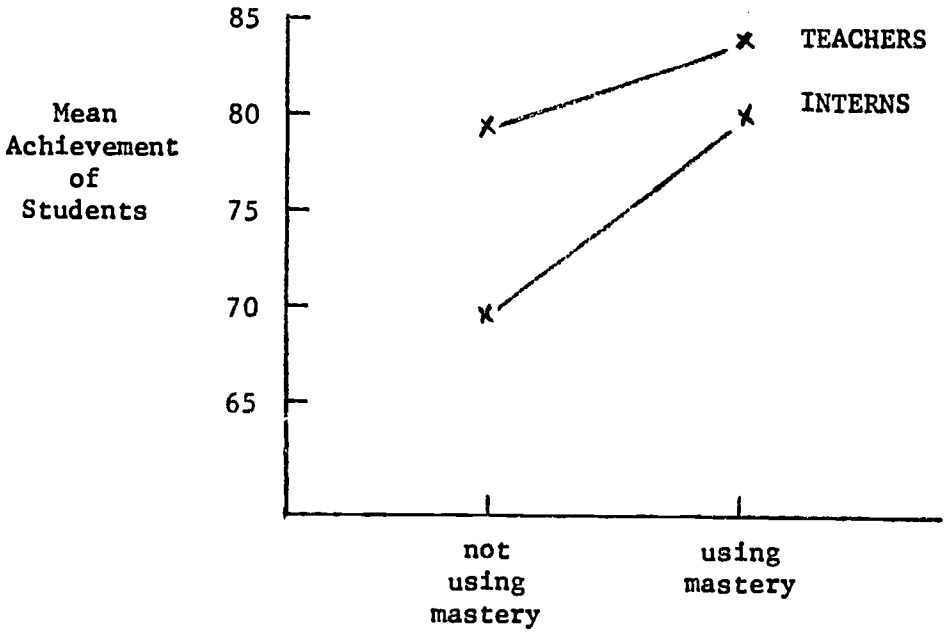

Figure 2. Pupil performance produced by teachers and interns under two learning conditions.

Student Attitudes

Attitude data were collected from the same classrooms that provided the perception data already presented. The Student Questionnaire-Attitudes (SQA) was administered by the six teachers on two occasions at the end of two-week units--once when they had followed a mastery teaching strategy and once when they had not. The mean scores for mastery and non-mastery classes are shown in Table 5.

TABLE 5

PUPIL ATTITUDES FOLLOWING INSTRUCTION IN MASTERY AND NON-MASTERY CLASSROOMS

	Mastery*	Non-Mastery*	Difference
1. On the playground I feel	4.51	3.14	1.37
2. When we have tests I feel	3.85	3.51	.34
3. School makes me feel	3.88	3.76	.12
4. The way my teacher taught this unit and helped me learn makes me feel	4.61	4.51	.10
5. When I'm the only one working on something I feel	3.42	3.23	.19
6. The things I learned in this unit makes me feel	4.54	4.39	.15
7. When my friends and I work on different things I feel	4.08	3.95	.13
8. The tests or quizzes I took in this unit makes me feel	4.15	4.07	.08
9. When someone asks me how well I did on the unit I feel	4.34	4.21	.13
10. This class makes me feel	4.29	3.95	.34
MEAN FOR ALL RESPONSES	4.17	3.87	.30

*The numbers are the mean response on a five-point scale in which pupils could check a face ranging from smiling (5 pts.) to scowling (1 pt.).

All responses show more favorable attitudes for pupils in mastery classrooms. Items #2 and #10 represent particularly important attitudes that were affected substantially by the differences in the classrooms.

CONCLUSIONS AND IMPLICATIONS

The major questions of this evaluation study were given in Figure 1. The questions were concerned with whether teachers (and

interns) acquired the skills needed for mastery teaching, had positive attitudes toward the mastery teaching philosophy, and changed their teaching behaviors as a result of their study of the Mastery Teaching materials. Further questions concerned whether pupil achievement and attitudes were favorably altered because of their teachers' use of mastery teaching and whether pupils could detect differences in procedures used by their teachers. A qualified "Yes" can be given to all of these questions as a result of the evaluation.

Teachers and interns acquired the mastery teaching skills (as judged by the paper and pencil Mastery Teaching Posttest) and used them to the degree that pupils perceived differences in their teaching (Student Questionnaire-Perceptions). Our inability to use the Classroom Observation Form leaves us with less than complete evidence about the classroom plans and practices of the teachers and interns although student perceptions indicate substantial differences in teaching practices between mastery and non-mastery classrooms. Attitudes of teachers and interns toward a diagnostic prescriptive teaching philosophy were also favorably altered during the study (Mastery Teaching Questionnaire).

Pupil performance (as shown by the Summative Test Record) and pupil attitude (as shown by the Student Questionnaire-Attitudes) were both positively affected when the teacher or intern followed a mastery teaching plan.

This study shows that teachers in urban schools were able to use a new teaching strategy and positively influence the attitudes and achievement of their students following study of an in-service training

program on mastery teaching. The influence on pupils in this study is not, however, as pronounced as in the mastery teaching study by Burrows and Okey (1975) in which commercially prepared materials were used. In the study reported here, teachers and interns prepared objectives, diagnostic tests, and remedial materials to accompany their regular curriculum materials. Additional studies are needed to examine the level of assistance teachers need in the form of materials preparation and classroom management to maximize student achievement at acceptable costs.

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