

Mastery Learning: An Effective Teaching Strategy

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Abstract

Mastery learning is used in order to advance an individual's potential for learning. Compared to traditional learning models, sufficient time, attention, and help are afforded to each student. This paper investigates the mastery learning model and changes that have taken place in its use as an effective teaching strategy. It also provides a comparison of Bloom's and Keller's approaches as well as a critique of both approaches using historical data. This paper shows that by applying mastery learning as a teaching strategy, students achieve higher learning and better academic performance.

Key words: Mastery Learning, Learning, Teaching Strategy, Personalized System of Instruction

Introduction

Allowing students the opportunity to achieve mastery of content at different time intervals has proven to be an effective method of increasing student learning. This paper will investigate the mastery learning model and changes that have taken place in its use as an effective teaching strategy. It also

provides a comparison of Bloom's and Keller's approaches as well as a critique of both approaches using historical data. By definition, mastery learning is a method of instruction where the focus is on the role of feedback in learning. Furthermore, mastery learning refers to a category of instructional methods which establishes a level of performance that all students must "master" before moving on to the next unit (Slavin, 1987). Thus, through one or more trials, students have to achieve a specified level of content knowledge prior to progression on to a next unit of instruction.

Background Information

Mastery learning though strongly influenced by the development of instructional technology is not, however, a new concept (Bloom, 1976; Wentling, 1973). Some principles of mastery learning originated with Aristotle and other ancient Greek philosophers. Furthermore, the concept that most students can learn everything that is being taught, if given sufficient time, goes back into the previous century (Block, 1973; Bloom, 1976).

Mastery learning was first introduced into the American educational system over seventy years ago. However, during the 1920s, only a few schools in America were using mastery learning. Washburne (1922) stated, "With the development of the achievement test movement, we may now make units of achievement the constant factor, varying the time to fit the individual capacities of the children." According to Block (1971), in 1922 there was an attempt by Washburn and others to produce mastery in students' learning. This plan was known as the Winnetka Plan, in which "primarily self-instructional practice materials were used, although the teacher occasionally tutored individuals or small groups" (p. 4). A further attempt was made in 1926 by Morrison in which "a variety of correctives were used -- for example, re-teaching, tutoring, restructuring the original learning activities, and redirecting student study habits" (p. 4). Block stated that Morrison's method was successful in the 1930s. However, because of a lack of technology, Morrison's idea of mastery learning failed to be used by teachers across the nation.

In the early 1960s the idea of mastery learning was revived in the form of programmed instruction. Programmed instruction derived initially from work conducted by B. F. Skinner was further developed by other behaviorists. This program was similar to mastery learning in the sense that the focus

was on the role of feedback in learning and on individualized learning. Also, like the original mastery learning model, this method of instruction allowed students to move at their own pace and receive instant feedback on their current level of mastery.

Founders of Mastery Learning

Both Bloom and Carroll are credited with formulating the idea of mastery learning, though many of its elements were strongly influenced by Washburn and Morrison in the 1920s and behaviorists in the 1960s. As cited in Carroll (1963), Bloom came up with an important component of instruction which is time. In Carroll's theory learning is a function of time spent divided by the time needed (Davis & Sorrell, 1995). According to Carroll, the differences in aptitude among students are due to the amount of time spent in learning the material. Carroll (cited in Block & Anderson, 1975) defines aptitude as "a measure of learning rate, i.e. as a measure of the amount of time the student would require to learn a given level under ideal instructional conditions" (p. 2). According to Davis and Sorrell (1995), Carroll indicated that if the student will make the effort to learn a task by allowing himself or herself the time that the student requires for individual learning then he or she will succeed. Therefore, in a given test, the only thing that varies is student performance.

In the late 1960s, Bloom's "Learning for Mastery" focused attention on the philosophy of mastery learning. Bloom interpreted Carroll's ideas and philosophy of learning in terms of mastery learning. He stated that the mastery learning proponent believes that intelligence and aptitude are not the best indicators of potential achievement. Furthermore, Bloom (1976, 1979, & 1980) pointed out that "cognitive entry characteristics" (specific knowledge, abilities, and skills), which are necessary prerequisites to a particular learning task, are better predictors of later achievement. These characteristics were seen as identifiable and alterable by Bloom. In addition, with continual academic success, Bloom felt that "affective entry characteristics" (attitude, self confidence, and motivation) would improve over time. According to Bloom "cognitive entry characteristics," "affective entry characteristics," and quality of instruction determine the rate of learning for each individual. Bloom along with Anderson (1976), Block (1973 & 1979), Guskey and Gates (1986), and Walberg (1984) argue that under the mastery learning approach, differences in learning rates will decrease and can approach zero. Thus, as students master the prerequisite skills for each new unit the need for corrective instruction will progressively

reduce on each succeeding unit (Bloom, 1976, 1980).

Bloom (1968) is known as the individual recognized for the theoretical formulation of the mastery model. His prediction was that 95% of the students taught by the mastery approach would achieve at a level that had previously been reached by only 5%. He suggested that learning outcomes in most all subject areas can be enhanced through the mastery learning method. Over time, the model of mastery learning, developed by Bloom, began to take on a number of different variables. According to Bloom, every mastery learning program divides instruction into small units. Feedback is always a part of mastery learning where students are given an opportunity to practice what they have learned and are given corrective feedback (Motamedi & Sumrall, 2000).

The idea of "cognitive objective" was originated by Bloom. Mastery is defined in terms of objectives. Students will be able to perform at least 90% or higher on a test. According to Bloom's theory of mastery learning diagnosis is required. For example, if a student is having problems with his studies, the cause needs to be found. Instruction should be supplemented with correctives such as tutoring, additional practice, small group study, games, or even re-teaching the material. The time is always allowed to vary.

Traditionally, many teachers believe that intelligence and aptitude have determined the individual's potential for learning. Bloom (1974a, 1976, & 1980) states that all too often, intelligence and aptitude scores have determined opportunities for further education, student support and encouragement, and even quality of interaction between teacher and student. Hence, students with high scores have been the ones to whom the teachers have directed most of their attention. However, in the mastery learning model, Bloom stated that teacher-student relationships are greatly altered and the potential of low achievers is increased.

Bloom recognized that one aspect of mastery learning is learning in sequence, where sequencing is described as hierarchical. Thus, mastery of each step prior to advancing to the next step is essential. This concept goes back to the behaviorists and Skinner in 1954. The learning of most complex behavior rests upon learning a sequence of less complex component behaviors. If we are learning algebra, for example, an understanding of later material requires a complete understanding of earlier material. This is related to the sequential nature of mastery learning. A student cannot take the next step until that

individual has fully mastered the previous material. Slavin and Karweit (1984) refer to Bloom (1976) in his claim that mastery learning "focuses primarily on students' abilities to understand instruction by attempting to insure that all students have mastered the previous skill before attempting the next" (p. 726). Jensen (2006) also supports mastery learning wherein a student who masters a skill or subject moves on to the next level of learning. In this process slow learners are not kept back and gifted students would perform to their own higher capacities.

Bloom was not without criticism, though few educators who are familiar with the mastery learning approach deny that it can provide some positive effects. However, the claim of mastery learning theorists that achievement variability and time variability can be minimized simultaneously has created considerable controversy (Arlin, 1984b). Whereas, Bloom's 1976 book on mastery learning has been described as "possibly the most significant book of its decade" [Havighurst, 1976 (cited by Arlin, 1984b)], Glass and Smith (1978) suggest that Bloom's claims are mere educational rhetoric. Others call his claims of vanishing differences "mythological statements" which deny reality and a psychological trap" which will entice teachers to attempt unfeasible goals (Arlin, 1984b).

Research Studies about Mastery Learning

Over the years many research studies based on mastery learning have been conducted. Studies ranging in population from elementary through university and in some cases using educational technology have taken place.

Whiting and Render (1984) provided research findings to support the hypothesis that mastery learning does produce successful learning experiences for at least 80% of the students in their program. Their study also indicated very strong positive outcomes in the affective domain with strong indications of satisfaction and pride in the learning accomplishments along with a steady increase in enrollment in the classes comprising the study. A high level of retention was illustrated with students motivated to remediate unlearned materials even though at times they were not required to retake a test. The authors made a strong case for the use of mastery learning while at the same time they clearly outlined some of the difficulties encountered in the "corporate culture" when such a program is implemented.

Guskey and Gates (1986) conducted a research synthesis of studies of group based mastery learning in elementary and secondary classrooms. Twenty seven studies were selected for the synthesis.

Guskey and Gates reported “that without exception the studies showed positive effects on a broad range of student learning outcomes, including student achievement, retention of learned material, involvement in learning activities, and student affect.” The synthesis revealed that the magnitude of the effect on student achievement varied widely across studies. Several of the studies investigated variables related to time. Although Guskey and Gates contend that student learning rates are alterable as Bloom’s model hypothesizes, their synthesis report does state that “Arlin (1984a, & 1984b) argues that learning rate is a fairly stable and unalterable characteristic.”

Lai and Biggs (1994) conducted a study with educationally disadvantaged students in grade 9 biology classes. Students were classified into surface biased and deep biased. The results of the study indicated that mastery learning benefited surface biased students while the deep biased students’ interest levels tended to progressively diminish using mastery learning. Thus deep and surface biased learners increasingly diverge in both performance and attitude, where surface learners did better than deep learners from unit to unit. Lai and Biggs stated that surface students seemed to be motivated by the success they have obtained; a success that is a rare event to these students.

Ritchie and Thorkildsen (1994) used the videodisc-based instruction method “to examine the factor of accountability in mastery learning programs. The videodisc-based instruction was chosen to help minimize differences in instructional materials, instructional time, and instructional delivery.” Results of this study indicated a significant difference in achievement test scores. Two possible reasons for the significant increase among mastery learning students were such that their awareness of participating in a mastery learning program quiz and test results will directly influence their progression and re-mediation of ensuing instructional material.

Kulik, Jaksa, and Kulik (1978) conducted a study which demonstrated that the high student achievement was an outcome of personalized instruction. They noted that this instruction has at least four sources. The first important factor is PSI’s high mastery standard. The second factor is the large number of unit quizzes. The third is timing of feedback which influences student achievement in Personalized System of Instruction (PSI) courses. The final critical factor is the total amount of review built into PSI courses.

Semb (1980) referred to several studies that have compared Keller’s (1968) personalized system

of instruction to more traditional lecture methods. The result of these studies demonstrated that PSI has produced higher levels of academic achievement and higher student ratings. According to Klishis, Hursh, and Klishis (1980) PSI has repeatedly been shown to be more effective than the traditional lecture approach.

Atkisson (cited in Klishis, Hursh, & Klishis, 1980) conducted a study with sixth-grade students in a PSI spelling class. He found that these students completed their work early, giving them time to work at building their vocabulary skills. Klishis, Hursh, and Klishis (1980) demonstrated in an experiment that PSI results in more effective learning of spelling in elementary classrooms. Results showed that students were more successful in mastering content and faster in completing the course than they were when taught by traditional methods.

They also found that attitudinally students enjoyed PSI more than the conventional approach and enjoyed serving as proctors. According to Kulik, Kulik, and Carmichael (1974), Keller reported that students rated the personalized courses as much more enjoyable than traditionally taught courses. The authors stated that students are "highly pleased with this way of teaching and learning" (p. 379). Kulik, Kulik, and Carmichael found that 72% of students in nuclear engineering, 91% in electrical engineering, 64% in mechanical engineering, and 59% in operations research considered PSI better than the lecture method. They presented results of 15 studies in which examination results in Keller and conventional courses were compared. According to the authors of the 15 studies, higher performance for the Keller section was reported in 11 of them. The authors also stated that "content learning under the Keller plan always equals, and most often exceeds, content learning under the lecture method" (p. 383).

A Comparison of Bloom's and Keller's Approaches

Similarities

One of the similarities is that students are capable of learning well. It is the task of the teacher to design his instruction. The teacher should have a set of objectives for students to follow. Both strategies assume that the course should be broken into smaller learning units so that there is a better interaction between students and the teacher. Both of these approaches take the same position on individual student performance. Individual student performance should be based on "absolute performance" rather than on "relative performance" (Block, 1974).

Differences

Bloom and Keller both agree that each student must master each part of the course. But Bloom believes that mastery of the parts is not the same as mastery of the whole. He bases a student's grade primarily on the student's performance over all units taken as a whole, whereas in Keller's plan, mastery of the parts of a course is the equivalent of mastery of the course taken as a whole. Keller bases the student's grade mostly on his performance on each unit. For Bloom, mastery is performance at or above a particular level on the course final examination, whereas for Keller, mastery is perfect performance on a particular number of units by a certain point in time. Bloom's plan tends to use larger learning units than does Keller's plan. Bloom's units usually correspond to two weeks worth of instruction; Keller's units usually correspond to about one week worth of instruction. In both strategies, the teacher is encouraged to sequence his learning units; but in Bloom's strategy, the teacher attempts to sequence the units hierarchically so that the material in one unit builds on the material from the preceding unit. Bloom's units are taught using group-based methods while Keller's units are taught using individual based methods. The Keller strategy asks students to learn by reading, whereas the Bloom strategy asks students to learn by reading, hearing lectures, and/or participating in discussions. In Bloom's strategy, the original instruction is teacher-paced; whereas in Keller's approach, it is student or self-paced (Block, 1974).

A Critique of Both Approaches

Both mastery learning and Personalized System of Instruction have been criticized. Gage and Berliner (1988) quoted Mueller (1976) as asserting that mastery learning

(a) takes much of the responsibility for learning away from students, who may end up not knowing how to learn independently; (b) requires non-fixed-time instructional units or greatly liberalized time allocations; (c) makes faster learner "wait around" while slower learner catch up, unless the faster learners are motivated to spend their time achieving objectives beyond the pre-specified ones; (d) commits a major part of finite instructional resources -- corrective effort, teacher aides, peer tutoring, and alternative learning materials -- to slower students and (e) assumes that everything in an instructional unit must be learned equally well by almost all students, although beyond basic skills and hierarchical subjects (such as mathematics) this assumption is hard to defend (p. 467).

Slavin and Karweit (1984) concluded that the results of their study "do not support the effectiveness of the principal component of group-paced mastery learning, the cycle of formative test, corrective instruction for nonmasters, and summative test" (p. 732). According to Slavin (1987) (cited in Gage & Berliner, 1988) longer-term experiments yield much lower estimates of effectiveness than do

brief experiments. Also standardized achievement tests show less effectiveness for the approach than do experimenter-made tests. Slavin, with a modified view, concluded that:

The best evidence from evaluations of practical applications of group-based mastery learning indicates that effects of those methods are moderate at best on experimenter-made achievement measures closely tied to the objectives taught in the mastery learning classes and are essentially nil on standardized achievement measures. ... These conclusions are radically different from those drawn by earlier reviewers and meta-analysts. (p. 464)

Gage and Berliner (1988) stated that unless carefully controlled and implemented, mastery learning often helps slower-learning students at the expense of faster-learning students by taking educational resources such as teacher's time and attention. Faster learners are often left on their own with "busy" work.

Most critics do not deny that benefits accrue under the Personalized System of Instruction or continuous-progress types of mastery programs in which students move at their own pace; however, several critics of group based mastery learning (Arlin, 1984a; Slavin, 1987) have questioned whether mastery learning simply shifts learning from high to low achievers. They suggest that mastery learning sacrifices coverage for mastery and since rapid coverage is likely to be of greatest benefit to high achievers and high mastery is of greatest benefit to low achievers, pure group based mastery learning will likely produce a "Robin Hood" effect.

There are several other reservations about the mastery learning approach. Mueller (1976) sees the mastery model as placing a ceiling beyond which the faster learners are not allowed to progress. Mueller also believes that it is not useful in training students to learn independently. In addition, he states, "the mastery model equates mastery with high quality performance" (p. 14). Mueller thinks that, in addition to what a student learns, how long it took him to learn it should be a part of his grade.

Later studies countered these criticisms by questioning the efficacy of the individual implementations of the mastery learning. Arredondo and Block (1990) stated that "when well implemented separately, both mastery learning and thinking skills programs appear to improve student learning." Technology is often viewed as a useful tool for the more efficient implementation of some of the key aspects of the mastery learning model. Both mastery learning and PSI try to ensure remedial instruction of high quality. Alternative textbooks, workbooks, programmed instruction, games, and interaction with a tutor may help a particular student to understand what he is learning (Gage & Berliner,

1988).

Discussion and Conclusion

The hidden agenda that schools carry out does not involve how much students learn. The agenda is to divide students based on their academic achievement. The schools function on a system that separates the smartest from those that are not as academically inclined. That is the structure of the educational system in the United States.

If, for example, forty students were put in a classroom, there would be some students that would have poor academic skills, while others excelled. These students are separated based on their academic performance. The reason why we have to perform this function in education for society is that businesses, law firms, graduate schools, etc. all want to employ the brightest and the best students. This is the way to categorize students. This is based on the function that our educational system performs for us in the United States. Thus, our educational system is based on the notion that allows performance to vary in the classroom. It is acceptable for us to teach all students the same things, assess their learning, and see how students differ in terms of what they learn.

In mastery learning, time rather than performance, varies. Time is probably the biggest and the most important element of mastery learning. What is done in classrooms now is the same as what was done one hundred years ago: uniform instruction is presented in the classroom. This is what goes on in 99% of classrooms. The same instruction is presented to a number of students. What is measured? Achievement is measured in terms of how much information students are able to master. A bell curve is found to tell what most are learning, which is about 70% of the objective.

Obviously students are different. Some have higher aptitude than others in the classroom. Therefore, for all students to reach a high standard of performance it will take some students longer than it will take others. Thus, with mastery learning, the longer period of time required for some students to learn hinders them from reaching the desired achievement level. An advantage of mastery learning is that more students achieve higher learning. Also, students would have prerequisite skills to move to the next units, objectives would be stated, and better academic performance would result for some students. An obvious disadvantage of mastery learning is that the less capable students who do not achieve the criterion as quickly take longer to master the material. Also, individualized instruction, a variety of

material for re-teaching, and several tests for each unit may be required. The main weakness of mastery learning is the time factor.

Mastery learning is an alternative method of teaching and learning for many students who do not respond well to traditional instruction. Traditional instruction has not been successful for many students in schools, colleges, and universities. Like the mastery learning theory, cooperative learning is a strategy that looks unfavorably on competition among individual students when learning the subject matter. In addition, it is a strategy like mastery learning that makes the students responsible for their learning the subject. Cooperative learning is considered by many educators to be the most viable means by which all students can learn the subject matter (Motamedi & Sumrall, 2000). Constructivism, on the other hand, has been described as the unifying theory of education that has succeeded in tying together all learning theories in all academic areas. Constructivists use a type of learning where students are allowed "concrete, contextually meaningful experience through which they can search for patterns, raise their own questions, and construct their own models, concepts, and strategies" (Fosnot, 1996, p. ix). According to Fosnot, the classroom in this model is viewed as sharing activities, discourse, and reflection. The teacher is more of a facilitator rather than traditional controller of the classroom. Unlike cooperative learning, the literature does not provide a positive tie between constructivism and mastery learning.

From the research discussed above, it is evident that mastery learning is an effective method of instruction which enhances student learning, achievement, attitude, and expectations. There is also evidence that students enjoy this method of learning and individually can reach success. Students prefer the Keller plan to traditional teaching methods. Mastery teaching and learning is a very simplistic way of teaching and learning in the sense that the instructors assume all students can learn the same material. The only difference among students is the amount of time needed to learn the material. With such positive results shown by research studies on mastery learning, it becomes clear that mastery learning techniques need to be more widely implemented in American classrooms than they currently are.

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