# HUMAN CHARACTERISTICS AND SCHOOL LEARNING

## Benjamin S. Bloom

"One of this century's major contributions to education."

—*The American School Board Journal*

# HUMAN CHARACTERISTICS AND SCHOOL LEARNING

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## TO MY STUDENTS

They continue to teach me
even after they have graduated

# PREFACE

When I first entered the field of educational research and measurement, the prevailing construct was:

1. *There are good learners and there are poor learners*

This was considered to be a relatively permanent attribute of the individual. It was also the prevailing view that individuals possessed it in different amounts and that a quantitative index of it could be made by the use of an appropriate intelligence, aptitude, or achievement test. Furthermore, it was believed that good learners could learn the more complex and abstract ideas, while poor learners could learn only the simplest and most concrete ideas. School systems throughout the world have been organized on the basis of this construct and selection systems, grading systems, and even the curriculum has been built on the basis of it.

During the early 1960s, some of us became interested in the Carroll Model of School Learning, which was built on the construct:

2. *There are faster learners and there are slower learners*

While we were not entirely clear whether or not rate of learning was a permanent trait of individuals, we dedicated ourselves to finding ways by which the slower learners could be given the extra *time and help* they needed to attain some criterion of achievement. In this research, in both educational laboratories as well as classrooms in different nations, it has become evident that a large proportion of slower learners may learn as well as faster learners. When the slower learners do succeed in attaining the same criterion of achievement as the faster learners, they appear to be able to learn equally complex and abstract ideas, they can apply these ideas to new problems, and they can retain the ideas equally well—in spite of the fact that they learned with more time and help than was given to others. Furthermore, their interests and attitudes toward the school subjects in which they attain the achievement criterion are as positive as those of the faster learners.

During the past decade, my students and I have done research which has led us to the view that:

3. *Most students become very similar with regard to learning ability, rate of learning, and motivation for further learning—when provided with favorable learning conditions*

This research questions the first two constructs, especially about the permanence of good-poor learning ability or fast-slow learning characteristics. However, the research does demonstrate that when students are provided with unfavorable learning conditions, they become even more dissimilar with regard to learning ability, rate of learning, and motivation for further learning. It is this research which underlies the theory of school learning developed in this book. It is this research which we believe has profound consequences for the prevailing views about human nature, human characteristics, and school learning.

However, the basic ideas in this book are not matters of abstract theory or faith. They depend on easily observed evidence readily obtainable in most of the classrooms of the world or in educational research laboratories. It is our hope that teachers will test these ideas with the students in their own classrooms and that educational researchers will test the validity and the limits of these ideas in their own research.

Evidence in support of this third construct has far-reaching implications for teacher training, instruction in the classrooms, the organizations of systems of education at the local and national level, selection methods, grading procedures, and the development of new curricula and instructional systems.

But, even more important are the effects of adequate or inadequate learning on the student's view of himself, his interest in learning, and his use of his learning ability as a means of adapting to change throughout his life.

# ACKNOWLEDGMENTS

During the period of a decade while I was preparing this book, I also participated in the International Studies of Educational Achievement (IEA). The IEA studies involved surveys of the learning taking place in many school subjects in approximately thirty countries of the world. While we were in the midst of gathering data on large numbers of schools, teachers, and students in these many countries, I was attempting to observe and think about the learning of individual students. The IEA research viewed the entire world as a natural educational laboratory. In contrast, my own research was concerned with the smallest educational situation—one student learning something. Some of the IEA findings have, of course, crept into this work, even though the dimensions are so different. I am grateful to my many colleagues throughout the world who have taught me much about the place of education in their countries.

During the last six years I have been privileged to work closely with three of our graduate students at the University of Chicago. James H. Block worked with me in setting out the general themes of the book and helped to find the research literature which spoke to these themes. Much of our interaction began with assumptions stated as, "What if _____?" followed by long hours of discussions about what would follow if such absurd ideas were possible. From these discussions, we proceeded to collect the literature and do observations and small studies to determine whether there was the slightest shred of evidence to support these ideas.

Having set the major themes and focus of the work, Lorin W. Anderson worked with me for two years in tracking down the literature and in conducting much of the reanalysis of selected studies to test the ideas. Lorin spent long hours discussing these ideas with me and even longer time periods reading and rereading my attempts to put these ideas into prose, graphic, and mathematical form. His encouragement and his good-natured patience with the first fumbling attempts at capturing these ideas made it possible for me to write and rewrite particular sections of the book more times than I would care to admit.

During the past two years, Lawrence Dolan served to find the fugitive material needed for particular points and to rework further data from selected studies until they could be used to test some of the ideas in the theory. Larry also helped me to decide when further rewriting was no longer necessary. In many ways, he has helped to set me free from the bondage in which this author has been held by the book.

Other graduate assistants devoted themselves to specific chapters or parts of the theory. Aurora Benasso, Lawrence Hecht, Edward Kifer, Tamar Levin, Rona Ruben, and Jeffrey Smith did much to summarize the literature, and each became something of an authority on a particular part of the book.

During these years, the many versions of each chapter were patiently and painstakingly typed by Evelyn Murphy, Judith LeFevre, Barbara Koelb, and Jean Babiak. Each secretary not only typed and prepared the tables and charts but also pointed out the many sentences which were found to be incomprehensible.

# HUMAN CHARACTERISTICS
# AND SCHOOL LEARNING

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# 1
# INDIVIDUAL DIFFERENCES
# IN LEARNERS
# AND LEARNING

He allowed very great influence to education. "I do not deny,
Sir, but there is some original difference in minds; but it is
nothing in comparison of what is formed by education."
    —BOSWELL'S *Life of Johnson* (FRIDAY, MARCH 15, 1776)

## INTRODUCTION

This is a book about a theory of school learning which attempts to
explain individual differences in school learning as well as to deter-
mine the ways in which such differences may be altered in the interest
of the student, the school, and, ultimately, the society. It attempts to test
the view that most students can learn what the schools have to teach—if
the problem is approached sensitively and systematically.

It is fortunate that schools, teachers, and parents do not postpone
their attempts to teach the young until an acceptable theory of learning
is proclaimed and tested. Learning takes place throughout the world in
the *absence* of an acceptable theory. We suspect that Stephens (1967) is
correct in assuming that *both* teaching and learning are such natural
phenomena that all members of the human species engage in them
without being entirely conscious of the processes they are using. There
is evidence that some major developments of learning in the homes, in
the schools, and in curriculum and instruction demonstrate very high
levels of effectiveness in spite of the absence of a guiding theory.
Perhaps the best that we can expect is that a theory such as this one may
be of help when the process is not going well or "naturally."

The home, especially in the age period of about two to ten, devel-
ops language, the ability to learn from adults, and some of the qualities
of need achievement, work habits, and attention to tasks which are
basic to the work of the schools. While homes vary greatly in their

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development of these characteristics, there are some homes which do a superb job of developing these and related characteristics. The evidence on the effect of these characteristics—largely developed in the home—has been demonstrated in some of the large-scale national and international studies of school learning such as Coleman (1966a), Plowden (1967), Husén (1967), Thorndike (1973), Comber and Keeves (1973), and Purves (1973). All these studies reveal that a large portion of the variation in school achievement, and especially in verbal ability, is accounted for by the differences in the home environments of children in each of the highly developed nations included in these reports.

Something of the processes used in the home is summarized in the longitudinal studies by Bloom (1964), and in the more detailed studies by Dave (1963), Hanson (1972), and Wolf (1966). These studies indicate that what adults *do* in their interactions with children in the home is the major determinant of these characteristics rather than the economic level of the parents, their level of education, or other status characteristics. Much of this research, which has been replicated in a number of countries, has been summarized by Marjoribanks (1974) and Williams (1974). The point of all this is that the home is a powerful environment (for good as well as harm) for the development of some of the basic characteristics of the child that are fundamental to further learning in the schools. Some homes do it well, while other homes do it rather poorly. It is possible that many homes which do it poorly could do much better if the parents were made more aware of the effects of their interactions with their children.

School systems, especially in many of the highly developed nations, have increased the number of years of school made available to the young. In many countries the official school leaving age is sixteen or higher, and there has been an increase in the proportion of youth completing secondary education. Thus, in the United States in 1975 approximately 80 percent of the age group completed secondary education as contrasted with about 8 percent in 1900. In several of the states the proportion of the youth completing secondary education is now over 90 percent. In Japan, the proportion of the age group completing secondary education in 1964 was 57 percent, while in 1975 it is claimed to be over 90 percent. Although these are about the highest figures reported, it is clear that many nations have moved from the view of schools as performing primarily a selection and classification function to the view that the major function of the schools is to help students develop educationally. The schools are increasingly concerned about

the ways in which they can provide for the fullest development of students during the many years they will spend in the schools (White & Duker, 1973). Some schools do a superb job of this, while others have much to learn about ways in which the educational functions of the school can be improved. It is hoped that the theory presented in this book can be of value for those schools concerned about improving this process.

During the past decade-and-a-half there has been much concern about ways in which curriculum and instruction could be improved. In this work at all levels of education from the pre-school to the professional school and graduate levels of education there is evidence that some approaches have been very effective, while others have been no more effective than the ones they replaced. It has become apparent that the amount of money and talent expended on efforts to improve curriculum and instruction is no guarantee of the effectiveness of the new approaches. A summary of some of the more effective approaches in the United States at the pre-school to the grade 12 level has been made by Crawford and others (1972). In general, their findings present evidence that some curricula and instructional strategies result in superior learning for students as contrasted with more conventional approaches. Here again, the theory presented in this book should be of value in explaining why particular approaches are effective and why other approaches are less effective.

Closely related to the work on the development of new approaches to curriculum and instruction is the recent work on mastery learning. This approach makes use of existing curricula but seeks teaching procedures and a set of feedback and corrective techniques to ensure a high level of learning for the majority of students. Using these strategies, many teachers and schools have produced very favorable conditions for learning—long in advance of a theory to explain why the approaches are effective.

## MASTERY LEARNING

The basic idea that most students can learn what the schools have to teach—if the problem is approached sensitively and systematically— is a very old one. It has been central in the tutoring of students for several thousand years. It has been well understood by parents (in many historical periods) who find ways of helping their children when they have difficulty with particular aspects of schoolwork. This idea in

various forms was emphasized by the Jesuit schools before the 17th century, by Comenius in the 17th century, Pestalozzi in the 18th century, and Herbart in the 19th century. Many other proponents could be cited. In the 20th century, Washburne (1922) and his Winnetka Plan and Morrison (1926) at the University of Chicago Laboratory School provided school situations where mastery of particular learning tasks rather than time spent was the central theme.

A modern approach to the notion that most students can learn what the schools have to teach has been developed under the rubric of mastery learning. There are many versions of mastery learning in existence at present. All begin with the notion that most students can attain a high level of learning capability if instruction is approached sensitively and systematically, if students are helped when and where they have learning difficulties, if they are given sufficient time to achieve mastery, and if there is some clear criterion of what constitutes mastery.

My own thinking in this matter was much influenced by John Carroll's Model of School Learning (1963). As I interpreted the Carroll model, it made clear that if students are normally distributed with respect to *aptitude* for some subject and all students are given exactly the *same instruction* (the same in terms of amount and quality of instruction and learning time allowed), then achievement measured at the completion of the subject will be normally distributed. Under such conditions the relationship (correlation) between aptitude measured at the beginning of the instruction and achievement measured at the end of the instruction will be relatively high (typically about +.70). Conversely, if students are normally distributed with respect to aptitude, but the kind and quality of instruction and learning time allowed are made appropriate to the characteristics and needs of *each* learner, the majority of students will achieve mastery of the subject. And, the correlation between aptitude measured at the beginning of instruction and achievement measured at the end of instruction should approach zero.

My students and I worked out various procedures and strategies for achieving mastery in selected school subjects. Basic to this work was the problem of defining what was meant by mastery on an achievement test. One approach to this problem was to use identical or parallel achievement tests in non-mastery and mastery classes and to set the level required for a grade of A in a non-mastery class as the definition of *mastery* for the mastery classes. Also important in this work was the

idea that mastery and non-mastery classes should have much the same original instruction—sometimes even having the same teacher teach in the same way to the mastery and non-mastery classes. This way of viewing the original instruction enabled us to disentangle the effects of mastery learning from the particular characteristics of the teacher and the subject matter. That is, it placed the central focus of the research on the effects of particular strategies of teaching-learning rather than on the characteristics of the teacher or the characteristics of the students.

More central to the mastery learning strategies was the development of feedback and corrective procedures at various stages or parts of the learning process. While a variety of feedback processes are possible—including workbooks, quizzes, homework, etc.—we found that the development of brief diagnostic-progress tests proved to be most useful. Such tests were intended to determine what each student had learned in a particular unit, chapter, or part of the course and what he or she still needed to learn. However, the key to the success of mastery learning strategies largely lies in the extent to which students can be motivated and helped to correct their learning difficulties at the appropriate points in the learning process. Here is where many teachers have been highly creative in both motivating students to do the necessary additional work and in finding the most effective ways of providing correctives. My general appraisal of the work done so far suggests that providing opportunities for small groups of students to help each other has been an effective method of motivating each student to make the correctives and providing the additional time and help he or she needs. Teachers' aides, programmed instruction, audio tapes or cassettes, and other instructional material also appear to work quite well in particular situations. In very few cases has the teacher provided the additional instruction or help needed. In most cases, the corrective work following the diagnostic-progress feedback testing is done *outside* the regular classroom time.

In the many studies reported by Block (1971, 1974) and by Peterson (1972), there is considerable evidence that mastery learning procedures do work well in enabling about four-fifths of students to reach a level of achievement which less than one-fifth attain under non-mastery conditions. The time costs for this are typically of the order of 10 to 20 percent additional time over the classroom scheduled time. The efficiency of the correctives and the additional time needed are direct functions of the quality of the diagnostic-progress feedback testing— the formative tests.

There is little question that mastery learning strategies have been effective in many classroom situations at all levels of learning from the elementary school level through the graduate and professional school levels. It is also clear that there are some situations in which mastery learning approaches do not work well. We have tried to understand something about the situations in which mastery learning works well and the situations in which it works poorly. In large part, this book regards mastery learning as a special case of a more general theory of school learning. Properly used, the theory should be useful in predicting the learning situations and characteristics of students necessary for mastery learning to succeed, as well as the conditions under which mastery learning is likely to produce about the same levels of learning as non-mastery learning situations.

But more important for the present work, we have attempted to do research using mastery learning strategies as research tools to determine the conditions under which most students can learn well and to determine the conditions under which they learn less well. It is this research and our reviews of the literature that have raised serious questions about our present views of individual differences in school learning. After almost a decade of work on mastery learning and research on some of the variables involved in mastery learning, we have come to the conclusion that individual differences in school learning under very favorable conditions of schooling will approach a vanishing point while under the least favorable conditions they will be greatly exaggerated. We must remind the reader that it is education that we are primarily concerned about, rather than individual differences. We are interested in the conditions under which education and the schools are most effective—individual differences in learning and the level of learning are two symptoms of the effectiveness of our educational methods under school conditions.

The research on mastery learning, our research using mastery learning as research tools, and the review of the relevant research literature have been the basis for a series of generalizations about schooling, learning, and human characteristics, which we have attempted to summarize in a theory of school learning. The theory attempts to explain school learning in terms of a small number of variables. It begins with almost no assumptions about human capacity for learning but attempts, on the basis of empirical evidence, to establish the extent to which our present common sense and common observations about students and learning should be questioned.