

LEARNING AND HUMAN ABILITIES:
EDUCATIONAL PSYCHOLOGY



HERBERT J. KLAUSMEIER

**Learning
and
Human
Abilities**

*Educational
Psychology*

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Printed in the United States of America

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Preface

Those who teach must know how to influence learning processes of others. They must also be concerned with the abilities that human beings can demonstrate with good instruction, whatever their present innate and acquired characteristics. Understanding and nurturing the range and variety of emergent abilities of children and youth—nursery through graduate school—is a dramatic challenge facing us today. Increasingly, it is recognized that the greatest opportunity for stimulating learning under desirable conditions is in school settings, mainly classrooms.

My purpose in this book is to set forth a theory of classroom learning and to bring together research findings that deal with efficiency of learning. Recognizing that the effects of maturation and learning and of biological and cultural factors are closely related in achieving learning outcomes efficiently, I have tried to bridge the gap between growth and learning as separate entities through use of the concept of human abilities.

Chapter 1 serves as the introduction in which the nature of human abilities and of teaching-learning processes is treated. Specific attention is given in Chapters 2–5 to describing the main components in an educational setting and their relationship to efficiency of learning. The objectives sought, the types and range in abilities and other characteristics of the students, the types and range of abilities and other characteristics of the teacher, and the interactions among the teacher and students are discussed. The treatment of each of these within a chapter is necessarily concise. The References and Suggestions for Further Readings at the end of these and all other chapters are intended to help the instructor and student locate more information readily. Heavy use was made of six books of readings in the Suggestions for Further Readings; these books are more readily available in libraries than are bound periodicals containing reports of original research.

In Chapters 6–10, outcomes of learning are organized and discussed under three headings: Cognitive, Psychomotor, and Affective. In each chapter the nature of the outcomes and underlying processes are treated first; then the developmental trends in acquiring the outcomes are given; and finally the principles for improving efficiency of learning are identified and explained. The principles in these and other chapters are stated as instructional principles, beginning with a verb form; the teacher or other person who guides the learners in informal or more formal settings is the assumed subject.

Many years of teaching educational psychology led to this form for stating the principles. Students have difficulty in inferring what explanatory principles or laws as stated by Hull, Tolman, Skinner, and other theorists mean for directing their own learning activities or the activities of those they may teach.

Efficiency of achieving the learning outcomes discussed in Chapters 6–10 is in part a function of motivation, type of material, method of learning, and provisions for individual differences. These matters are dealt with in Chapters 11–13. As attempts are being made to utilize technological inventions and other arrangements in teaching–learning processes, psychologists and educators must be concerned with TV instruction, teaching machines, electronic laboratories, instructional teams, and the like. Chapter 14 deals with new settings and contexts for learning.

In Chapter 15 the main purposes and features of evaluation and measurement are first presented and then a number of the notable published tests are described. Tests which have wide applicability in the schools, Grades 1–12, are given major attention; however, several instruments used in research on teacher effectiveness are also discussed. In Chapter 16, informal procedures of evaluation, including teacher-made tests, are considered. Chapter 17 is devoted to the statistical and research terminology frequently encountered in research reports such as those listed in the References at the end of each chapter. Since reference to tests and statistical terminology is made early in Part I, the student will profit from using Chapters 15–17 to familiarize himself with any new material which he encounters.

I have indicated frequently in the book that knowledge about many phenomena connected with learning and human abilities is incomplete. This may be disconcerting for students who want solutions that can be applied immediately to their problems. But the inquiring student will find substantial information about these areas of incomplete knowledge as well as guides to chart his subsequent efforts. I assume that some of the present generation of college students and teachers eventually will contribute new methods and knowledge in this exciting field at a more rapid rate than has the previous generation.

HERBERT J. KLAUSMEIER

November, 1960

Learning and Human Abilities: Educational Psychology

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Part I *Essential Components of Teaching–Learning Situations*

What are your present abilities? What are the abilities of human beings at various age levels? Does man today possess more and higher-level abilities than he did 1000 years ago? 5000 years ago? Do children and youth in the United States learn more now than did the children and youth of 200 years ago? Should or must the next generation learn more than the present one? What do we know about teaching–learning processes in school or other educational settings that might enable us to raise the level of human abilities generally, to add to mankind’s accumulating knowledge and skills, to enable mankind to understand himself and others better and behave accordingly? Questions such as these cannot be answered finally, but they must be raised and given serious attention.

In Chapter 1 an overview of the nature of human abilities and of teaching–learning processes is given. There are several main components in any educational setting which affect what is learned and the efficiency with which it is learned. These components, discussed in Part I, are the goals sought (Chapter 2), the types and range of abilities of learners (Chapter 3), the types and range of abilities and other characteristics of teachers (Chapter 4), and the interactions among the teacher and pupils within the educational setting (Chapter 5). Any theory of learning which intends to serve as a tool for improving human abilities and for facilitating human learning must take into account these four and other less important components of educational settings.

Chapter 1 Human Abilities and Teaching-Learning Processes

The greatest problems facing mankind are raising the level of human abilities and improving interpersonal relationships. More people must learn to understand and control the physical world and manage themselves in it in such fashion that each achieves a reasonable degree of self-realization. In this respect the challenges to psychology and education are far more complex now than they were fifty or even twenty years ago. Man's knowledge of himself, of others, and of the physical world is increasing at a very rapid rate. Man's skill in controlling the physical environment through a variety of inventions and discoveries is also increasing rapidly. Somehow children must more efficiently acquire more of this knowledge and the related skills and attitudes, or with each consecutive generation each individual will be less aware of what is known to mankind. We have the biological characteristics necessary for learning; what we eventually make of these characteristics depends upon the efficiency with which we learn.

The school is the institution in our society organized and supported to promote efficient learning—to assist learners in acquiring and improving the many cognitive and psychomotor abilities which previous generations required thousands of years to generate. How long did it take mankind to develop the alphabet which children now learn to use in the first grade? the number system which many children in the third grade understand and use quite well in solving many immediate problems? printing, combustible engines, atomic power, satellites, vaccines, and antibiotics? Unknown to mankind only a short time ago in his long history, these concepts are now appropriately studied in the elementary grades.

The scope of this introductory chapter is very broad, as is the nature of human abilities and of learning. The intent is to provide a focus for the entire book through a discussion of (1) the nature of human abilities; (2) the processes of learning; (3) maturation and learning; (4) factors affecting efficiency of teaching-learning processes.

THE NATURE OF HUMAN ABILITIES

What is an ability? An ability is the "actual power to perform an act, physical or mental, whether or not [the power is] attained by training and education. . . . Ability implies that the task can be performed *now*, if the necessary external circumstances are present; no further training is needed." Accepting this definition of ability from *A Comprehensive Dictionary of Psychological and Psychoanalytical Terms*,¹ we properly infer that human abilities change with age—the ten-year-old has many abilities which the infant does not. Similarly, a highly intelligent and physically strong ten-year-old demonstrates more or higher-level abilities than does a ten-year-old of low intelligence and low coordination. We also infer that the main task of education is to assist learners to acquire new or higher-level abilities as they progress through school.

What is the relationship between capacity and ability? Tests are designed to measure abilities—what the testee actually performs. On the basis of certain measured abilities, we can infer capacity or what the individual might be able to do some time hence with further maturation and education. In this sense, the items in an IQ test sample present abilities from which future performances or abilities are inferred. To clarify the relationship between capacity and ability, imagine two quart milk bottles side by side. We see that each has the capacity for holding a quart of milk. One bottle is half full, the other entirely. The present ability of the two bottles to provide milk is unequal, although both have the same capacity. This analogy to the capacity and ability of the milk bottles may serve to clarify the terms. But there it stops, for our means of measuring present abilities by which to infer accurately future abilities are much less adequate in the field of human learning than in the physical world of liquid, linear, and other measures.

What is the relationship between abilities and learning? Again accepting one set of descriptions of learning from English and English: "A highly general term for the relatively enduring change, in response to a task-demand, that is induced directly by experience; or the process or processes whereby such change is brought about. Not included under learning are changes due to bodily injury or surgery, disease, fatigue, sensory adaptation. . . . Learning is manifested by performance, and all performance is dependent in part on learning, but the two are not identical."

By definition, all human abilities are learned. Beyond this, the learning of certain abilities makes possible the learning of other abilities. For example, speaking words normally precedes reading words, and reading

¹ By Horace B. English and Ava Champney English, Longmans, Green and Co., 1958. The author has referred to this volume throughout the writing of this book. He hopes, with English and English and their consulting editors, that, increasingly, psychological terms will convey the same meanings to readers of the many books and other writings of psychologists.

normally precedes spelling the words. Further, as pointed out in the introductory paragraphs, many mature individuals demonstrate abilities which mature individuals of a century ago did not.

Let us now get the three key terms—ability, capacity, and learning—in proper relationship with an example. When a healthy infant is born, we properly infer that he has the capacity to learn all the abilities characteristic of the human species which have been transmitted to him through heredity. For example, when sufficiently mature, the infant will smile, crawl, walk upright, run, hop, skip, talk, sing, and so on. Some of these abilities will be acquired with little if any instruction and with relatively little learning. With instruction at home or in school he will acquire other abilities that people without instruction do not—the ability to read, spell, write, count, swim, play a musical instrument, drive an automobile, and many others.

At present, we have identified and classified a number of human abilities, ranging from general to highly specific. A general mental ability, as measured by certain IQ tests, correlates positively and high but far from perfectly with achievements in subject fields such as English, mathematics, science, and social studies. A more specific ability, such as numerical reasoning, correlates much higher with achievements in mathematics than in English. The more we know about the type and level of human abilities, the greater the possibility for teachers and other school personnel to assist students in learning efficiently. We are yet in the early stages of systematically identifying and categorizing abilities in human beings, from infancy to adulthood, but have made more progress in this direction since 1900 than during the previous recorded history of mankind.

Table 1.1 is a schematic arrangement of many possible human abilities and related outcomes of learning under three main headings: cognitive, psychomotor, and affective. The existence of affective abilities is questioned because neither the processes nor the contents are well understood. However, the emotional state and other affective characteristics of the learner vitally affect the efficiency with which the outcomes in the cognitive and psychomotor areas are acquired; and the affective outcomes of learning, e.g., feelings and attitudes toward self and others, are highly significant not only in school settings but in society generally.

Two examples will clarify the relationship between cognitive and psychomotor abilities as applied to areas of school learning. In a child's acquiring facility in reading, the main learnings involve the cognitive processes of perception, discrimination, abstraction, generalization, and remembering; and, at a high level of reading, imagining and creating. However, some of the psychomotor abilities are involved in the child's learning to handle the book properly, to sit properly, and to focus his vision on the printed page in a right-to-left and a top-to-bottom sequence. In learning

TABLE 1.1. Schematic Arrangement of Human Abilities and Related Outcomes of Learning

COGNITIVE DOMAIN		
<i>Abilities—Processes Combined with Contents</i>		
<i>Processes</i>	<i>Contents^a</i>	<i>Outcomes</i>
Perceiving Remembering Discriminating Integrating Abstracting Generalizing Evaluating Imagining Thinking Problem-solving Inventing Creating	Figural—concrete material perceived through senses; actual things that are seen, heard, felt, etc. Symbolic—letters, digits, and other signs, usually organized in general systems such as the alphabet. Semantic—verbal meanings or ideas. Behavioral—?	Facts, concepts, skills, and performances connected with such curriculum areas as language arts, social studies, science, mathematics, foreign language, and others. The same outcomes are closely related to some psychomotor performances.
PSYCHOMOTOR DOMAIN		
<i>Abilities</i>		
<i>Factors or Processes^b</i>	<i>Contents</i>	<i>Outcomes</i>
Strength Speed Impulsion Precision Coordination Flexibility Vocal—circulatory-respiratory endurance, muscular endurance.	Bodily manipulation in such activities as walking, running, dancing, etc. Object manipulation—tools, pencils, typewriter keys, musical instruments, etc. Vocal movements connected with voice productions of all types.	Motor sets and skills connected with such curriculum areas as physical education, handwriting, typing, instrumental music, home economics, agriculture, industrial arts, vocal music, dramatics, speech, etc. Psychomotor outcomes are closely related to some cognitive outcomes.
AFFECTIVE DOMAIN		
<i>Abilities (?)</i>		
<i>Processes—?</i>	<i>Contents—?</i>	<i>Outcomes</i>
		Feelings, attitudes, and values toward self, others, and things; interests and motives; personality integration and character.

^a Based on Guilford, 1959.

^b Based on Guilford, 1958, p. 165.

to play a musical instrument efficiently, strength, speed, impulsion, flexibility, precision, and coordination are involved in perfection of the physical movements. The reading of notes to guide the movements involves the development or use of some of the cognitive abilities as outlined above. Note, however, that once the motor aspects of reading a printed page are habitual, and this comes at an early point in reading, developing higher abilities in reading is primarily cognitive. Once note reading is fairly well mastered, acquiring high efficiency in playing the instrument is largely the result of improvement of psychomotor abilities. Affective characteristics of the individual are associated with learning to read and to play a musical instrument throughout the sequence in learning. We turn now to a further discussion of human abilities as outlined in Table 1.1. Since the reader already possesses many of the abilities, it would be well to test out anything not understood by evaluating it against one's own experiences.

Cognitive Abilities

Cognition refers to the processes whereby an individual obtains knowledge about anything—perceiving, remembering, discriminating, integrating, abstracting, generalizing, evaluating, imagining, thinking, problem-solving, and creating. Remembering is included, for if what is acquired is not remembered, it cannot be ascertained that cognition has occurred.

Cognitive abilities include the content of what is acquired as well as the process. Perceiving, discriminating, and integrating, for example, do not occur in a vacuum; always there is perception of something; discrimination of at least two somethings; and integration of several somethings. Thinking and problem-solving also always occur in some context, and the contents of thinking or problem-solving usually, if not always, involve the use of symbols—words and other signs. Since the terms used to describe the processes may convey a variety of meanings, those uses of the terms which fit the author's intent are now given from English and English. The entry word to which the reader should go to find further information in *A Comprehensive Dictionary of Psychological and Psychoanalytical Terms* is given:

perception: 4. a sensation, together with a context of other experiences that give it meaning.

remember: to reinstate some part, or all, of a previous experience so that it may function in present behavior. . . .

discrimination: 1. the process of detecting differences in objects.

integration: the process . . . of bringing together and unifying parts in a whole. . . . It is a stronger term than association, coordination, or organization.

abstract: 1. to consider a quality apart from the object, or apart from other qualities with which it is actually found; to separate, mentally or in words, a quality or aspect of a thing from its concomitants.

generalization: The process whereby one reaches a judgment applicable to a whole class, often on the basis of experience with a limited number of the class. . . . The process is not necessarily a jump to a final conclusion: there is often a sort of preliminary generalization which is extended (or restricted) as further facts are perceived. . . .

evaluation: [the process of] determining the relative importance of something in terms of a standard.

imagine: to respond to the properties of an object or event not present to the senses. . . .

thinking: 3. meditating or reflecting upon a problem in order to understand the relationships involved.

problem-solving: the process of selecting from a number of alternatives those that lead to a desired goal. [Most of the previously mentioned processes are involved in knowing what the alternatives are.]

creativity: ability to find new solutions to a problem or new modes of artistic expression; bringing into existence a product new to the individual (not necessarily new to others).

Guilford (1959) described five intellectual operations or processes—cognition, memory, divergent thinking, convergent thinking, and evaluation. Guilford did not classify memory, thinking, and evaluation as cognitive processes but as intellectual processes. He did not include perception; however, he defined cognition as meaning “discovery or rediscovery or recognition.” Other psychologists believe that perception is essential to cognition, as proposed in the definition by Guilford; and in learning to read well, for example, there must also be discrimination, abstraction, integration, and generalization. Further, memory, thinking, and evaluation can also be classed as cognitive processes inasmuch as they cannot occur without previous perceptions or cognitions.

The contents which combine with these processes are figural, symbolic, semantic, and behavioral:

Figural content is concrete material such as is perceived through the senses. It does not represent anything except itself. Visual material has properties such as of size, form, location, or texture. Things we hear or feel provide other examples of figural material. Symbolic content is composed of letters, digits, and other conventional signs usually organized in general systems, such as the alphabet or the number system. Semantic content is in the form of verbal meanings or ideas, for which no examples are necessary. . . . [The behavioral content] has been added on a purely theoretical basis to represent the general area sometimes called “social intelligence” [Guilford, 1959, pp. 470, 471].

Returning again to Table 1.1, we see that the processes, combined with contents, are the abilities and that there may be many such abilities. It should be noted in connection with the schema proposed in Table 1.1 that thinking cannot occur in the absence of the processes preceding it, nor can problem-solving be accomplished without thinking. Creating always involves problem-solving and thinking, but the focus here is on the production