Mastery Learning in the Secondary Schools

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Mastery Learning in the Secondary Schools

(TITLE)

BY

Eddie Joe Steffey

Field Experience

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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ABSTRACT

The purpose of this field study was to develop and implement a model for the introduction of mastery learning at Chester High School in Chester, Illinois. In 1984-85 this researcher was named principal at Chester High School, which is located in a small, blue-collar community. Academic achievement was not perceived to be at an acceptable level. The researcher felt that the introduction of the mastery learning techniques suggested by Bloom and others combined with other pertinent research on effective schools could have a positive effect on academic achievement.

Although this field study was designed for Chester High School, it may readily be adapted to serve as a reference for other small high schools striving for a more effective educational program. It is divided into five chapters. Chapter one provides background information, a problem statement and delineates limitations of the study. Chapter two provides a review of the literature on mastery learning. Chapter three addresses planning for mastery learning as it relates to (1) outlining learning objectives, (2) developing formative tests, (3) providing feedback, correctives and enrichment, and (4) developing summative examinations. Chapter four describes the working model for implementation
of mastery learning developed by the writer. Chapter five provides results of the implementation of mastery learning at Chester High School.
CHAPTER 1

Introduction

Background Information

Over the past decade there have been a variety of studies on effective schools and characteristics of effective teaching. There have been fewer studies, but much more publicity given to exposes of ineffective education systems. Many proposals to improve school involve money, time, new requirements, new curricula, and changes in school governance. Yet if real change is to occur, it is the instructional process which must change.

The recent literature on school effectiveness concludes that differences among schools do affect student’s academic achievement. This literature challenges previous research that had found unequal academic achievement to be primarily a function of family background and related variables (Coleman, 1968; Jenckes, 1972). Easily measured differences among schools - class size, teacher salaries, number of books in the library, the reading series, the age of the school building - were found to bear little relevance to achievement (Coleman, 1968; Jenckes, 1972; Furkey and Smith, 1981; Murname, 1980).

Studies on the determinants of achievement have been concerned with variables relating to (1) how schools and
school districts are structured and make decisions, (2) the process of change in schools and school districts, and (3) the way in which classrooms and schools can increase the amount of time spent on productive instruction. Although these variables are less susceptible to mechanical changes in policy, they are alterable (Bloom, 1981) — generally with difficulty, but often for little money.

The researcher views school systems as "nested layers" (Barr and Dreeban, 1977) in which each organizational layer sets the context and defines the boundaries for the layer below. The locus of the educational process is at the lowest structural level, the classroom. It is the adjacent level, the school, which forms the immediate environment in which the classroom achievement level is enhanced or diminished by the quality of activity at the level above it. It is through recognition of and action upon the nested layer viewpoint that administrators can impact mastery in the classroom.

Often the reformers and critics have pointed to a process called mastery learning as an integral part of the vast majority of successful teaching and learning experiences. The modern notions concerning mastery learning were introduced by Benjamin Bloom in 1968. However, the underlying principles have been applied by educators since
Plato and Socrates. Recent research in learning achievement and schooling along three separate lines support the basic tenets of mastery learning. That research reveals:

1. a high relationship between achievement at grade 3 and at grades 10 or 11.
2. students academic self-concept is relatively positive for most students during grades K-2. Thereafter, the gap between achievement and self-concept of the top quarter of learners and bottom quarter of learners begins and widens each year.
3. student achievement under one-to-one tutoring is 98% higher than under conventional conditions (Bloom, 1976).

While it is obvious that public school systems cannot provide 1:1 instruction, mastery learning techniques in group-based instruction exceed the level of learning by 85% of conventional instruction (Guskey, 1985).

Statement of the Problem

The specific problem to be explored is the organization of the typical building by its administrator to foster the adaptation of mastery learning to the classroom. Three principle steps will be discussed for implementation:

1. planning for mastery learning.
2. managing mastery learning.

3. evaluating mastery learning.

To accomplish this the project will outline the history of mastery learning, discuss various management strategies and ways of adapting mastery learning procedures to fit existing classroom conditions and consider evaluation of learning outcomes within mastery classrooms.

Parents, teachers, students, administrators, taxpayers, and employers would all like students to learn more at school. Most schools provide a successful learning experience for only 25% of their students (Block, 1974). Numerous proposals have been made in recent national reports on how to improve our schools. Their suggestions range from more money to better school buildings; from longer days to more foreign language; from more school days to a voucher system for public and private schools. All of these miss the point. It is doubtful that these suggestions will improve student performance. Efforts by students and teachers create successful learning experiences. If teachers do not improve the quality and effectiveness of their instruction, students will not learn any more than they always have; regardless of how many filmstrips they see, or the number of days or periods they go to school, or which school they attend. Educators must learn of and
practice more successful methods of teaching. Mastery learning is one such method.

The problem is one of translating the elements of appropriateness and individualized help into classroom group-based instruction. Over the last two decades much has been learned about the instructional process; yet little has changed in the classroom. Educators know that different students learn in different ways, that not all instructional approaches are effective for all students. Individualization brings great progress but the demands of the classroom environment make individualization hard to accomplish. When students determine their own individual pace, only the most highly motivated students will learn at an acceptable rate. Management and curriculum demands make individualization extremely difficult and impractical in most schools.

What is needed is an approach to teaching and learning that provides appropriate instruction and individualization in the group-based setting of the typical classroom. Mastery learning provides that approach. It combines what we know about effective teaching and learning in a set of sound instructional practices. Mastery learning provides procedures for planning and organizing instruction with regular feedback to students on their learning.

Yet despite research describing the effectiveness of
mastery learning it has expanded at a gradual rate. Perhaps past experiences have taught educators to be cautious of new innovations. More likely, it is because mastery learning is not simply a package of educational materials that can be purchased like a new phonics program; it is not a new gadget like the computer. Mastery learning is a process. Teachers' use of this process is central to the success of the mastery program.

Limitations of the Study

The limitations of this study were:

1. The research data was developed for implementation in a unit district in a rural, blue-collar community.

2. Although experimentation with mastery learning techniques occurred, no control groups were established.

3. The writer relied upon research foundations laid by Bloom, et al. for parallels.

Definitions

Mastery learning as applied to this study will include three basic factors:

1. A clear statement of desired outcome: Students should clearly understand what outcome is desired, why the outcome is important and how
the outcome will be assessed.

2. Feedback: The teacher needs to receive feedback on the outcome desired. The assessment of student outcome should closely correlate with the stated desired outcome (test what we teach and teach what we test).

3. Correctives: Feedback should indicate the strengths and weaknesses of the students in relation to desired outcome. Based upon this feedback, the teacher provides alternative strategies to individualize for students who have not achieved mastery.
CHAPTER 2
Rationale and Review of Literature

Rationale

The researcher is an administrator at the building level with additional district-wide curriculum responsibilities. Statistics, excerpted from the 1987 school report card prepared by the Illinois State Board of Education, describe the district. The students in the district are 98.9% white compared to the state average of 67.1%; 18.8% of the students are from low-income families, which is lower than the state average of 29.1%. The attendance rate of 94.3% is above the state average of 93.8%. Average class size of 22.5 and 13.9 at the grade school and high school are lower than the state average 23.2 and 19.7. Elementary students have a non-promotion rate of 1.6%. The high school reported a graduation rate of 76.9%. ACT scores for high school students (19.7) were above the state average of 18.9. Performance characteristics of the students on norm referenced achievement tests were low-average across grade level.

The above statistics reveal an average Illinois public school district. The only statistic drastically different from state averages is ethnic composition. As a school administrator, it is the researcher's philosophy that the current statistical definition of average is not good enough.
The Gallup Poll on education (Phi Delta Kappan, 1987) reveals a slight increase in the number of respondents who give schools above average marks. This is due in large part to the increased awareness of the effective school movement. Only 56% of parents surveyed gave schools above average marks and 61% of non-parents polled gave schools marks of average or below. Those Americans who are most likely to give the high grades are the best educated and those in higher income categories. Those least likely to award local public schools high marks tend to be younger, less affluent, residents of central cities, and non-white.

A troublesome point in these statistics is the negative correlation between the level of satisfaction with the public schools and the already evident demographic shifts of the next 25 years. The population groups most likely to grow are those least likely to express satisfaction with public schools. This problem is exacerbated by the public’s feeling that the reform movement has improved schools least for students of below-average achievement. Barring a change in one of these factors, it is reasonable to assume the grading of public schools will decline in the near future unless schooling becomes more effective for all, not just those who currently do well.

Review of the Literature

The succeeding review of research and literature will
focus upon the historical development of mastery learning and comparisons with other systems.

Educators have long held to the belief that all children can learn well if the instruction is appropriate to the student. This perspective can be found in the writings of early educators (Bloom, 1974) and is a basic premise of mastery learning.

John B. Carroll’s article in 1963 "A Model for School Learning" was a modern precursor of the mastery movement. Carroll’s article focused attention upon time as an alterable learning variable. A student’s aptitude for learning could be expressed as a mathematical ratio of:

1. "opportunity - the time allowed for learning,
2. perseverance - the amount of time the learner is willing to engage actively in learning, and
3. aptitude - the amount of time needed to learn...”

Carroll’s mathematical ratio can then be expressed as:

\[
\text{Degree of learning} = F \left(\frac{\text{time actually spent}}{\text{time needed}}\right)
\]

This view of learning time as an alterable variable leads to the realization that there need be no under achievers. The complete model involves five elements:

(1) aptitude - the amount of time needed to learn under optimal instructional conditions, (2) ability to understand instruction, (3) perseverance - the
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amount of time the learner is willing to engage actively in learning... (4) opportunity - time allowed for learning, and (5) the quality of instruction...

Carroll's article was a significant contribution to learning theory. Particularly important was the identification of factors that influence learning in school settings. The model set forth new guidelines for research into the concept of aptitude, and also offered an optimistic view of learning potential and the potential for schooling. It stopped short of providing a definite prescription for instruction. The problem of how to improve instruction in order to improve learning was left unresolved.

Mastery-type approaches have been used for many years (e.g. Washburne, 1922), but the researcher most responsible for the renewed interest in the topic is Benjamin Bloom. Parsons (1978) refers to "the Bloom concept."

During the 1960's, Benjamin Bloom pioneered research on human variability, especially in terms of learning. Bloom was impressed by the optimism of Carroll's perspective on learners, particularly that students varied in terms of time required for learning rather than ability to learn. Bloom believed that by attending to the instructional variables under the teacher's control - the opportunity to learn and quality of instruction - the teacher should be able to ensure
that each child attain a predetermined level, called mastery.

In most traditional classroom settings, all students are provided with the same opportunity to learn and the same instruction. Those students, for whom the instruction is appropriate, learn well. Those, for whom it is inappropriate, learn less well. Bloom set out to design an instructional strategy that would alter the opportunity to learn to meet the learning rate of all students. The theory of mastery learning is based on the simple belief that all children can learn when provided with conditions appropriate for their learning.

In seeking to devise a more appropriate learning strategy Bloom drew upon knowledge of the most ideal teaching situation, one to one tutoring, particularly the work of J. Dollard and N.E. Miller (1950). Bloom felt that dividing the material into smaller learning units and checking on the progress at the end of each unit were useful instructional techniques. However, to be an improvement these must be paired with a feedback and correctives process. In this way the teacher could diagnose individual learning difficulties and prescribe remediation procedures.

Bloom outlined such a teaching/learning strategy in his article "Learning for Mastery" (1968). With this strategy the material to be learned during the term is divided into smaller units of a week to two weeks in duration. After each
unit is presented a test is administered to check on student learning. This test serves to check learning at that point and provide feedback to teacher and student. Students are provided with suggestions and correctives to recoup any deficiencies. Students need work on only those sections not mastered. Thus the results of this formative test are both diagnostic and prescriptive.

Following corrective work, a second parallel formative test is administered to assure all have mastered the material in the unit.

Mastery theorists offer the promise of an equality seldom attained in schools—equality of educational outcomes. Bloom claims that mastery learning strategies can produce outcomes that are equal for all students. He and his students have been able to produce strong achievement effects with mastery learning. Some of these approach raising the achievement of 90% of students in mastery conditions to levels achieved by only the top 10% under nonmastery conditions (Bloom, 1976). Block's findings (Block, 1971; Block and Burns, 1976) are also optimistic. Block concluded after a review of over 50 studies of mastery learning that the achievement of 75% of students can be raised to standards previously attained only by 25% of students. Burns (1979) examined results of 157 mastery learning studies. He found results of 107 of the studies were statistically significant
in favor of mastery learning. Hyman and Cohen (1979) concluded on the basis of studying mastery learning in 3,000 schools over 15 years that mastery was "consistently more effective than traditional curriculums."

Bloom suggests that current school practices exacerbate initial individual differences and lead to increasingly unequal and artificial educational outcomes (1971, 1976, 1980). He sees the widening gap between capable and less capable students as an artifact of current schooling processes. He explains this as follows: A student who begins a learning sequence by performing poorly on the first step performs ever more poorly on the second step because he lacks some of the prerequisites; he misses more prerequisites at each successive step, getting further behind. Thus the academically rich get richer and the poor, poorer. This, Bloom argues, is why the achievement variance observed amongst 7th graders is greater than the gap in 1st grade. This ever increasing gap is the result of equal time devoted to learning for all students. Bloom suggests the way to decrease the gap between students is to provide students with extra learning time in those prerequisites where they are deficient, before preceding to the next step.

Leyton (Guskey, 1985) was interested in procedures that might be used to enhance entry skills of ill prepared students. He believed that taking a brief period at the
beginning of a term to identify and then reteach these necessary skills might greatly enhance students' learning in the course. To test this idea, Leyton designed a study that involved four groups of students. These students were then treated with four conditions; conventional instruction, conventional with review, mastery learning and mastery learning with review. When conventional methods only were employed, only 8 percent of the students attained mastery. In the group where conventional instruction was combined with review, 28 percent achieved mastery. Forty-three percent of students taught under mastery learning conditions achieved mastery. Where mastery learning was combined with review 61 percent of the students achieved mastery. Combining mastery learning with an early review of the pre-requisites for the class resulted in a mastery rate more than seven times conventional methods.

A wide variety of programs and techniques have evolved for applying Bloom's ideas in modern classrooms. In some cases this variation has led to confusion as to what mastery learning is or is not.

Mastery learning has been confused with personalized systems of instruction (Keller, 1968). The PSI model is an individually based, student-paced approach to instruction in which students typically learn independently of their classmates. It is an extension of programmed instruction
with feedback provided by people. Students work at their own pace and move on only after demonstrating 100% mastery. Students may retake mastery tests without penalty and if they fail to achieve mastery, they repeat the original instruction (Kulik, Kulik and Cohen, 1979).

Mastery learning is a group-based, teacher-paced approach to instruction in which students learn cooperatively with their classmates. It is designed for use in the typical classroom setting of 25 or more. The pace of instruction is determined by the teacher. Support for this idea comes from studies that show elementary children lack the ability to be self-motivated (Reiser, 1980; Ross and Rakow, 1981). A high level, but not perfect, of mastery is required on each test. This is in recognition that:

(1) not all learning follows the same sequence for all learners, (2) tests may be less than perfect, and (3) perfect performance may be an unrealistic standard.

Instructional Leadership

It is impossible to overemphasize the importance of administrative support for mastery learning. In fact current research reveals that the principal may be the pivotal individual. While a teacher can certainly implement mastery learning within an individual classroom, only the building administrator can institutionalize mastery concepts and make
them practical on a building wide level (Barber, 1979).

One of the most important aspects of administrative support is recognition that the use of mastery requires most teachers to make changes. Undoubtedly there are teachers who intuitively use most or all of the principles of mastery learning in their teaching. But the majority of teachers find that it requires them to alter the way they plan or to revise their instructional format. Changes such as these take time. Only the administrator can make this time available and encourage a school climate conducive to change. The best administrative support is based upon collaborative planning, collegial exchange, and mutual adaptation (McLaughlin, 1978).

Many administrators show their interest and support for mastery learning by attending workshops and participating in development activities with teachers. This helps them become more familiar with the process and gives them a better understanding of the work involved for teachers (Delseni, 1981). Some administrators further facilitate collegial exchange by scheduling a common planning period once a week for those teachers using mastery learning. Furthermore, most administrators encourage teachers to try mastery learning on a small scale experimental basis at first and usually only ask volunteers to participate initially in the program. These successful volunteers serve as credible models for
other teachers. The challenge for the administrator is to create an atmosphere of positive change and institutionalize a structure which makes adaptation of mastery possible. Admittedly a voluntary approach is likely to result in slower and more gradual change. But changes that do occur typically endure because teachers have established ownership of the change. Mandated, top-down, changes are seldom successful and seldom last once the original mandate is removed (Purkey & Smith, 1982). The challenge for the administrator as instructional leader is to lead the horse to water and cause it to enjoy drinking.

Nearly all of the literature on effective schools (Brookover, 1982; Edmonds, 1979; Hoover, 1978) emphasizes the importance of the school principal in bringing about high levels of student achievement. The specific behaviors for successful administration can be divided into two categories; the role of instructional leader and change agent (Brookover, et al., 1982).

The leadership role in establishing an effective instructional program is foremost. The style of leadership is less important that the accomplishment of the tasks that need to be done. The principal must provide leadership to establish clearly identified and specific learning objectives at each grade level and for each course. It is important that all members of the staff understand what is to be
achieved at each grade level and course; or they are likely to go in many different directions. Agreement on the objectives is essential for evaluating the school's effectiveness. The principal cannot do all these tasks alone, but must provide the leadership and the structure to do so.

Some districts are beginning to examine whether changing the way educational decisions are made can serve as another tool to increase student achievement. This new style of decision making is called variously "school based management," "site based management," or "building based management" and fits into an outcomes-based philosophy. It offers the premise that by mobilizing resources at the school level children's learning can be affected. School based management is a process that involves the individuals responsible for implementing decisions in actually making those decisions. In general, under school based management, decisions are made at the level closest to the issue being addressed. This is the decision making model being utilized to promote outcome-based education in the study. When school based management is working well, more decisions flow up through the system than down from the top. School based management is based on two fundamental beliefs:

1. Those most closely affected by decisions ought to play a significant role in making those decisions.
2. Educational reform will be most effective and long-lasting when carried out by people who feel a sense of ownership and responsibility for the process (American Association of School Administrators, 1988).

Today, many management experts - in the private sector as well as in the public schools - cite the advantages to systems that shift decisions to levels most directly affected. In Megatrends, Naisbitt points out the trend toward decentralized decision making throughout the private sector. He adds, "People whose lives are affected by a decision, must be part of the of the process of arriving at that decision." (American Association of School Administrators, 1988).

Although Peter Drucker, generally considered the dean of American management experts, does not advocate decentralization as extensive as is contemplated by proponents of school based management, he does emphasize how important it is for managers to pay attention to the needs of employees (American Association of School Administrators, 1988).

One has to assume, first, that the individual human being at work knows better than anyone else what makes him or her more productive, and what is helpful or not helpful. One assumes, secondly, that to be fully productive, people of knowledge and skill need to take responsibility. It requires
willingness on the employer's part to ask employees systematically and to listen to their answers.

After agreement upon objectives is obtained, standards of mastery must be set. The staff must first agree on the standards to be set and then adopt an instructional program to insure that all students actually attain the standards set. The instructional leader plays a major role in developing and maintaining these high norms and expectations. Scheduling devices, inservice programs and budget planning must be used by the instructional leader to carry out the mastery program. Both formative and summative tests should be available for teachers to measure all of the various objectives at appropriate times. Teachers and other personnel can contribute to the development of such tests, but is up to the principal to make certain that appropriate tests are available and are representative of the learning objectives (Brookover, et.al. 1982).
Planning for Mastery

Planning for mastery learning involves a number of tasks. First teachers must review their materials to decide the content to be taught. This process is called valuing (Block and Anderson, 1975). It involves making judgements about what new concepts and information are important for all students to learn well and at what level of Bloom's taxonomy these concepts should be learned. The decisions can be outlined in a table of specifications (Bloom, Madaus, Hastings, 1981). The table outlines what is to be taught and makes clear the criteria to be used to evaluate the students' learning.

The second step in planning involves the development and organization of formative tests, correctives and enrichments, and summative tests.

In the third step, attention centers on managing and coordinating mastery learning in the classroom. Managing tasks include informing students of the intentions and procedures of mastery learning and then administering the cycle of instruction - diagnostic testing - correctives and enrichments - diagnostic testing (Guskey, 1985).

Mastery learning can be adapted to a wide variety of teaching styles and instructional methods. It makes no dictates in this matter. Yet it does imply a change in the
teacher's role in the classroom. In most classrooms learning is very competitive, creating winners and losers. The teacher serves as a rule maker and director of competition who is responsible for making judgements, evaluations and classification of students.

Under mastery, learning becomes more cooperative — students are graded on criterion-referenced standards. It is no longer detrimental for students to help one another. In fact teachers often find peer tutoring begins spontaneously as both a corrective and an enrichment activity (Guskey, 1980).

Planning

Planning for mastery learning involves (1) outlining learning objectives, (2) developing formative tests, (3) providing feedback, correctives and enrichment, and (4) developing summative examinations.

Learning Objectives

The first task in mastery learning is to set out what specific tasks students are expected to learn. These are referred to as learning objectives. Learning objectives describe the skills and abilities students are to acquire. This requires that important decisions be made as to what learning is essential. Learning objectives focus instructional activities and add precision to procedures for evaluating students' learning.
B. S. Bloom, J. T. Hastings, and G. F. Madaus (1971) point out:

The usefulness of a structure for learning has to do with the ability of students to comprehend it and use it as an organizing factor in their learning. There is no relationship between the usefulness of a structure for scholars and its usefulness (and meaningfulness) for students. (pg. 12)

Research on "advance organizers" in instruction (Ausubel, 1963, 1978), has shown that ideas are more readily grasped and retained when learned in relation to one another rather than in isolation. Guskey (1985) lists the following key elements for organizing learning goals into learning units:

1. The final learning goal to be attained must be specified.

2. The final learning goal must be analyzed to identify the steps that are necessary to reach the goal.

3. The steps must be ordered in an appropriate sequence to facilitate learning and provide for steady and regular progress toward the goal. (pg. 20)
Attention to these will help to keep teachers focused on the final goal and the sequence of steps required to reach that goal.

The process of analyzing a learning goal and organizing to reach that goal is a natural part of teaching but teachers must institutionalize the process to be effective. To do this a learning, or summative, goal must first be analyzed in terms of the parts that need to be mastered. Those parts are then organized and arranged in an appropriate sequence of learning steps. Each of the steps or learning units must be mastered while progressing to the final goal.

The next step in the planning process is to specify the learning objectives of each learning unit. To do this, any new knowledge to be taught must be identified. Teachers must also make clear what students are to do with the knowledge. A useful way to outline content and resulting behavior is to construct a two-dimensional table referred to as a table of specifications. A table of specifications is an outline of the learning objectives for each unit. It adds precision and clarity to daily teaching. It serves as a guide for consistency between learning objectives and procedures for checking students' learning progress (see Appendix A).

A table of specifications may illustrate the relationships among content elements; that knowledge of facts may be necessary to a procedure. A table of specifications will
also help reveal gaps in instruction.

Outlining learning objectives and preparing tables of specifications clearly illustrates the importance of decisions made by teachers using mastery learning. Developing a table of specifications compels teachers to be very conscious of those judgements and decisions and to make them in an explicit way.

Mastery learning as a process is neutral with regard to the type of instruction or model of teaching. There is no support for a single most effective method of instruction. Certain techniques have been found to be superior to others for teaching certain kinds of skills (Gagne, 1974, 1977), but no single method has proven effective in all contexts. There are elements that characterize good teaching and presentations of new material. A clear developmental sequence of ideas and diversity of activities to enhance involvement are important regardless of the instructional setting. But research has shown that the most effective teachers are those who have a broad repertoire of tactics and can select the most appropriate model of teaching (Lortie, 1975). Because of the tremendous diversity among students in terms of their aptitudes and learning styles, methods appropriate for most students may be inappropriate for some. Since we are interested in the learning of all students it is important to identify those who have not been successful with
the first instructional methodology. Instructional alternatives must be planned for these students. They may be identified through the use of formative testing.

Formative Testing

The main purpose of formative testing, as differentiated from placement or summative testing, is to provide short-term information on students' learning progress. It is very important that both teachers and students understand that formative testing is an instructional tool. Formative tests may take many forms but the most important characteristic is that they provide students with precise and immediate feedback on their learning progress. Formative tests serve as a guide for the correction of errors made during the original instruction. Formative tests need to address all the elements of the instruction essential to the learning task, but should be limited to those elements that form the basis for concepts or ideas. Formative tests should contain the following elements, according to Guskey (1985).

1. A good formative test should be clear and legible to all students.
2. A good formative test should contain precise directions that are stated in clear and simple language.
3. A good formative test requires a minimal amount of class time.
4. Good formative tests usually include "spiraling" items.

5. A good formative test should be well matched with a table of specifications.

It is essential to mastery learning to have a parallel formative test to each learning unit. The second formative exam is to be administered to students who did not attain mastery on the first formative test for the unit. It serves as a check on the corrective process. It must be a parallel exam; one that tests the same content and student learning.

Feedback, Correctives and Enrichment

The feedback and correctives process is the most critical element of mastery learning. It is that aspect that most clearly differentiates mastery from more traditional approaches to instruction. The major purpose of providing feedback is to help students identify what they have learned well and what they need to spend more time on. The primary vehicle for this feedback is the formative test. It should help students identify the important elements in the lesson and tell them how well they have learned those elements. It should clarify for students what they are expected to learn and how well they have learned.

The results of formative tests provide teachers with two important kinds of feedback; first, an explicit description of each students' learning progress and second, information
about the effectiveness of the original instruction. The results of the formative test can delineate for teachers what they taught well and what they did not. Teachers may use that information to concentrate their efforts toward improving their teaching.

If learning outcomes are to be improved after formative testing, the results must be paired with specific activities for remedying the learning deficiencies. These activities are known as correctives. Correctives must teach the same material in a way that is different from the way it was originally taught. Corrective activities must provide an alternative pathway to learning. Correctives must present the material differently from the way it was originally presented or involve the students in learning in a way that is different from the original. It is essential that correctives provide students with a successful learning experience.

**Summative Testing**

To determine if mastery learning has the intended effect a system of evaluation is needed. Evaluations may serve many purposes, but our focus is upon evaluating mastery learnings impact at the classroom level. The purpose of evaluation at this level is to ascertain:

1. whether the introduction of mastery learning has made any difference,
2. what changes have occurred,
3. how application of the process might be improved.

Whatever form of evaluation is used, student learning must be the focus of the evaluation. To determine whether mastery learning has truly helped students learn very well, it is necessary to gather evidence on their level of achievement. Three different types of achievement data can be collected at different times during the instructional cycle. Data may be gathered before instruction begins, while instruction is in progress, and when the instruction cycle is completed. Pretests may be used before instruction begins to assess whether students have the necessary prerequisites and to assess knowledge of the material the teacher will present. The results of formative tests can be very useful in evaluating the mastery learning process. Formative tests offer a source of data for evaluating how well the mastery learning process is working. The most important sources of achievement information for evaluating mastery learning are the summative evaluation results.

Another very important aspect of learning outcomes centers on the way the students feel about the subject they are studying, their teacher, and school in general. These feelings are usually referred to as student affect (Anderson, 1981). The relationship between learning and student affect is reciprocal in nature. The affective influences learning
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and positive learning influences the affective. Mastery learning theory recognizes the strong influence student affect can have upon learning (Bloom, 1976, Guskey, 1985). The attitude of students toward learning is a prime detriment of classroom success. Classroom success in each mastery unit influences students' feeling and attitudes toward each succeeding unit.

There is a variety of important affective outcomes that can be assessed – academic self-esteem, interest in the subject, attitudes, preferences, etc. The two which are of prime importance and which can easily be assessed are academic self-esteem and interest in the subject. A person's perception of himself as a learner in the school setting is his academic self-esteem (Anderson, 1981). Information on students' academics self-esteem can be gathered in a variety of ways. The most common technique is the use of a short questionnaire (see Chapter 5 for an example).

Interest in the subject is a feeling that impels a person to seek out things – people who are interested in a subject want to find out more and gain a better understanding. Again, the most efficient way to assess student interest in a subject is through the use of a questionnaire.

Research indicates that other important learning outcomes can be promoted through the introduction of mastery learning. Many studies on effective schooling have centered
upon the percentage of time that students are actively involved in the learning process. The more time students are involved in learning activities, the more they tend to learn (Denham & Lieberman, 1980). A consistently high rate of student involvement is one of the results frequently noted in mastery learning classes. One such study found that students in mastery learning classes maintained a high level of involvement throughout the semester (Anderson, 1975).

Additional dividends have been noted in the areas of attendance and discipline. Under mastery conditions, students learn that the first test is not their only chance at success. They find that tests are learning tools. Since students have more success under mastery conditions, attendance rates are usually higher than those of non-mastery classes (Clark, Guskey, & Bennina, 1983). Most discipline problems tend to occur after the first instructional unit has been concluded. Research by J. S. Kounin (1970) shows that a vast majority of discipline problems involve students who are having academic difficulties and experience little success in school. Mastery learning may drastically reduce classroom discipline problems by introducing success into the classroom.

Once decisions have been made on how to evaluate the impact of mastery learning, meaningful comparisons need to be made. Evaluation generally implies a determination of merit
or worth. In regard to mastery learning, we need to compare the changes that result from its use with those that were previously attained. Much of the research that has previously been conducted and cited in this work was done under strict control conditions. I do not recommend this procedure for the small school setting. Research has already shown mastery learning's positive impact. Teachers who experience success with mastery will not wish to deny its benefits to their other students. Comparison may be drawn from artifactual data from previous years; e.g. grade books, discipline records, and attendance records. Current teacher evaluations and student affect questionnaires may also be utilized.

These comparative evaluations may be conducted in the following areas:

1. The average summative examination score for mastery vs. non-mastery classes.
2. The proportion of students receiving various letter grades in mastery vs. non-mastery settings.
3. An average of the affective measures.
4. A comparison of the variation in examination scores, course grades and affective measures.
CHAPTER 4

Model

The call for educational reform has brought about a proliferation of programs, ideas, and procedures. Many of these proposed remedies suggest how public education can emerge from the perceived doldrums of the past to provide vital and effective institutions for the future. Unfortunately, in many schools, districts, and states, educational reform is seen as a long succession of different programs; all implemented at the same time in the name of reform. Many educators criticize this system, saying that educational reform is no reform at all but simply a call for more of the same; which never worked in the past anyway.

Past experience indicates that trickle down educational reforms and state board mandates have little impact. Opposition to the imposition of new mandates becomes entrenched at the local level, particularly when funds do not accompany the mandates. A refreshing change from this theme exists amongst schools which have sought to take the best of effective schools research, the effective teaching research, mastery learning and outcome-based schooling, and put this material into a unified system that addresses the reform of public education from the grass roots level. This chapter centers on one district's attempt to tie together the many elements of staff development, teacher evaluation,
Mastery Learning

It is hoped that by examining this district's attempts at a local solution readers will better understand the benefits of outcome-based education which has its roots in mastery learning. Outcome-based education requires data-based decisions about instruction that are adapted to each student's current learning level. Assessment data on which assignments are based must be gathered frequently and tied to the goals of the instructional program. Students' goals become more personal and less competitive as the system allows students sufficient time and opportunity to learn.

Philosophical Premise

The following premises form the basis of organization and decision making processes:

1. Almost all students are capable of achieving excellence in learning the essentials of formal schooling.

2. Success influences self-concept; self-concept influences learning and behavior.

3. The instructional process can be changed to improve learning.

4. Schools can maximize the learning conditions for all students by:
   a. establishing a school climate which continually
affirms the worth and dignity of all students;
b. specifying expected learning outcomes;
c. expecting that all student perform at high levels of learning;
d. insuring that all students experience opportunities for personal success;
e. varying the time for learning according to the needs of each student and the complexity of the task;
f. having staff and students take responsibility for successful learning outcomes;
g. determining instructional assignments directly through continuous assessment of student learning; and
h. certifying educational progress whenever demonstrated mastery is assessed and validated.

Outcome-Based Instructional Systems: Primer and Practice (Murphy, 1984, pg. 3)

Long Range Plan

"If you don’t know where you’re going, odds are you’ll end up not getting there."

Yogi Berra

It is the writer’s perspective that excellent schools can be compared with excellent businesses. Successful corporations place a high value on the input from front line workers. Thus, in the district’s organization heavy
emphasis is laid upon teacher input into decision making. The district has adopted the ASCD Quality Circle decision making model in our teacher in-service model. Asking school staff members to participate in instructional decision making sounds like a good idea. But for the most part, participatory decision making has failed in most schools. The reasons are clear. First, many school leaders lack the training to facilitate group discussions. Second, busy school administrators and teacher tire quickly from unstructured meetings that accomplish to little and waste too much time. Third, too many recommendations for school improvements made by study committees go unanswered. All these reasons contribute to faculty and administrative disenchantment with participa-tion in school decisions.

Quality circles are a voluntary group of participants that meet on a regular basis to identify, analyze, and solve instructional problems and improve the quality of instruction in that school. Quality circles are a decision-making tool that have proven their effectiveness in correcting the weaknesses of participatory decision making. This is because leaders and circle members are trained; structures are established and methods used that guarantee results in specified times; and a mechanism is set to ensure that every recommendation receives a definite answer.
The quality circle idea, conceived by University of Chicago efficiency engineer Edward Deming, was adopted by the Japanese in the early 1960’s as a method to improve productivity, motivation and quality control. Within a decade, American companies such as Honeywell, Lockheed Aircraft, and Burlington Industries seized upon the method. Since then, the quality circle approach has succeeded in banks, hospitals, industrial plants and schools throughout the United States.

The school version of quality circles is an adaptation of the original Japanese method. Because schools do not produce "hard products" but the less tangible "growth and development of students," instructional quality circles are structured to renew faculty efforts for improving instruction within each school. Though there are many state mandates to satisfy, the instructional program is designed and revised by teachers.

Excellent companies know in which business they plan to compete; they have a mission. Fostering students’ learning by effectively and efficiently implementing the district’s instructional program is the district mission. Through the development of their instructional objectives and the plans for evaluating the program, the mission statement is turned into practical objectives.
Excellent companies stay close to the customer and seek to serve their needs. Student achievement is the primary mission of an outcome-based school. Mastery learning schools view students progress as a function of performance, not a function of time.

Successful businesses also use long range planning and objectives to direct their path. It is the writer's philosophy that a wide range of potential futures, some positive and some negative, exist; careful decision making can determine which of those futures become reality. Thus, the following three-phase plan of implementation was developed as a first step.

Chester Community Unit District #139
Three Phase OBE Implementation
Flow Chart

Phase I - Initial Implementation

Part I

1. Introduce OBE principles to staff and Board of Education.

2. Inservice principals and Board on goal setting and developing a Vision.

3. Develop OBE implementation policy with Board.

4. Systematically collect materials on Outcome Based Education.
5. Administer "Prediction Guide" to all staff. Analyze. (See Appendix B)

6. Administer a school climate survey.

Part 2

1. Form district and building CORE Groups from volunteers.

2. Develop OBE implementation plan with CORE Group and Principals based on a model "change" process.

3. Organize documentation procedures to establish baseline data.

4. Choose teachers to develop and deliver OBE pilot units.

5. Inservice pilot teachers on effective teaching strategies and Mastery Learning techniques.

6. Form staff committees to articulate priority subject areas and to write learner outcome objectives.

Part 3

1. Begin implementation of pilot units using staff volunteers.

2. Collect test results of pilot units. Compare with test results collected before pilots.

3. Analyze student performance in pilot units and pool staff reactions to their experience.
4. Set OBE project priorities in relation to district resources and pilot results. Relate these priorities to staff development.

5. Provide release time for development of learner objectives by subject area priority.

6. Form OBE Mentor Teams (coaches) for each component of the OBE Project.

Part 4

1. Begin inservice of Mentor Teams.

2. Have subject area teachers develop course outcomes and learner objectives.

3. Plan activities for staff release time, planning, research, and involvement in OBE project components.

Phase II - Expanding Participation to Create the Critical Mass

Part 1

1. Begin implementation of pilot unit using staff volunteers.

2. Collect test results of pilot units.

3. Analyze student performance in pilot units and pool staff reactions to the experience.

Part 2

1. Set OBE project priorities in relation to district resources and pilot results.
2. Continue to provide release time for development of learner outcomes and objectives by subject area priority.

3. Form OBE Mentor Teams (coaches) for each component of the OBE project. (Effective teaching strategies, Mastery Learning, etc.)

Part 3

1. Continue inservice of Mentor Teams.

2. Start an OBE Newsletter on OBE success, research, and staff activities.

3. Plan activities for staff release time, planning, research and involvement in OBE project components.

Part 4

1. Provide workshop opportunities for Mentor Teams.

2. Continue writing and refining learner outcomes and objectives.

3. Progress report to the Board of Education.

Phase III - Widening the Circle

Part I

1. Expand staff participation in OBE activities through mentor teams and district workshops.
2. Continue Mentor Teams training and coaching programs.

3. Begin aligning current curriculum to course outcomes and learner objectives.

4. Review course outcomes and learner objectives that were written earlier.

**Part 2**

1. Continue Mentor Team activities for each OBE component. Create a mentor assessment instrument on effective teaching.

2. Start CORE Group on the development of a district teaching model based on research of effective strategies.

3. Conduct a staff survey on attitudes and progress toward OBE components to help plan for next year.

4. Consider modifying school schedule for accommodating "correctives" and "enrichment."

**Part 3**

1. Plan OBE workshops for all staff for following school year.

2. Conduct a community survey to assess attitudes toward OBE.

3. Begin development of assessment instrument
to improve teacher effectiveness (for Mentor Teams).

4. Re-administer school climate survey. Analyze. Should the commitment to OBE be continued.

Part 4

1. Select teams of teachers to define course outcomes and learner objectives for the next subject area.

2. Provide staff with OBE workshops and programs.

3. Select an "Initiation" team from among district teachers to provide OBE workshops for all new teachers to the district. New teachers will be required to participate.

4. Progress report to the Board of Education by OBE leadership group.

5. Relate the formative aspects of teacher evaluation plan.

6. Organize inservice programs on formative aspects of evaluation of teaching.

Mid-Range Plan

New state-wide demands and subsequent changes in the state's philosophy as expressed in the educational reform package of 1985 have been incorporated into the overall inservice and staff development plan. The following model for a regular inservice and staff development plan has been
In order to provide quality programs and improve curriculum and instruction for the students of Chester Community Unit District #139, teachers and administrators will meet monthly for inservice. School will be dismissed early the third Wednesday of each month to provide a time for inservice training. As a vehicle for the inservice, teachers will be assigned to a quality circle for training and problem solving.

Nine quality circles have been established. Their titles and brief description of each quality circle's charge follows:

**High School Language Arts** - Review current high school curriculum and implement changes necessitated by the structural change.

**Grade School Language Arts** - Review current curriculum and disseminate information to other staff members concerning district objectives and develop recommendations for implementation. Develop a K-8 learner assessment plan.

**Substance Abuse Prevention Education** - Review and evaluate the effectiveness of district programs.

**Grade School Math** - Review current curriculum and disseminate information to other staff members.
Mastery Learning

concerning district learner objectives and develop recommendations for implementation. Develop a K-8 learner assessment plan.

Science - Improve curriculum articulation and develop a local assessment plan for district learner objectives.

Vocational Education - Continuation of alignment of district programs with Education for Employment.

Special Education - Review special education policies and procedures.

Assertive Discipline - Provide staff with orientation to, instruction in, and implementation of the principles of assertive discipline.

Mastery Learning - Implement mastery learning procedures.

Student achievement has been made the main focus of this plan. District-wide articulation of the curriculum with state mandated learner objectives at grades 3, 6, 8 and 11 and the development of local criterion - referenced assessment procedures are also central to the plan. Intertwined with achievement of the conceptual model of implementation are four supporting areas: climate, instruction, staff development and organization. All of these are directed by a fifth area, leadership. School climate refers to good discipline policies, an open environment, and an active involvement of parents and the community.
Instruction refers to a coordinated instructional program which uses the classroom techniques that research has indicated may lead to greater learning on the part of students. Staff development refers to an ongoing systematic program for all staff. Organization refers to a balanced curriculum and student support services that focus on improving student achievement. Leadership highlights key responsibilities for the school board, building administration and teaching faculty in carrying out the other four areas.

**Scheduling for Mastery**

One of the greatest barriers to successful implementation of the mastery learning model has been time management for the remediation and enrichment process. The high school has adapted a daily class schedule which institutionalizes the remediation process. The building operates on 8 periods with each period being 48 minutes in length. The last 30 minutes of the regular school days is a tutorial period. The period is utilized for remediation (reteach, retest) and enrichment. All teachers and all students are available at this time.

Cross (Phi Delta Kappan, 1984) describes an unfortunate picture of many of the educational reform initiatives. She cites simple-minded approaches to complex problems, top-down mandates on every aspect of schooling, quick-fix plans for
long term problems and lingering desire to find the bad guy -someone to blame. According to Cross, education reform can only survive and succeed at the local level by being administered with a large dose of common sense.

The use of common sense is tied to the need for making school reform a practical activity that can succeed in a local school. The writer believes school reformers need to be driven by the actual operation of the school and not by theory. Educators who want to implement outcome-based education can avoid drastic changes that sacrifice the normal operation of a school. Using common sense enables administrators to move toward an outcome-based program without destroying the support of teachers, parents or students. To encourage the concept of common sense, the following factors are emphasized:

1. Change is natural and no one should be blamed when change occurs. When the change process becomes natural and teachers meet on a regular basis to plan for change, it is not so threatening.

2. Expectations must be reasonable. Expectations for teachers should be analyzed and adjustments made where necessary. Likewise, student expectations must be reasonable. High expectations are a must but alone cannot overcome inadequate background and preparation. Remediation plans must be in
place for those who do not achieve mastery.

3. Truth in reporting is critical. Educators must accurately report and analyze both successes and failures.

4. Be flexible within the system. Flexibility within the system requires the principal to recognize that there is a happy medium between strict adherence to the system and total ignorance of the system.

5. Expect success, but be prepared to act when necessary. Educators too often develop the perfect instructional plan, only to destroy it when it does not succeed. The failure by a few students or a few teachers will lead some to believe that no instructional management plan can work and that we need to return to the past when the teacher alone ruled instruction, with the classroom door closed and students as the sole observers (Saterfiel, 1985).

A final example of the use of common sense can be demonstrated relative to high expectations. There are a number of studies that indicate high expectations that properly challenge students make a difference. Yet some students, who have neither background nor preparation to attack a particular area, will fail. Challenges without proper preparation will not lead to success. However,
placing the student at an appropriate level in the curriculum is often interpreted by some educators as having low expectations for student performance. Educators who use common sense know that high expectations do not conflict with plans to deal with those who do not succeed. To the contrary, having an alternative plan for those who are not successful represents true high expectations and a commitment to make a second and third effort to see that success occurs. When students finally succeed, not only are expectations high, but achievement is high as well. The use of common sense in such situations allows a local school to grow with the reforms associated with an outcome-based education program instead of riding the boom or bust cycle.
CHAPTER 5

Results, Summary, and Recommendations

American educators recognize their responsibility to help students learn. In an effort to improve student achievement, schools have adapted a number of changes, including more rigorous curricula, an increase in the number of courses required for graduation, and a movement for higher teacher salaries.

Further, a number of management experts are advocating the effectiveness of smaller business units. Peters and Waterman (1982) noted the advantages in their book, In Search of Excellence. "The point of smallness is that it induces manageability and, above all, commitment... Smallness works. Small is beautiful," they write.

It has been the task of the writer to implement an O.B.E./Mastery learning program based upon the above model (see Chapter 4). A belief in school-based management has dictated instructional leadership style.

Within the framework of our O.B.E. implementation model and given the limitations imposed upon the study, success can be demonstrated. To document this success, the writer includes artifactual evidence from the current school year and evidence gathered earlier.

Results

The following are assessment results taken after a
semester of work in math classes using mastery techniques. The following form to survey subject interest and academic self-esteem was adopted from Guskey (1985) (see Appendices C and D).

Interest is a feeling that impels a person to seek out things (Anderson, 1981). Persons who are interested in a subject want to find out more about the subject, want to understand it better, or want to enhance their skills in that area. A person's subjective perception of him or herself as a learner in academic settings is referred to as academic self-esteem. (Anderson, 1981). Someone with positive academic self-esteem feels confident and self-assured in learning situations, while someone with negative self-esteem feels incompetent and uncertain.

The results of the survey show student responses in diverse levels of math. The figures are divided by the percentage of students responding to each choice. A numerical comparison has been drawn by the researcher to compare positive to negative responses. The middle response has been eliminated. The conclusions are expressed as a fraction with the positive responses recorded as the numerator and the negative responses as the denominator. Fractions where the numerator is larger than the denominator represent highly positive responses. In all areas except three, the responses form a positive integer. Most
Importantly, all integers on the academic self-esteem indicator are positive. Assumptions made concerning mastery learnings impact on the affective domain appear to be valid.

**Subject Interest - Vocational Math**

1. 66/16  
2. 61/27  
3. 38/33  
4. 21/38  
5. 44/44

**Academic Self-Esteem - Vocational Math**

1. 72/0  
2. 72/16  
3. 72/11  
4. 27/0  
5. 61/16

**Subject Interest - Algebra II**

1. 72/20  
2. 63/16  
3. 39/24  
4. 46/31  
5. 38/37

**Academic Self-Esteem - Algebra II**

1. 59/13  
2. 63/22  
3. 69/6  
4. 52/10  
5. 74/4

**Subject Interest - Math IV**

1. 100/0  
2. 70/0  
3. 30/0  
4. 50/10  
5. 90/10

**Academic Self-Esteem - Math IV**

1. 70/0  
2. 70/0  
3. 70/0  
4. 50/0  
5. 100/0

The student surveyed had been taught by mastery learning teach-test-reteach units. The quiz, remediation exercise and re-quiz were all designed to test the pre-determined objectives. As shown in the sample from Algebra II, this insures that the teacher is testing what he/she taught and that the assessment measures are truly parallel (see Appendix E).

After completing the above mastery unit, the following results were obtained as shown in Table 1 below.
Table I
Algebra II - Formative Re-Test Chapter 5

<table>
<thead>
<tr>
<th>Student</th>
<th>Before</th>
<th>After</th>
<th>Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.R.</td>
<td>60</td>
<td>90</td>
<td>30</td>
</tr>
<tr>
<td>C.M.</td>
<td>60</td>
<td>95</td>
<td>35</td>
</tr>
<tr>
<td>K.P.</td>
<td>90</td>
<td>95</td>
<td>5</td>
</tr>
<tr>
<td>N.M.</td>
<td>80</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>J.C.</td>
<td>85</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>E.B.</td>
<td>60</td>
<td>90</td>
<td>30</td>
</tr>
<tr>
<td>J.B.</td>
<td>75</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>J.S.</td>
<td>65</td>
<td>95</td>
<td>30</td>
</tr>
<tr>
<td>K.E.</td>
<td>80</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>T.J.</td>
<td>60</td>
<td>95</td>
<td>35</td>
</tr>
</tbody>
</table>

- Average gain 22.5%
- 100% retaking showed gain.
- 100% at Mastery after re-take (eliminate failure).
- 50% retaking already were at Mastery (upward movement on grade scale C -> B, B -> A)

Comparisons of success in mastery learning classes are drawn by comparing the percentage of students who receive a satisfactory grade (C or higher) with non-mastery classes. The ensuing Table 2 compares percentages of students successful in all levels of math prior to mastery with current success percentages under mastery learning conditions.
Further evidence of the success of mastery learning is demonstrated by two recent statistics. Twenty-seven percent of the student population achieved a grade point average of 3.0 on a scale of 4.0. More importantly the percentage of students receiving unsatisfactory grades were reduced by 26 percent.

Mastery learning emphasizes the importance of getting all students to learn the material in each unit to a high standard. In this way all students have the prerequisites for each succeeding level. But some students enter a mastery learning class ill prepared. These students have not learned the material from previous classes very well and are inadequately prepared for the current course. Leyton’s data on procedures that might be used to enhance entry skills of ill prepared students were utilized. He believed that taking a brief period at the beginning of a term to identify and then reteach these necessary skills might greatly enhance
students' learning in the course. Leyton designed a study that involved four groups of students. These students were treated with four conditions: conventional instruction, conventional with review, mastery learning and mastery learning with review. When conventional methods only were employed 8 percent of the students attained mastery. In the group where conventional instruction was combined with review 28 percent achieved mastery. Forty-three percent of students taught under mastery learning conditions achieved mastery. Where mastery learning was combined with review 61 percent of the students achieved mastery. Combining mastery learning with an early review of the pre-requisites for the class resulted in a mastery rate more than seven times conventional methods. The fourth condition is essentially the mastery treatment applied to the district's math students.

Recommendations

As a result of this study, the researcher recommends that educators concern themselves with (1) how schools are structured and make decisions, (2) the process of change, and (3) the way in which teachers and students can increase the amount of time spent on productive instruction.

Prior to attempting the introduction of mastery learning the administrative team should design a long range plan of implementation. The plan should be reviewed yearly;
accomplishments noted and adjustments made. Equally essential is the adoption of the outcome-based education mission statement and philosophy.

It is also important that baseline data is accumulated prior to the beginning of mastery learning implementation. Only in this way can any type of control group be established for evaluating mastery learning's impact. The administrator should use these to certify success.

Staff development resources, district inservice time and district finances must be committed to the furthering of mastery implementation. Those who administer and guide mastery learning implementation must keep their eyes on the goals on the horizon, not the immediate potholes in the road. This is the function of the three phase implementation plan in the district's model. The yearly inservice model is used to make short term correction.

Summary

Teachers are generally skeptical of innovations in education. Their experience indicates that many innovations prove impractical for use in classroom settings. Few are the panacea they are described to be. Many view mastery learning in the same way.

Yet mastery learning makes no pretense for being an educational cure-all. There are many classroom problems it will not solve. Mastery learning by itself will not solve
all the problems of disruptive or poorly motivated students. It does offer a very useful tool that incorporates many elements of effective teaching. It can help teachers organize their instruction and insure congruence between their teaching and evaluating student's learning. It is a way for teachers to have more students experience success in their learning.

Few teachers initially believe that mastery learning will bring about significant improvements in their classes, especially veteran teachers. It takes actual results in their classes to convince teachers that mastery learning works.

Mastery learning stems from an optimistic view of the potential of education. It stresses that all students can learn very well when appropriate conditions are provided. Educators must not fall into the trap of believing mastery learning will teach all to be nuclear physicists or novelists. However, all students can learn to read and comprehend, can learn to solve problems requiring computational skills and can learn to write in a clear and concise manner.

There is little doubt that education is one of the most difficult and challenging professions. The responsibilities of educator's often seem overwhelming. Teachers not only influence what their students learn, they also shape
students' attitude toward learning and themselves as learners. The thrust of this field study has been to combine mastery learning with other research on effective schools to demonstrate the power of mastery learning. Mastery learning offers teachers a powerful tool that increases their effectiveness in helping more of their students gain the positive benefits of learning success.

The mastery learning process outlined here or elsewhere is not perfect. It may not cause all students to learn everything they are taught. But there is strong evidence from the above results that it can reduce the variations among students in terms of their mastery of specified learning outcomes, and it can greatly increase learning outcomes.
## Appendix A: Table of Specifications

<table>
<thead>
<tr>
<th>Knowledge of</th>
<th>Analy-</th>
<th>yses &amp;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rules &amp; Process</td>
<td>Anal-</td>
<td>yses &amp;</td>
</tr>
<tr>
<td>Prin- &amp; Pro- ciples</td>
<td>yses &amp;</td>
<td>Syn-</td>
</tr>
<tr>
<td>Terms Facts cedures lations cations thesis</td>
<td>Syn-</td>
<td>thesis</td>
</tr>
</tbody>
</table>
Appendix B: Prediction Guide

1. Most kids can learn and have talents that can be developed.
2. High expectations promote excellence.
3. Effective instruction decreases the need for remediation.
4. When teachers and students are optimistic about learning, more learning takes place.
5. As competition increases, learning increases.
6. An effective instructional program provides for the needs of all pupils.
7. Control is a cooperative student-teacher effort.
8. An environment of trust is more productive than one based on fear.
9. Grouping should be based on achievement and performance.
10. Meeting objectives is the basis for certification.
11. Students can learn well in a student oriented atmosphere.
12. Change is natural and should follow a process.
13. If students don’t master the material the first time, they probably won’t do better on a second try.
14. Reading strategies are needed only in classes which specifically teach reading.
Appendix C: Subject Interest

Directions: Choose from among the following responses that comes closest to your feeling about each statement.

A    B    C    D    E
Strongly Agree  Not Sure  Disagree  Strongly Agree  Disagree

1. I would like to learn more about this subject.
2. The things we learn in this class are interesting to me.
3. I would like to spend more time in this class.
4. I would like to take more classes on this subject.
5. I enjoy doing extra work for this class.

Appendix D: Academic Self-Esteem

Directions: Choose from among the following responses the one that comes closest to your feeling about each statement.

A    B    C    D    E
Strongly Agree  Not Sure  Disagree  Strongly Agree  Disagree

1. I am proud of my work in this class.
2. This is a subject that I understand easily.
3. I usually do well on class assignments.
4. The teacher often praises my class work.
5. I feel good most of the time I am in this class.
Appendix E: Mastery Learning Assessment Sample

# 1 Algebra II Quiz

Simplify

1. \( \sqrt{-128} \)
   - \( 242 \)
2. \( i \)
3. \( \sqrt{-8} + \sqrt{-18} \)
4. \((2 + 7i) - (6 - 11i)\)
   - \( 2 \)
5. \((3 + 3i)\)
6. \((3 + \sqrt{-3})(20 - \sqrt{-2})\)
7. \(4 + 5i\)
   - \( \frac{1 + i}{1 + i} \)
8. \(7\)
   - \( \sqrt{2} \) 

EXTRA CREDIT

A. \( \left( \sqrt{-4} \right)^3 \)

B. Show that these expressions are multiplicative inverses. \(5 - 4i; 5 + 4i\)

\(\frac{1}{41}\)

# 2 Algebra Remediation

1. a. \( \sqrt{-98} \) b. \( \sqrt{-108} \)
   - \( 170 \) \( 46 \)
2. a. \( i \) b. \( i \)
3. a. \( \sqrt{-27} + \sqrt{-75} \) b. \( \sqrt{-20} + \sqrt{-45} \)
4. \( a. \ (3 + 5i) - (4 - 2i) \quad b. \ (4 + 3i) - (11 - 4i) \)

5. \( a. \ (2 + 2i) \quad b. \ (7 + 7i) \)

6. \( a. \ (2 + \sqrt{-2}) \ (11 - \sqrt{-5}) \quad b. \ (3 + \sqrt{-3}) \ (9 - \sqrt{-6}) \)

7. \( a. \ 3 + 6i \quad b. \ 2 + 9i \)

8. \( a. \ 5 \quad b. \ 3 \)

\[ \sqrt{3} - 2i \quad \sqrt{5} - i \]

**43 Algebra II Re-Quiz**

Simplify:

1. \( \sqrt{-288} \)

2. \( \sqrt{33} \)

3. \( \sqrt{-24} + \sqrt{-54} \)

4. \( (4 + 3i) - (6 - 4i) \)

5. \( (5 + 5i)^2 \)

6. \( (4 + \sqrt{-2}) \ (8 - \sqrt{-5}) \)

7. \( 4 + 7i \)

8. \( 4 \)

\[ \sqrt{3} - i \]
References


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