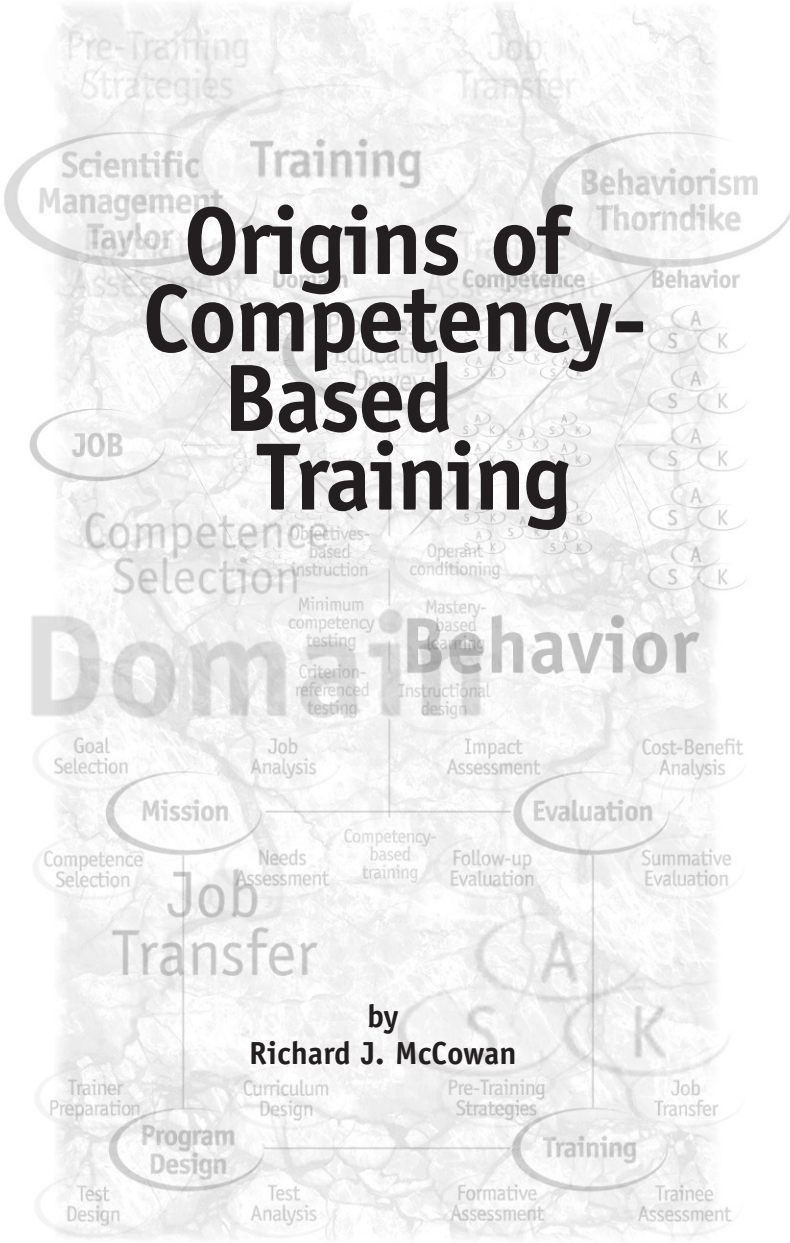
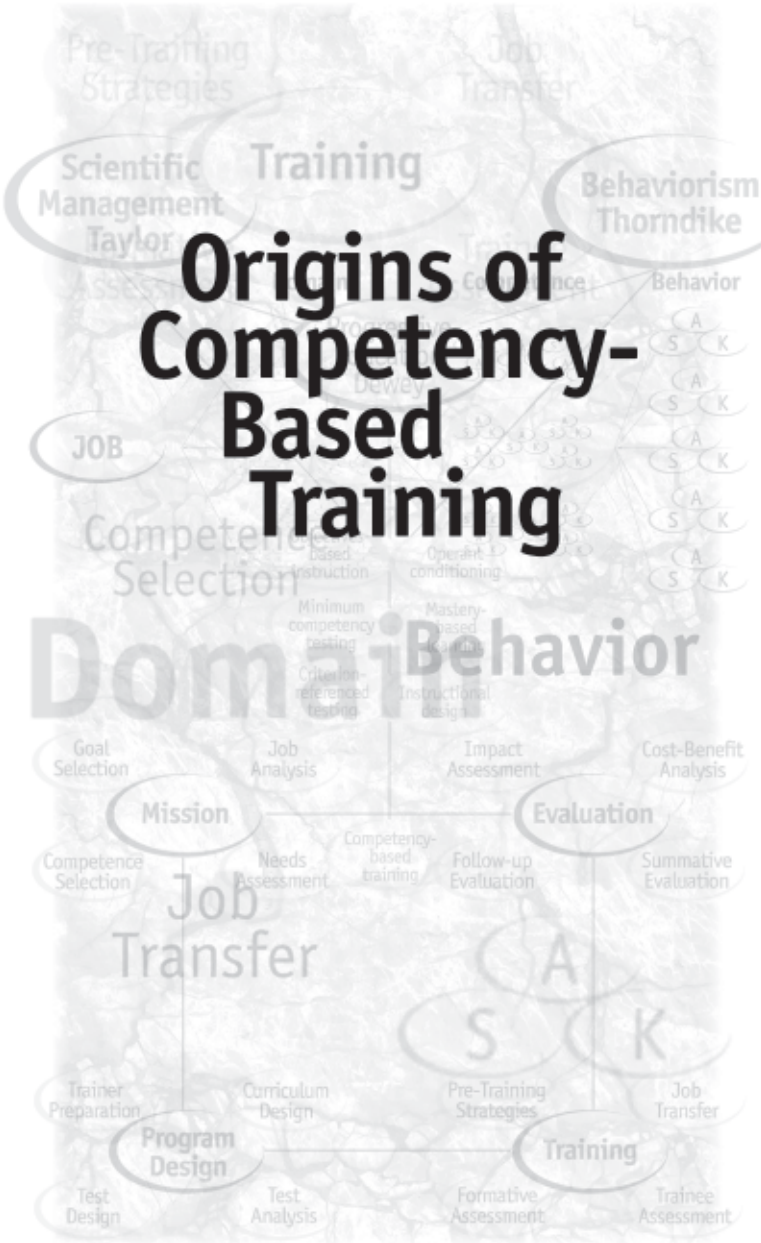



# Origins of Competency-Based Training

by

**Richard J. McCowan**




# Origins of Competency-Based Training


*Center for Development*
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# Introduction

Competency-based training (CBT) is a popular curriculum development model in social services training. Unlike social work practice, CBT flows from a behavioral and not a humanistic foundation. When used in a proper context, CBT is a highly effective training approach, particularly when the curriculum can be specified and sequenced. Technical programs, such as computer applications, or required training for novice workers, are appropriate for CBT. Conversely, CBT is far less effective with experienced people or with content that is less specific, is difficult to sequence, and which builds on expertise. Practitioners who promote and use CBT should understand the strengths and limitations of the approach, as well as the technical values and philosophy on which the model is based, because it imposes rigid constraints on how training is developed and delivered.

CBT originated in the mid-1960s when concern about inadequate teacher training programs and poor student achievement prompted state departments of education to promote competency-based teacher education (CBTE) (McKenna, 1992). Prior to this time, the term "competency-based" was not widely used and did not appear in the *Encyclopedia of Educational Research* until the 1969 edition.

The Education Professions Development Act of 1970 promoted the development of CBTE. We cannot determine how well CBTE programs were implemented. In all probability, few faculty members offered the programs as designed. In New York State, for example, the State Education Department mandated that colleges and universities register all teacher certification programs in competency-based (CB) format. However, after programs were approved, no one monitored whether or not institutions (or individual faculty members) actually followed the registered programs. Since faculty have great autonomy in regard to how and what they teach, it seems unlikely that many professors conformed to the precisely stated instructional objectives listed in registered programs.

When EPDA funding ended in 1977, only 11 states claimed that they used CBTE to license teachers (Villeme, 1977). The survey did not reveal whether programs were effective or if they actually incorporated essential elements of CBTE. Since statewide programs conducted on multiple campuses by many different faculty members cannot be carefully monitored, much of this training was probably competency-based in name only. CBTE was an ephemeral innovation with a life span of about 10 years. As an illustration, the *Handbook of Research on Curriculum* (Jackson, 1992*)* included no citations of "competency" or "competency-based."

In the 1980s, as interest in CBTE diminished among teacher educators, it increased among social work educators who developed CB programs at the undergraduate level (Arkava and Brennen, 1976; Clark and Arkava, 1979) and for professional inservice training using funds provided by Titles IV-E and XX of the *Social Security Act*. However, social services faculty and trainers had far less formal training in curriculum development and evaluation. Consequently, the new programs, while based on specific objectives, lacked adequate assessment procedures to test trainee achievement. After reviewing CBT curriculums for major social services training programs, McCowan and Wegenast (1995) concluded that only one was competency-based because the remaining programs did not evaluate trainee performance. These programs, which are based on lists of specific objectives, are best described as objectives-based instruction.

Why were these programs, several of which are popular and well regarded, so badly mislabeled? The answer involves several factors. People are readily seduced by, and naively misuse, catchy phrases. Trainers might inaccurately call a program "competency-based" without realizing that it lacks essential components required for CBT. Those who make this mistake will claim inaccurately that they are conducting competency-based training, never realizing that their training and personal values differ diametrically from those on which CBT is based. In addition, professional trainers, who are practitioners and not academics, tend to be atheoretical and are probably unfamiliar with the theories on which CBT is based.

Managers are also careless when they label training programs, but their position is understandable. In a society concerned with efficiency and accountability, CBT is attractive because it sounds effective and economical. Consequently, managers simply claim that they have initiated innovative competency-based training without concerning themselves about the details.

# Origins

This paper clarifies this confusion by describing the historical and theoretical origins of CBT. This discussion is important because the values derived from these origins affect training content and practice. Organizations unaware of these origins may "adopt" a curriculum system without realizing that curriculum paradigms are based on philosophical orientations with implicit value structures.

To use a cliché, social work promotes a kinder, gentler society that promotes self-actualization. Conversely, with its roots in behaviorism and scientific management, CBT emphasizes job tasks and performance expectations. Depending on program goals, both positions are reasonable and effective, but managers should recognize that training outcomes will vary dramatically based on these differing orientations.

The origins of any educational movement are difficult to describe because theoretical concepts seldom have a direct, straight-line influence on related theories. Instead, they overlap, draw from each other, and change — sometimes in reasonably clear patterns, but often in erratic, unpredictable ways.

The social and political climate in a nation exerts a significant influence on curriculum. In 1960, after the election of John F. Kennedy, Robert S. McNamara left the presidency of Ford Motor Company to serve as Secretary of Defense for Kennedy and, later, Lynden B. Johnson. McNamara led Kennedy's "whiz kids," a group of analytical experts from universities and research institutes. McNamara used his computer-like mind and Harvard Business School management methods to implement PPBT (Program Planning and Budgeting Technique) and planning by objectives in the Department of Defense.

After Kennedy's assassination, Johnson's Great Society legislation included passage of the Elementary and Secondary Education Act of 1965. Senator Robert Kennedy, who was concerned that the funds would not be used with the targeted population of disadvantaged children, demanded that an evaluation amendment be attached to

the bill. The national stage was for aggressive implementation of efficient, effective, cost-conscious programs such as competency-based education and training.

The needs and problems of the times, politically feasible solutions, and available expertise shape social services policies. In a society concerned with efficiency, effectiveness, and accountability, competency-based training (CBT) has a compelling logic and presents an attractive option for training programs. When policy makers are concerned about cost-benefit effects of training, it is reasonable for them to assume that structured, focused instruction will improve learning and reduce program and training costs. Given these conditions, it is not surprising that CBT is widely used for training in social services agencies.

If advocates who promote different philosophies of curriculum clarify the values on which their orientations are based, they will have a common basis for discourse and a means to compare competing training models empirically. While this dialogue would improve training practices, it seldom occurs.

# Curriculum theory

The literature is replete with definitions of curriculum ranging from "a regular course of study or training as at a school or university" (*Oxford English Dictionary)* to "all of the experiences planned and unplanned, that occur under the auspices of the school" (Bobbitt, 1918, p. 8). Gress and Purpel (1978) observed that "one can find at least as many definitions of curriculum as one can find curriculum textbooks" (p. 1). At the risk of adding to the confusion, the following definition, which is used in this paper, is more comprehensive in scope and refers to a "curriculum model."

> *A curriculum model is a set of procedures based on a clear value orientation that is used to develop and deliver a complete instructional package for a specific group of trainees.*

The significance of describing the underlying value orientation of a curriculum becomes more apparent by considering McNeil's (1977) taxonomy in which he classified curriculum theories into four major categories including humanistic, social, technological, and academic.

> *Humanistic* theorists are primarily concerned with helping people achieve self-actualization. They think that education should provide students with a personally satisfying educational experience that results in a liberating process. It should not be confused with the study of humanities, an integrated study of related topics across areas such as art, history, and literature, which is an *academic* discipline.
>
> *Social* theorists stress societal needs over individual needs. They focus on providing a better future for people by creating a more egalitarian society. They achieve this goal through efforts such as public ownership of industry and an equitable sharing of income.

*Academic* theorists employ an approach that is primarily associated with universities. They develop curriculum from a traditional orientation that includes formal, academic disciplines and organized fields of study.

*Technology* theorists use structured, rational procedures to achieve goals demanded by policymakers. They directly influence curriculum goals and content to achieve these goals and make extensive use of modern technology.

CBT clearly falls into the technological category because it is characterized by an orientation that is technical, efficient, rational, and objective. It is an amalgamation from leading learning theorists and includes elements of programmed instruction, specific behavioral objectives, hierarchical methods of knowledge acquisition, and social learning techniques (Magnusson & Osborne, 1990). Ironically, this deterministic value orientation seems antithetical to the underlying philosophies of humanism and individual self-actualization on which social work is based. This paper does not judge the comparative advantages or disadvantages of any of these curriculum orientations because each approach has unique benefits, depending upon the goals on which training is based. However, managers should recognize the underlying philosophy on which training is based because this philosophy directly affects program outcomes.

# Taxonomy of theories

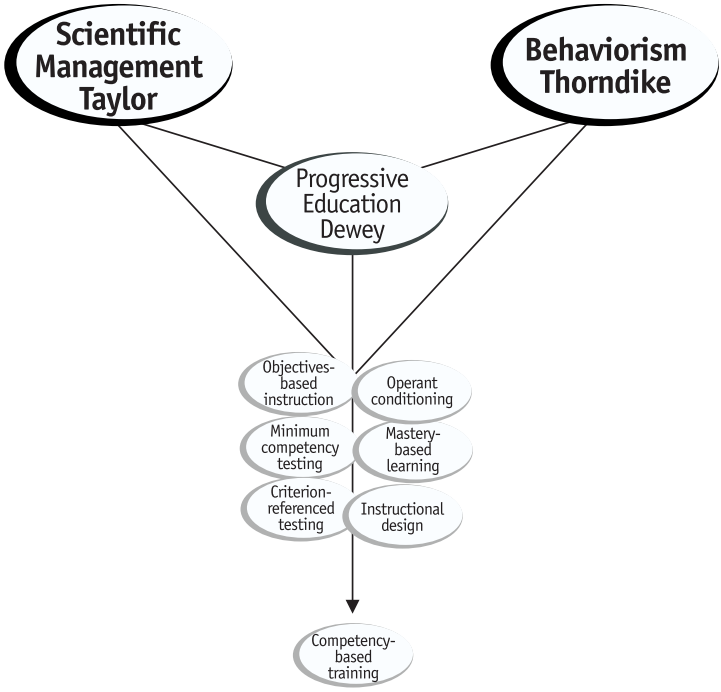
Evolutionists use cladograms to infer evolutionary relationships and arrange species in a branching hierarchy that includes all members of a species with the same ancestors. Cladistics is a taxonomy that uses systematic patterns to infer evolutionary processes. It defines a species by unique, shared characteristics not found in ancestral groups. However, while these patterns influence theory development, it is not always easy to distinguish one from another. (Grande & Rieppel, 1994).

Curriculum theorists, who work in less precise areas than evolutionists, often develop flowcharts that present precise models to display the origins of the new theories. These models clarify complex abstractions, but they are deceptive because the origins of theories are seldom simple, easily defined concepts. Despite the distortion, this article presents a flowchart in the form of a cladogram to clarify the theories that contributed to competency-based training.

This paper describes three theories — behaviorism, scientific management, and progressive education — that were developed respectively by Edward L. Thorndike, Frederick W. Taylor, and John Dewey early in the 20th century. It also discusses six related theories developed in the late 1950s and early 1960s — operant conditioning, minimum competency testing, instructional design, objectives-based instruction, mastery-based learning, and criterion-referenced testing.

Academics who develop models often assume that ideas develop in neat, linear patterns that can be calculated, graphed, and placed neatly into flowcharts. However, the history of ideas is seldom neat and tidy. Instead, it is a complex interaction of social and economic factors often difficult to categorize and explain. Theories do not begin or end abruptly. They evolve as individual streams of thought that blend into a coherent entity similar to that which occurs when jazz musicians create a single melody composed of personal improvisations that arose from the group while still retaining a unique identity. The theoretical factors that contributed to CBT are shown in Figure 1.

Figure 1
**Origins of Competency-based Training**




At the turn of the century, scientific management and behaviorism had a profound effect on the entire fabric of American society. The influence of progressive education, while significant, was more limited because it focused on education, particularly at the elementary level. However, the six derivative theories (i.e., operant conditioning, minimum competency testing, instructional design, objectives-based instruction, mastery-based learning, and criterion-referenced testing) were influenced by scientific management and behaviorism, but they relate more directly to progressive education. In turn, competency-based education drew heavily and directly from these six theories.

This paper describes the contributions of these theories to competency-based instruction, including the implications of competency-based training for the social services profession.

# Major Theories

In the early 1900s two people, Edward L. Thorndike and Frederick W. Taylor, developed theories that significantly changed American society and, in turn, provided a theoretical foundation for CBT. Thorndike's behaviorism provided a psychological base for the social-efficiency movement in psychology and education, while Taylor provided the methodological structure for scientific management in business and industry (Pinar, Reynolds, Slattery, & Taubman, 1995).

## Behaviorism

At the turn of the century, Edward L. Thorndike dominated the field of learning theory and behaviorism because he straddled the fields of psychology and education. In *Animal Intelligence (*1898) he described his basic learning concepts and applied his theory of connectionism to human beings in *The Psychology of Learning* (1913). He and other behaviorists, such as Clark Hull, Neil Miller, and Albert Bandura, left an indelible mark on education and training.

Thorndike and Dewey were both on the faculty at Columbia University in the early 1900s. He thought that learning was based on trial and error associations strengthened or weakened through use or disuse and by the nature and frequency of pairings. This empiricist model assumes that organisms learn through associations strengthened and weakened by activity and experience. A learner was a passive entity who merely responded to environmental stimuli. He described the human mind as a machine with hundreds of thousands of individual connections, each containing a message with no necessary relationship with other messages (Kliebard, 1986). Unobservable internal states of mind had no effect on learning. Thorndike believed that behaviorism would modify and improve human behavior and help people achieve their fundamental aspirations (Rippa, 1988).

Thorndike's classic example of connectionism was a cat that learned to escape from a "puzzle box." After many trial and error behaviors, the cat learned that pressing the lever would open the door resulting in the satisfaction of escaping from a box. The connection was established because the pairing occurred many times (law of effect), was rewarded (law of effect), and formed a single sequence (law of readiness).

Thorndike provided a rationale for the quantitative aspect of CBT in noting:

> Whatever exists at all exists in some amount. To know it thoroughly involves knowing its quantity, as well as its quality. Education is concerned with changes in human beings; a change is a difference between two conditions, each of these conditions is known to us only by a the products produced by it — things made, words spoken, acts performed, and the like. To measure any of these products means to define its amount in some way so that competent persons will know how large it is, better than they would without measurement (Thorndike, 1918, p. 16)

Thorndike established a foundation for CBT primarily in the areas of quantification, individual measurement, and assessment of outcomes. His concept that learning involved the strengthening of trial and error associations was a precursor of objectives-based instruction movement. As a contemporary of John Dewey at Columbia University, he contributed to the scientific movement in Progressive Education. He also provided a psychological rational for the social-efficiency movement.

## Scientific management

Frederick Winslow Taylor (1856-1915), the father of scientific management, based his credo of rational efficiency on time-motion and cost-benefit studies. He thought that job tasks could be analyzed and workers trained to perform more productively. His efforts continue to exert a major influence on American society. Taylor's thinking permeates modern life and has "burned its way into the modern mind" (Kanigel, 1997, p. 10). Taylor provided the structure for scientific management in the workplace (Pinar, Reynolds, Slattery, & Taubman, 1995, p. 95).

> Taylor bequeathed a clockwork world of tasks timed to the hundredth of a minute, of standardized factories, machines, women, and men. He helped instill in us the fierce, unholy obsession with time order, productivity, and efficiency that marks our age. Foreign visitors to America often remark on the rushed, breathless quality of our lives. Taylor — whose life, from 1856 to 1915, almost exactly coincided with the Industrial Revolution at its height — helped make us that way (Kanigel, 1997, p. 7).

Taylor (1912) used scientific methods to analyze the way jobs were performed. For example, when he established the best way to shovel materials at Bethlehem Steel, he counted the number of shovel loads handled by each man during the day, weighed the total tonnage of material handled, and divided this weight by the number of shovel loads. His first experiment showed that the average shovel load was 38 pounds and the average daily tonnage about 25. Then, he cut the shovel off, making it shorter to handle a load of 34 pounds, and the average daily tonnage increased to 30. Each time the shovel was cut, average tonnage increased until the ideal shovel load of 211/2 pounds was established.

Productivity (and earnings) increased. When Taylor began his work, men loaded an average of 12 1/2 tons (106,400 pounds) per day or approximately 30 iron pigs per hour. Under his new schedule, workers would load 47 1/2 tons (106,400 pounds) or 115 pigs per hour. Daily pay for workers was increased 60 percent from $1.15 to $1.85. Taylor imposed his new system by persuading one man, fictitiously called Schmidt, who was "a little Pennsylvania Dutchman who had been observed to trot back home for a mile or so after his work in the evening about as fresh as he was . . . in the morning" (Taylor, 1911, p. 42).

> Industrialists, managers, and engineers were enthusiastic about Taylor's research. However, workers, labor leaders, and humanitarians were appalled. A Congressional hearing was held during which Taylor was forced to defend his position, often under criticism, and today, even though his principles are firmly entrenched in American society, many people have negative feelings about efficiency experts, time cards, and stop watches.

Taylor (1911) coined the phrase "task analysis," which became the basis for CBT programs. He stipulated that managers should gather knowledge of the entire production process that in the past had been possessed by skilled workers, after which they should classify, tabulate, and reduce this information to rules, laws and detailed procedures. This detailed specification of the task to be performed was essential to scientific management. Taylor insisted that managers provide workers with detailed instructions on how jobs should be performed. The manner in which Taylor analyzed a job is strikingly similar to that used in job analysis in competency-based social services training.

> This was done by timing with a stop watch a first-class man while he was working fast. The best way to do this, in fact almost the only way in which the timing can be done with certainty, is to divide the man's work into its elements and time each element separately. For example, in the case of a man

> loading pig-iron on to a car, the elements should be: (a) picking up the pig from the ground or pile (time in hundredths of a minute); (b) walking with it on a level (time per foot walked); (c) walking with it up an incline to car (time per foot walked); (d) throwing the pig [p. 48] down (time in hundredths of a minute); or laying it on a pile (time in hundredths of a minute); (e) walking back empty to get a load (time per foot walked) (Taylor, 1903, pp. 49-50).

Taylor claimed that task analysis was the most important element of scientific management. He maintained that managers should provide workers with complete, sequenced instructions regarding the details of the task to be performed, including production goals and the procedures used to achieve those goals.

Taylor's contribution to CBT was extensive. He originated the practice of task analysis and promoted the notion of clear job descriptions. He also quantified performance standards and the evaluation of workers based on job-related competencies related to measurable program outcomes.

## Progressive Education

In the late 19th century, excesses of American individualism troubled intellectuals such as John Dewey and his friend Jane Addams. They held that excessively rigid schools, which had not kept pace with rapid social change, stifled authentic individual growth. This dissatisfaction led to the establishment of several experimental schools, the most prominent of which was Dewey's University of Chicago Laboratory School founded in 1896.

Dewey said that the purpose of the school was

> . . . to discover in administration, selection of subject-matter, methods of learning, teaching, and discipline, how a school could become a cooperative community while developing in individuals their own capacities and satisfying their own needs (Mayhew & Edwards, 1936, pp. xv-xvi).

Dewey's Progressive Education has been described as a form of pragmatism, although he favored the term "instrumentalism" or experimentalism." Dewey believed in the democratic worth of the individual and wanted education to evoke latent possibilities from within the child, rather than prescribing an external structure. His political imperative was to develop a society that provided conditions for growth and self-realization through participation in community life. (Westbooke, 1991).

In *School and Society* (1899), *The Child and the Curriculum* (1902), and *Democracy and Education* (1916), Dewey developed a philosophy that continues to influence education. He felt that society should begin with the interests of the child with the classroom functioning as a miniature society. He maintained that education is life, not merely a preparation for life. His major objective was educating the "whole child" by attending to physical and emotional, as well as intellectual, growth. The influence of progressive education advanced slowly during the first decades of the 20th century, but spread more rapidly during the 1920s.

As a philosopher, Dewey thought that experimental scientific methods would solve social and ethical problems. He felt that democracy provided the opportunity for maximum experimentation and personal growth. His ideal society continually enlarged the experience of its citizens. In formulating educational aims, Dewey drew heavily on learning theories developed by contemporary psychologists.

In *School and Society* (1899) and *The Child and the Curriculum* (1902) Dewey developed an educational philosophy that began with the interests and experiences of the child. The teacher was a guide and mentor rather than a taskmaster with fixed lessons and recitations. Dewey was not the child-centered romantic that critics made him out to be. He never thought that children had inborn wisdom, but that they needed talented teachers to stimulate them to use innate interest to solve problems. Dewey's experimentalism pursued the highest or "consummatory" experiences of religion, art and everyday life (Ryan, 1997).

Dewey exerted a strong influence on educational in the United States. Progressive educators stressed student-centered, rather than subject-centered instruction, activities rather than formal learning, and laboratory, workshop, or vocational education rather than traditional subjects.

During the last 20 years of his life, Dewey was subjected to numerous attacks. Progressive education was blamed for the neglect of basic subjects and inadequate discipline. Dewey's convictions never wavered, but when he realized that some of his many disciples were neglecting organized subject matter, he sharply criticized them in *Experience and Education* (1938).

In 1912, articles in the *Saturday Evening Post* (Mearns, 1912) and the *Ladies Home Journal* (Warren, 1912) bitterly criticized the schools because of high costs, outmoded curriculums, and inefficient business management practices. School administrators who were anxious to counter these charges quickly applied (and often misapplied) the concepts of scientific management in the public schools.

Progressive education was an amorphous, diffuse movement with prominent advocates from diametrically different camps. While Dewey's philosophy was liberal and democratic based on a belief that in the self-actualizing potential of people, some prominent progressive educators (Bobbitt, 1918; 1924) emphasized conservative, utilitarian values that focused on the quantitative, cost-benefit aspects of education (Callahan, 1962). Tyler's Eight Year study with its focus on unique behavioral objectives originated with the liberal wing of the movement, but many concepts incorporated into the six derivative theories (operant conditioning, minimum competency testing, instructional design, objectives-based instruction, mastery-based learning, and criterion-referenced testing) were primarily influenced by the conservative wing of the movement.

As noted earlier, in the late 1950s and early 1960s, the six derivative theories established the conceptual framework for CBT. This paper describes how these theories contributed to CBT and discusses the implications of CBT for the social services profession.

# Derivative Theories

## Operant conditioning

Skinner maintained that learning is a change in behavior brought about by experience through SR (stimulus-response) connections. He assumed that the mind is an inaccessible "black box" that can only be understood by observing overt behavior. Based on this perspective, he studied the feedback loop that connects overt behavior to stimuli that activate the senses. Skinner (1961) maintained that inner entities did not "cause" behavior and that these entities were not expressed by individual behavior because the ultimate cause of behavior was external to the organism. He felt, therefore, that behavior could be predicted, controlled, and modified according to specifications without answering the explanatory questions posed by philosophers about the inner man.

Skinner exerted a powerful influence on American society.

> The consequences of Skinner's initial modest and seemingly trivial experiment have been staggering. Ever since 1930, and at a positively accelerated rate the end of which is not yet in sight, hundreds of rats and pigeons, as well as mice, turtles, chimpanzees, fish, cats, dogs, college students, mentally defective persons, psychotic patients and naval trainees, have been pushing doors, pressing levers, nosing plastic disks, and pulling all sorts of switches, unwittingly producing cumulative records (Verhave, 1959; reprinted in Ulrich, Stachnik, and Mabry, 1966, 33).

Skinner's concept of operant conditioning proposed that learning occurred directly between the reinforcement and the response. He influenced the design of CBT curriculum by carefully sequencing instructional material and presenting material in small steps. By sequencing events in "frames" with self-pacing and by giving positive feedback at each stage of learning, the desired behavior was imprinted on the learner (Skinner, 1958).

CBT directly incorporated Skinner's techniques of using a sequenced hierarchy of objectives and frequent testing and feedback to assess learner performance. These procedures are critical for CBT.

## Objectives-based Instruction

Interest in objectives-based outcomes existed early in social services. In his 1931 presidential address to the National Conference of Social Work, Dr. Richard Cabot said:

> I appeal to you . . . measure, evaluate, estimate, appraise your results, in some form, in any terms that rest on something beyond faith, assertion, and "illustrative case." State your objectives and how far you have reached them. Let time enough elapse so that there may be some reasonable hope of permanence in the results which you state (p. 5).

The implementation of objectives-based training programs in academic and professional settings developed more slowly. John Franklin Bobbitt (1918; 1924), a devotee of using business techniques in schools and a preeminent force in curriculum reform, stimulated the use of activity analysis to develop objectives, setting the stage for subsequent objectives-based instruction.

In 1932, the Progressive Education Association formed a commission to improve the coordination of secondary school and college work and "to seek an agreement which would provide freedom for secondary schools to attempt fundamental reconstruction" (Aiken, 1942, p. 2). Between 1934 and 1942, Ralph W. Tyler led the team of measurement experts to conduct the famous Eight Year Study. Thirty secondary schools participated, and 300 college agreed to waive their formal admissions requirements for recommended graduates. He compared 1,475 graduates from these schools with students of similar backgrounds and ability. He established specific performance objectives and evaluated the extent to which the students achieved these objectives. Students from the experimental program did as well or better than the control group students, but the major implication was the use of specific behavioral objectives to assess program effectiveness.

Tyler (1950) said, "the process of evaluation is essentially the process of determining to what extent the educational objectives are actually being realized by the program and instruction" (p. 69). His approach focused on assessing behavioral objectives and included six steps: formulating objectives, classifying objectives, refining objectives, identifying situations for assessing objectives, selecting ways to assess objectives, and interpreting results (Madaus & Kellaghan, 1992).

In the early 1960s, efforts to develop objectives-based programs increased dramatically.

> With the growing demands for government accountability in society at large came increased demands for curricularists to pre-specify what they planned to achieve, to directly strive to obtain it, and to prove that they did. Hence, behavioral objectives arrived on the scene (Schubert, 1980, p. 176).

Three factors provided a major stimulus for the behavioral objectives movement.

Benjamin Bloom and his associates published the *Taxonomy of Educational Objectives*, a major reference for subsequent curriculum design efforts (Bloom, Englehart, Furst, Hill, and Krathwohl, 1956).

Robert Mager (1962) published *Preparing Instructional Objectives* which was widely accepted by educators as a primer on how to write instructional objectives. As Mager (1962) noted:

> When clearly defined goals are lacking, it is impossible to evaluate a course of program efficiently, and there is no sound basis for selecting appropriate materials, content, or instructional methods (Mager, 1962, p. 3).

The US Congress in 1965 provided substantial federal support to local districts on the condition that they complete an annual evaluation of programs funded through the Elementary and Secondary Education Act (ESEA).

Objectives-based instruction exerted a major influence on American education and CBT, primarily in the use of measurable behavioral objectives sequenced in a logical hierarchy to structure curriculum development and develop tests based on these objectives.

## Minimum competency testing

Progressive educators promoted the first wave of minimum competence testing (MCT) as an effort to reform the public schools. The business culture that fostered these efforts emphasized efficiency. They wanted to centralize school administration, control costs, and set standards to compare schools (Resnick, 1980). Educational reformers also used tests to determine if children, particularly immigrants, should be retained or promoted to a higher grade level.

In the mid-1960s, however, the emphasis in social policy shifted to more liberal, humanistic values. This change was most striking (and most easily implemented) in education. Reformers were relatively unconcerned about monitoring the performance of children. Instead, they focused on how well the schools performed in preparing their students. They assumed that hostile, indifferent schools caused the low performance of disadvantaged children and felt that improvement would result if performance data were made public. Parent involvement with the schools increased, and some cities established community-based schools controlled by board members from the community (e.g., IS 201 in Manhattan; BUILD Academy, Buffalo, NY).

This concern was incorporated into Lynden Johnson's Great Society programs, most notably Head Start and Title I of the elementary and Secondary Education Act. In the late 1960s interest in program evaluation surged. The Westinghouse-Ohio Head Start evaluation, the Follow Through evaluation, and the Head Start Planned Variation experiment are several examples. These studies used student scores on standardized tests of achievement or ability as outcome measures, which reinforced the use of test data to measure program impact (Cohen & Haney, 1980). Despite the goal of establishing equity for disadvantaged children, testing programs that

include intelligence and minimum competency tests may inadvertently perpetuate inequalities (Madaus, 1994). In California (Diana v. California State Board of Education 1970), the plaintiffs challenged the use of IQ tests to place children in special education classes because of linguistic bias. They showed that Mexican-Americans gained 15 points on IQ tests when they were allowed to respond in Spanish. The consent decree allowed non-Anglo children to choose the language in which they were tested, banned the use of verbal test sections, and required state psychologists to develop an IQ test appropriate for Mexican-Americans and other non-English-speaking students.

In 1983, the release of *A Nation at Risk: The Imperative for Education Reform* by the National Commission on Excellence in Education triggered a push to upgrade the quality of American schools by establishing performance standards (Markham, 1993).

The major focus of MCT shifted back to individuals as states required students to pass competency tests before they were allowed to graduate or move to a higher grade. Teachers were required to demonstrate a minimal level of achievement on standardized tests such as the *National Teacher Examination*. The question of bias also became an issue with testing of teachers. For example, the National Education Association, the South Carolina Education Association, and the U.S. Justice Department challenged the use of the *National Teacher Examination* for certifying teachers. They claimed that the test was biased against minorities because many more African-American than white applicants failed the test. The court decided that the NTE was valid for this purpose because scores reflected presence or absence of knowledge, there was no intent to discriminate, and an ETS validity study showed compliance with Title VII of the 1964 Civil Rights Act (Legal issues in testing, 1985).

In the public school sector, interest in MCT has grown stronger in the last decade. This renewed interest, as well as the theory on which MCT is based, have exerted a significant influence on CBT. The major concepts include assessment of performance standards evaluation based on posttest performance of trainees and remedial training for persons who do not meet pre-established standards.

## Instructional Design

Gagné (1965; 1968) was one of several cognitive psychologists who had major influence on instruction. Based on his research on military training during World War I Gagné developed a system of instructional design that supplemented traditional learning principles with research on learning and test design. He influenced curriculum design by analyzing learning tasks into discriminations, classifications, and response sequences based on prerequisites for learning a more complex task. He maintained:

> The basic principles of design consist of: (a) identifying the component tasks of a final performance; (b) insuring that each of these component tasks is fully achieved; and (c) arranging the total learning situation in a sequence which will insure optimal mediational effects from one component to another (Gagné, 1962b, p. 88).

Gagné stressed that the principles of instructional design differed from learning principles in the following ways:

> Concerned with such things as *task analysis, intratask transfer, component task achievement,* and *sequencing* . . . These principles are not set in opposition to the traditional principles of learning, such as reinforcement, differentiation of task elements, familiarity, and so on, and do not deny their relevance, only their *relative importance*. They are, however, in complete opposition to the previously mentioned assumptions [that] "the best way to learn a task is to practice the task" (Gagné, 1962b, p. 88, emphasis in original).

Gagné's model expanded on concepts derived from Thorndike and Skinner by adding task analysis of the desired performance, hierarchical sequencing of subordinate knowledge and skills, and assessment of training performance on related training outcomes (Gagné, 1962a; 1965; 1968). He noted that "Analysis of a topic begins with the statement of the terminal objective—the perfor-

mance or performances one expects the student to be able to exhibit after the learning topic has been completed" (Gagné, 1965, p. 245).

Gagné 's system significantly influenced curriculum design. He arranged instructional tasks into sequences based on their relative complexity with simpler components treated as prerequisites for more complex tasks. Although his framework focuses on intellectual skills, the theory has been used to design instruction in all domains (Gagné & Briggs, 1974).

The field of cognitive psychology had a major impact on CBT because researchers such as Gagné examined the implication of concepts such as task analysis, the sequencing of specific training objectives, the organization of curriculum into learning modules, and providing remediation based on post-test performance. Although the concepts are not unique to the field of cognitive psychology, the manner in which the procedures were organized and articulated represented a significant contribution to the training profession.

## Mastery-Based Learning

Mastery-based learning (MBL) was developed by John Carroll (1963) and popularized by Bloom (1968; 1971; 1974). MBL is a fundamental change in thinking about the nature of instruction because it focuses on the time individuals need to learn the same material. It is based on the assumption that almost everyone can learn material if they have sufficient time. Trainees with insufficient time will only master part of the curriculum. This contrasts with the classic model, which focuses on differences in ability in which all learners have the same amount of time to learn. MBL is a radical shift in responsibility for instructors because trainee failure results from instruction, not a lack of learner ability. The challenge is to provide enough time and use instructional strategies that enable all trainees to achieve the same level of learning (Levine, 1985; Bloom, 1981).

Mastery learning is based on the following procedures:

Prespecify the required terminal behavior for the learner.

Describe how the behavior will be evaluated.

Break the behavior into a series of small, sequenced steps.

Expect that each trainee will achieve mastery.

Encourage trainees to respond actively.

Allow trainees to learn at their own pace.

Assess trainee progress.

Provide immediate feedback regarding performance.

Allow successful trainees to move ahead to new units.

Provide remediation for unsuccessful trainees.

Retest trainees to determine if performance is satisfactory.

Mastery learning has been widely applied in educational and training settings, and research shows that it improves instructional effectiveness (e.g., Block, Efthim & Burns, 1989; Slavin, 1987). However, it has theoretical and practical weaknesses because people differ in ability and attain different levels of achievement (see Cox & Dunn, 1979). It also requires considerable time and effort to implement.

MBL is ideal for programs with clear instructional objectives and hierarchical structures. Training based on specific, discrete competencies allows close monitoring of performance using diagnostic tests that focus on specific learning objectives. Nonmasters receive additional instruction using materials designed to correct areas of deficiency. Despite compelling reasons to use MBL in professional training, it is primarily used in elementary schools, less frequently in middle and senior high schools, and infrequently at the college level. It is rarely used to evaluate social services training programs, probably because most training programs lack valid tests to assess trainee competence.

Many techniques used in MBL are incorporated in CBT. Most of these originate in quantitative measurement and the development of sequenced, measurable objectives. Objectives are organized into learning modules, and trainees are provided with sufficient time to master tasks. Post-training assessment of trainee performance is routinely performed, and remediation is provided for person who fails.

## Criterion-referenced testing

Criterion-referenced (CR) testing includes a comprehensive set of procedures to design training including:

task analysis - identify what needs to be learned.

performance objectives - specify the outcomes and how these are assessed.

criterion referenced testing - evaluate the knowledge/skills specified in the objectives.

learning modules - training materials related to specific objectives.

CR instruction often incorporates different media (e.g., workbooks, videotapes, small group discussions, computer-based instruction). Trainees practice skills required for each objective and receive feedback regarding performance. After each module, they complete tests to assess their mastery. If their performance is satisfactory, they move to the next module or repeat training until they achieve mastery.

CR tests are deliberately constructed to assess individual performance on a well-defined domain of behaviors which is a precise measure of a person's ability to perform a well-defined set of criterion behaviors. Criterion-referenced tests are not based on normative standards that compare test takers to an external reference group. The criterion focuses on what people can and cannot do and on whether instruction was effective (Millman, 1974). According to Glaser (1963, p. 519), criterion-referenced tests "depend on an absolute standard of quality," while norm-referenced tests "depend on a relative standard." Tests used in competency-based training

should be criterion-referenced, which means that individual performance is compared to specific performance standards. CR tests are appropriately used when normative tests are not available, which is the condition under which most training is conducted.

The major concern in test development is to obtain rigorous, precise domain specifications that maximize the interpretability of a domain score. Conventional item analysis that calculates item difficulty and discrimination is unnecessary. Instead, CR Item analysis determines if the test items measure their respective objectives, are free of structural flaws, and discriminate between masters and nonmasters.

The theoretical bases for CRT are similar to those on which CBT is based. These range from the identification of competencies based on task analysis and needs assessment to the development of test instruments that validly measure whether individual trainees demonstrate mastery of required skills. While CRT shares these techniques with other approaches, its emphasis on assessment is more focused and definitive.

# Competency-based Training

CBT is based on specific, measurable objectives related directly to instructional activities. Trainees complete posttest performance assessments to determine if they have mastered essential attitudes, skill, and knowledge. Instructors or supervisors review these data, make appropriate program modifications, and offer additional instruction and mentoring to trainees who did not master the material.

Although the theoretical foundations for CBT originated in the early 20th century, the term "competency-based" was not used until state departments of education promoted the concept in the mid-1960s. The decision to implement CBTE was heavily influenced by social and political pressure, particularly concern about low student achievement, the poor quality of teacher training, and the high costs of education (McKenna, 1992).

While funding was available, universities, at least nominally, conducted CBTE programs. However, interest diminished as funding declined and by 1977, as noted earlier, only 11 states claimed that they used CBTE to license teachers (Villeme, 1977).

Social work educators, however, were interested in CBT. In 1974 the National Association of Social Workers (NASW) adopted the following policy statement that laid the groundwork for CBT.

> Legislation for the licensure of social work shall require that each level of practice, including that of independent practice, have a valid means of objectively assessing the qualifications, knowledge and competencies of applicants for licensure, in addition to requirements for special educational attainments (p. 20).

NASW also questioned the adequacy of traditional means for evaluating the qualifications of applicants and said that the profession should explore "the validity of traditional examination techniques in assessing professional performance and capability . . . [and] the development of new test modes (*NASW News*, p. 21).

Interest in CBT in the social services field is evident in the extensive use of this model for social services training by agencies throughout the United States. New York City's Preservice Academy uses a competency-based model to prepare child welfare workers. Alaska, Connecticut, Ohio, Oklahoma, New Hampshire, and Pennsylvania offer a program developed by the Institute for Human Services and the Child Welfare League of America (Hughes & Rycus, 1989). Alabama and Florida use a program developed by the Child Welfare Training Institute (Morton, undated). Nebraska has a competency-based training unit called Action for Child Protection, and Washington has a Preservice Training Academy. Maine (Bernotavicz, 1992). Illinois, Virginia, and North Carolina (Pecora, 1990) also conduct competency-based preservice and specialized training programs. Since 1987, Tennessee has used posttests to screen workers before placing them in permanent positions (Office of Research and Public Service, 1993).

The only major training initiative that required trainees to complete tests that assessed mastery of the competencies on which training was based was supported by the New York State Office of Child and Family Services. The evaluation model called CREST (Criterion-Referenced Testing in Social Services Training) was developed by the Center for Development of Human Services at the State University College at Buffalo (McCowan, McGregor, & LoTempio, 1983a; 1983b). Trainees complete tests based on items that correspond to specific training objectives, and follow-up surveys of trainees and their supervisors assess whether critical job-related skills were mastered.

CBT programs are simple in concept. The first step in program development is the identification of clear, general goals or outcomes that describe the purpose of training. These goals present the vision on which training is based. After policy makers reach consensus on the goals, staff use job descriptions and desired program outcomes to identify domains and competencies which are used to assess training needs of the relevant population. After needs assessment, staff develop specific training objectives and organize them into instructional units. As training objectives are added to the curriculum, domains and competencies are modified and refined and

a hierarchical structure of attitudes, skills, and knowledge is developed. McCowan and Wegenast (1996) have developed a comprehensive model that contains detailed specifications of the procedures involved in developing CBT programs.

Based on this theoretical orientation CBT must have the following characteristics:

Clear job descriptions and program outcomes.

Needs assessments based on job-related competencies.

Structured hierarchy of domains, competencies, and objectives.

Instruction based on specific behavioral objectives with opportunities to apply new attitudes, skills, and knowledge.

Posttest assessment of trainee performance compared with clear criteria.

Remedial training and OJT mentoring to assure trainee mastery of essential material.

Training programs that lack any of these characteristics cannot be labeled competency-based.

# Conclusion

This paper clarified the theories and social factors that contributed to the development of CBT. A closer examination of different curriculum approaches, as well as the origins of CBT, places CBT into the proper perspective. In appropriate settings and conditions, CBT is an effective training methodology, but obviously it is not the only way to design training. If managers and curriculum specialists have a clear understanding of the theory and values on which CBT and other curriculum models are based, the programs they design will be more effective in meeting organizational needs.

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