Educational Psychologist
1979, Vol. 14, 24—29

Mastery Learning: A Psychological Trap?

William F. Cox, Jr. and Thomas G. Dunn
The University of Toledo

In spite of all its announced advantages, the implementation of mastery learning instruction often falls short of theoretical expectations. As discussed under the four major characteristics of mastery learning, these implementation weaknesses pose serious problems for unsuspecting students, teachers, and instructional designers alike.

The basic assumption of mastery learning is that most if not all students can successfully master the material to be learned. This assumption is based on Carroll's (1963) conceptual model of school learning which suggests that scholastic aptitude need not be the best predictor of academic achievement; rather it can serve to predict the amount of time required for acceptable academic achievement to occur. Thus, when the variables of time and quality of instruction are optimized according to the students' affective and cognitive entry characteristics, about four-fifths of the students reach a level of achievement which less than one-fifth achieve under non-mastery conditions (Bloom, 1976). Whereas traditional instruction serves to perpetuate the dichotomy between the "good" and "poor" learner, continued implementation of mastery learning eliminates the dichotomy by elevating the achievement level of the slower students.

This promising approach to education is not without its critics. Possibly because the mastery learning approach typically incorporates many varied instructional innovations (e.g., behavioral objectives, criterion-referenced testing, and systematic design), it automatically receives the criticisms intended primarily for these innovations. Indeed, a major contention within this article is that the instructional innovations that comprise what we refer to as mastery learning have not evolved to the level of desired prototypic operation. This being the case, there is then a discrepancy between what the mastery learning model promises and what it can now deliver.

In general, the major factors contributing to this discrepancy include: the inability to objectify and/or specify all components that constitute mastery or competency, the failure to meet certain assumptions of the theory, and the belief by some individuals that initial, less than optimum results of curriculum implementation efforts is prima facie evidence that mastery learning is a failure rather then representing a natural phase in the systematic refinement of instruction. To most clearly indicate the effects of such discrepancies on an instructional system, the discussion will focus on what can and does happen within the four major characteristics of mastery learning (Bloom, 1974); i.e., (a) systematic design of instruction, (b) appropriate instructional correctives, (c) sufficient time for learning, and (d) clear criterion of mastery. Accompanying examples are derived from experiences within a mastery - learning/competency - based teacher education program.

Systematic Design of Instruction

The process of systematizing instruction generally includes the following activities: specifying the intended learning outcome(s), developing the field testing programs that address these outcomes, and evaluating student and program performance.

Performance or behavioral objectives, while common elements in most systematically designed instructional efforts, are nonetheless far from being unanimously accepted by educators. Often those individuals best able to

This article was accepted by the former editor, Margaret M. Clifford.

The authors wish to thank Dolly Eidy for typing the manuscript.

The address of William F. Cox, Jr. is Department of Educational Psychology; University of Toledo; Toledo, Ohio 43606.

describe elusive but very important higher level and experiential-based learning outcomes and/or processes are reluctant to specify performance objectives. As a result, too much time and energy is spent refuting or convincing the critics of behavioral objectives instead of cooperatively refining the objectives of concern. Equally troublesome, early mechanical approaches to specifying objectives frequently attracted well-intentioned, but nonetheless short-sighted technicians (to the exclusion of academicians) as practioneers of the model. As a consequence, the resultant objectives often suffered the frequently ascribed criticism of being trivial, incomplete, and insensitive to the learner's needs (cf. Nash & Agne, 1971).

More substantively, an all too typical problem encountered with the use of behavioral objectives has resulted from the confusion between ends (i.e., objectives) and means toward achieving ends (i.e., instructional methods). Objectives should describe the end products and are not meant to dictate the teaching style or instructional strategies used to reach the end products. For instance, critics of systematic approaches to education often express the view that such programs are always too structured and that such programs of necessity include programmed instruction, rigid sequencing, a mechanistic frame of reference, and very little human contact. Such comments are invalid since all the above cited examples are more appropriately classified as "means" to "ends" and not ends in themselves. From this perspective then, it is entirely possible and appropriate that an instructor might *choose* programmed instruction as a principal means for students to learn an objective. In fact, since a ptimary tenet of the systems approach is to select strategies (means) based on their ability to help students attain objectives (ends), other instructional means (e.g., inquiry learning) are equally likely to be potential candidates for selection.

While it is important to be able to make discriminations between means and ends and to select means as a function of their ability to achieve ends, it is equally important to give credence to certain experiences that are not necessarily tied to particular ends. In our quest to match instructional procedures to previously stated outcomes of learning, we may overreact and actually prevent students from being exposed to certain beneficial experiences that do not result in an immediate behavioral change or at least do not result in a behavioral change detectable to the degree demanded in a behavioral objective. An example of such an experience would be exposing teacher-training students to an unruly group of children for the purpose of living through feelings of inadequacy prior to learning techniques for managing disruptive behaviors.

Another aspect of systematizing instruction relates to the identification of prerequisite skills. Too often, instruction does not begin at a level consistent with the student's entering behavior. This mismatch of instruction and entry behaviors seems to result from at least two causes. First, assuming that they are assessing a student's entry level, instructors often make the mistake of only testing for the exit level or final behavior. This erroneous type of "pre-testing" rarely reveals to the instructor where to begin instruction but only indicates whether the student can accomplish the terminal objective. Obviously, subsequent instruction will not pick up from where the student "is" but instead will address only the terminal behavior–a very inefficient method for teaching.

A second way that instruction and entry behaviors are mismatched occurs when programs based on mastery learning overlook the necessity for mastery of all prerequisite skills. Systematically planning for mastery to occur within a course, or even a series of courses (e.g., a teacher training program), in no way assures that students have mastered all prior coursework. We know all too well that students are "passed" out of courses and graduate from programs for reasons other than academic achievement. Since prerequisite skills are typically cumulative in their effects and since they sometimes serve as cognitive strategies or ways of thinking that are not quickly teachable or trainable (i.e., remediated), their absence, if not addressed, quickly invalidates the effectiveness of mastery learning as an instructional system (Bloom, 1974, p. 6).

Instructional Correctives

Instructional correctives are prescribed whenever a student's performance falls below

prespecified levels. The prescriptives cover a wide range of activities; their intent is to provide an additional opportunity for the student to master the material.

This practice (often called recycling) raises some interesting and profoundly important questions. One such question relates to how an instructor can be assured that the student really understands the content versus merely having memorized it. Obviously, when the performance outcome is memorization of facts, information, etc., continued retesting over the exact same material is not only harmless but may in fact be desirable. However, when the desired performance outcome is a generalizable capability (cf. Gagné & Briggs, 1974), then repeated assessment on the exact same material is an inadequate if not erroneous indicator of mastery attainment. As an instance of the latter case, when the student recycles a written composition by strengthening a particular point of view and also perhaps correcting punctuation errors, the assumption all too often is that the student now possesses the capability to independently punctuate and use written communication strategies to adequately present various points of view on a given topic. However, in this example, the student may have only been parroting or following exactly what the instructor indicated should be done. Without a demonstration of these capabilities on a *new* composition, unaccompanied by specific instructor guidance, there is no guarantee that the supposed learned capability truly exists.

A second issue relates to the effect that the opportunity to recycle has on student study habits. Students, using the "principle of least effort," are sometimes astute learners in detecting the minimal amount of work that is necessary to pass a course with an acceptable grade. For example, many students with little or no preparation, willingly will risk initial failure on an exam to discover the minimal knowledge required to achieve the satisfactory criterion level on the second attempt. In such situations, the student's inappropriate behavior may be reinforced by success thereby increasing the probability that this strategy will be employed again in similar circumstances.

This latter example of how students may adapt to a mastery learning program clearly accentuates the need to state, as comprehensively as possible, all the desired learning outcomes (e.g., behavioral objectives) and to insure that assessment instruments address capabilities and not isolated performance. Then, any negative effects that result from employing the least effort principle will be negated if the recycle assessment instrument, while addressing the same general capabilities as the initial instrument, nonetheless clearly differs from it in terms of the specific test questions (i.e., eliciting stimuli).

The practice of recycling also differentiates among students with respect to their "willingness" to "relearn" an instructional unit. These reactions find their extremes in students that welcome the opportunity to recycle an instructional unit for the purpose of improving their performance and in students that rationalize away any attempt to restudy by ascribing the initial and the subsequently expected performance to capriciousness of the instructor and/or the grading system. The construct locus of control (Rotter, 1966), as a measure of belief in personal influence, seemingly would be a good index of these differentiated behaviors–certainly it provides a testable hypothesis.

Finally, in some cases this seemingly beneficial practice of providing an opportunity for recycling builds in the student exactly what the proponents claim it will eliminate–a negative self-image. On the one hand, students have to resolve the "promise" of success (i.e., most can achieve) with the reality of having to take the exam, and possibly the unit of instruction, over again. Too often this initial failure is interpreted as an indication of intellectual inferiority given the success expectation coupled with the clear, oftentimes simplified explication (via published behavioral objectives) of what constitutes success in the course. Similarly, the instructor is burdened with the stigma of having broken a promise to the student. These feelings of broken trust on the part of the instructor can too easily become a rationale for excusing or downgrading rigorous standards of achievement.

Ample Time to Learn

Within the mastery learning paradigm, performance differences across individuals are

considered to be manifestations of differential possession of prerequisite skills rather than possession of inherently uncontrollable factors. Thus, individual differences in performance outcomes at any point in time are viewed as a function of past matches or mismatches between the instructional material and the student's abilities. To wit, when instructional conditions are optimized, then real differences in learning rates between "good" and "poor" students are of a 1½ to 1 ratio and not a 6 or 7 to 1 ratio as previously assumed (Block, 1974, p. 61). Most of the assumed large differences between these two groups of learners are evidently a result of measuring instructionally related differences rather than real or innate differences. Accordingly, differences induced by instructional means may likewise be reduced by instructional means.

Attributing student differences to a lack of prerequisites rather than to innate, unchangeable entities is a healthy but nonetheless burdensome approach to instruction since the responsibility to ensure successful learning is shifted from the learner to the instructor or instructional designer. Ironically, if the burden of responsibility becomes too great, because of too many unprepared students and/or too great a discrepancy in entry level, the process of iterative improvement that was intended to solve these very same problems becomes stagnated. As a result, important instructional innovations are less likely to occur, the existence of pervasive individual differences may be ignored, and the explication of abilities already difficult to objectify (cf. "withitness," Kounin, 1970) is extremely unlikely. In any event, individual differences are perpetuated and ample time to learn is really never ample. Carried to an extreme, this could result in a program that includes only those objectives which most students readily master–obviously, an inadequate program at best.

The perpetuation of individual differences as they relate to attainment of mastery levels is also related to several other factors. One, the relaxation of admissions criteria with open admissions policies results in a wider range of entering student abilities, or more precisely, a higher percentage of students without both the intellectual skills and the cognitive strategies (cf. Dunn, Note 1) that for some reason are still assumed to be part of the entering student's repertoire. Another major factor is the reluctance of instructional designers and teachers to screen on certain non-content related abilities (cf. Rosenshine & Furst, 1971), possibly as a show of faith in the power of existing mastery learning models that typically, as with most other curriculum efforts, do not address these abilities or possibly because screening implies that mastery learning curricula can not do all that its proponents claim. Further, even when these abilities are specified as being desirable but entrance requirements and screening practices admit individuals lacking in these abilities, there really is no certainty that these abilities can be productively taught or modeled within the practical constraints of "ample time to learn." Again, individual differences are perpetuated and thus there may never be ample time to learn.

Clear Criterion of Mastery

In the true spirit of mastery learning, the prespecified criterion of mastery becomes the standard for evaluation. Student performance is judged against this standard rather than being judged primarily in relationship to peer performance.

A problem arises with the latent assumption that because certain criteria are specified they are then automatically the final statement in the matter. For example, when students meet the published criteria, they logically assume that they are fully competent and thus expect to receive their just rewards (e.g., course grade of A, high recommendations, etc.), and often they do even when the teaching faculty "know" that the students are not fully qualified. Also, no matter how well intentioned instructors may be in publicizing criterion statements, this practice seems to be associated with more rather than fewer student complaints. Apparently it serves as a release mechanism for student frustrations, whether justified or not. These student frustrations are additionally exacerbated if, as is often the case with developing technologies, well-meaning instructional intentions are not always totally successful during initial implementation attempts.

Obviously some clarification is needed. To think we can specify and/or train all the

competencies a teacher should have is very presumptuous; to say that a graduate of a teacher training program is as fully qualified as an experienced teacher is undoubtedly erroneous; and therefore, to equate mastery of competencies with receiving an A at the end of the course is misleading.

Too often, the publicized criterion performance indicative of mastery is not the humanly best level, or even a comprehensive statement of all the capabilities, but something that is somewhat closer to a reasonably acceptable level. Thus, there is always a range of performance expertness beyond or different from the specified acceptable level. Also, statements of acceptable performance are typically incomplete in their failure to address errors of inclusion that may even co-occur with acceptable performance. This kind of measurement imprecision is not unrealistic given our current capability in specifying and assessing complex human performance. Thus, it is appropriate and realistic to recognize and document that some people are somehow better than others at certain skills.

It should also be recognized that a typical training or instructional program addressed to complex human skills can never graduate totally competent performers but, more realistically, learners who are prepared for the next learning phase. In various professions and skilled trades alike, progressive levels of competence are recognized–as they should be in teacher training programs. The existance of a program based on mastery learning should not trap us into believing that its graduates have achieved all there is to learn about the topic, especially a topic where guided experience is so vital a component.

Given the above concern, the distintion should also be made between achievement of mastery and assignment of course grades. Logically there should be some connection, however, the egalitarian concept that most can achieve mastery should not automatically confer equality in scoring or grading. Given our imperfect assessment technology coupled with the general inability to specify all the competencies important to complex behaviors, mastery achievement should be considered more as minimal or acceptable competence and not total competence. Any demonstration of appropriate skills different from or beyond those conceptualized in the program could thus be appropriately recognized without the fear of committing heresy to the existing mastery learning program. Furthermore, it seems important to document and differentially reward student differences in the number of recycles, and the amount of time and help it takes to achieve mastery. Otherwise we have the likely dilemma of a school principal who has to hire a new teacher from a list of candidates, all of whom possess an "A" average in their mastery-learning teacher-training courses, but who nonetheless may substantially differ in rapidity of learning, and possibly transfer of learning, unbeknownst to the principal.

Conclusion

Perhaps the most perplexing issue facing proponents of the mastery learning approach is the matter of resolving philosophical beliefs to practical realities. The philosophy that most, if not all, can master the material to be learned has practical limitations. At some point it must be realized that all individuals are not equal even should there be the totally unlikely case where more than one individual shares the exact same history of learning. Certainly, one does not encounter a continuous mastery learning environment nor are we all identically endowed. Thus, at any point in time individuals will vary both in terms of innate abilities and possession of teachable prerequisites. Faced with these innate and environmentally determined differences that exist among individual learners, the instructor or instructional designer must realize that certain instructional objectives have a higher probability of achievement for some learners than for others. Obviously, time and resources for recycling and building of the missing prerequisites are not unlimited. So it naturally follows that some objectives or sequences of objectives differ in their appropriateness for various learners.

Further, it seems that any humanly derived set of capabilities supposedly representative of total mastery, in all but the simplest tasks, will never be complete in the true sense of the word. Subtleties in human performance will always exist to make some individuals more

masterful than others. Moreover, these subtleties are often the type that are so difficult to specify objectively yet so clearly constitute the mark of excellence.

In essence, then, the inherently admirable philosophy of mastery learning must be balanced with practical realities to suggest that not everyone will equally achieve the desired objectives. The results of this ultimate confrontation of philosophy and reality should not in any way be considered as a weakness of mastery learning. Rather, it should serve to strengthen the master learning approach by indicating some natural, possibly temporary, limitations.

Reference Note

1. Dunn, T.G. *Using Ordering Technique to Analyze Hierarchical Relationships Among Intellectual Skills and Propositional Logic Tasks.* Paper presented at the meeting of The American Educational Research Association, New York, April, 1977.

References

Block, J.H. Mastery learning in the classroom: An overview of recent research. In J.H. Block (Ed.), *Schools, society and mastery learning.* New York: Holt, Rinehart & Winston, 1974. Pp. 27-69.

Bloom, B.S. *Human characteristics and school learning.* New York: McGraw - Hill, 1976.

Bloom, B.S. An introduction to mastery learning theory. In J.H. Block (Ed.), *Schools, society and mastery learning.* New York: Holt, Rinehart & Winston, 1974. Pp. 4-14.

Carroll, J. A model of school learning. *Teachers College Record,* 1963, *64*, 723-733.

Gagné, R.M., & Briggs, L.J. *Principles of instructional design.* New York: Holt, Rinehart & Winston, 1974.

Kounin, J. *Discipline and group management in classrooms.* New York: Holt, Rinehart & Winston, 1970.

Nash, R.J. & Agne, R.M. Competency in teacher education: A prop for the status quo? *The Journal of Teacher Education,* 1971, *22*, 147-156.

Rosenshine, B., & Furst, N. Research on teacher performance criteria. In B.O. Smith (Ed.), *Research in teacher education: A symposium.* Englewood Cliffs, N.J.: Prentice-Hall, 1971. Pp. 37-55.

Rotter, J.B. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs,* 1966, 80 (1, Whole No. 609).