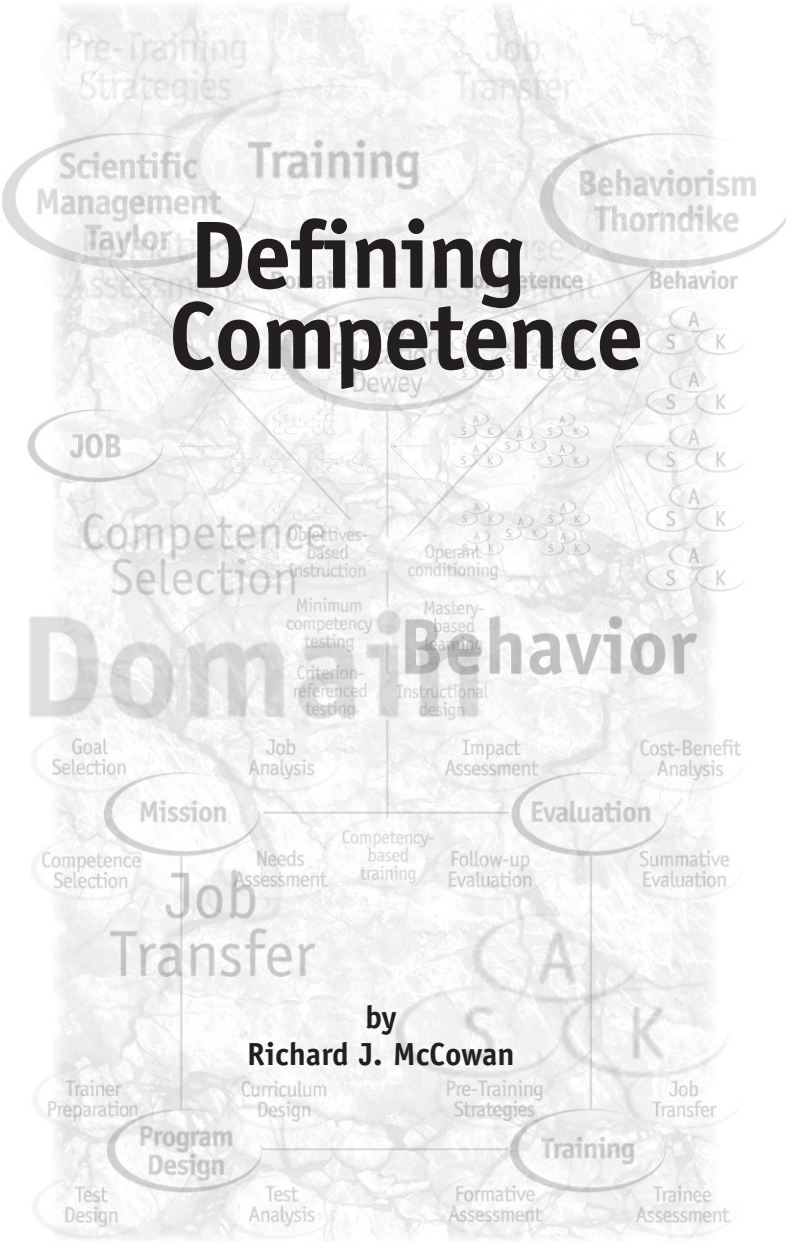
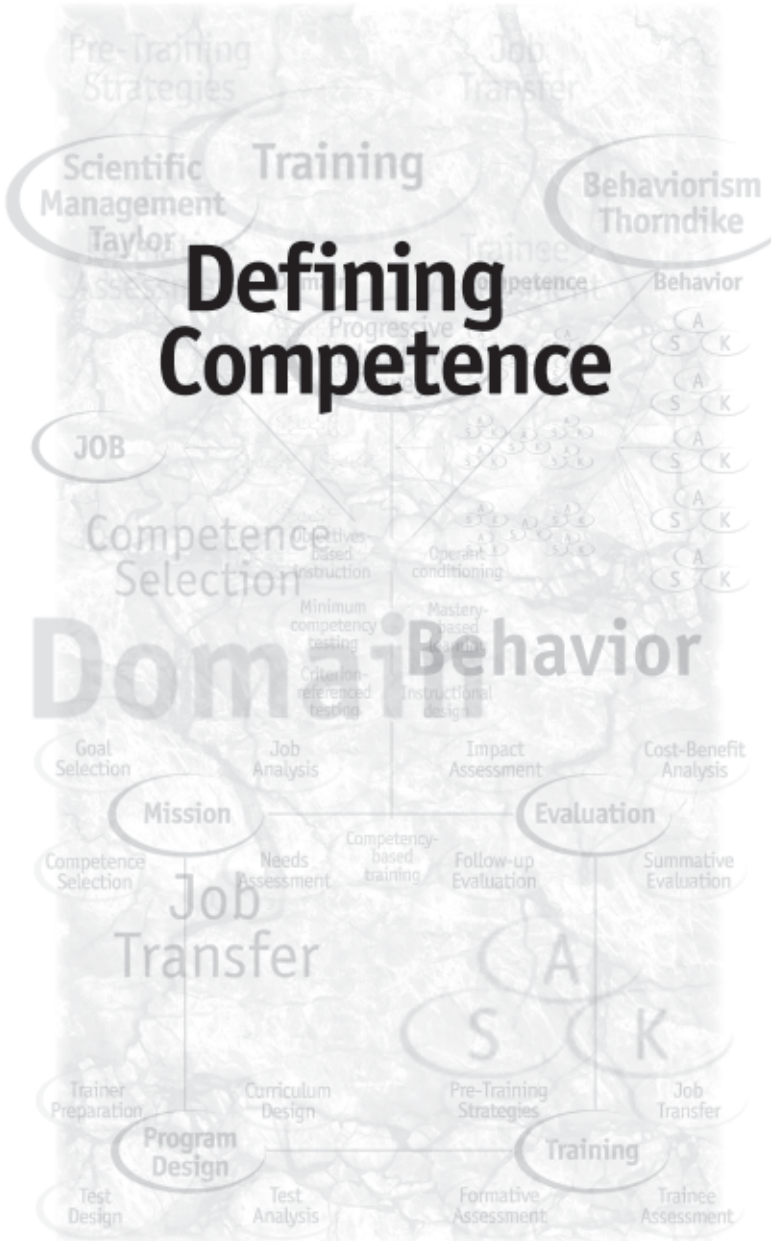


Defining Competence

by

Richard J. McCowan



Defining Competence

Center for Development
of Human Services

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Introduction

Competency-based training (CBT) is widely used to develop curricula for educational and training programs in the public and private sectors. CBT is an attractive option for organizations with concerns about program effectiveness. When policy makers are concerned about program costs and effectiveness, they assume that structured, focused training will improve efficiency and productivity.

CBT is simple in concept. Instruction is based on specific, measurable objectives related directly to training activities and job responsibilities. The first step in developing a CBT program is to identify clear, general goals that describe the purpose of training. The next steps involve identification of domains, competencies, and specific training objectives, after which objectives are sequenced into a logical hierarchy that best facilitates learning.

In CBT poor definition of terms is a major problem because many programs do not define the terms "competence" and "objective." Professional trainers use the words interchangeably and confound significant CBT constructs such as competence, skill and objective. This problem, which is not unique to social service training, adversely affects efforts to integrate, compare, and evaluate CBT programs. Curriculums based on objectives and competencies with inconsistent levels of specificity are difficult to organize into a coherent curriculum. This paper defines competence and presents a taxonomy appropriate for organizing objectives and competencies into well-defined domains.

The use of specific behavioral objectives in social sciences is based on stimulus-response theory developed by behaviorist psychologists in the 1930s (Thorndike, 1918; Tolman, 1932; Guthrie, 1935; Skinner,1938). This theory assumes that behavior is an organism's response to a stimulus and views knowledge as a related set of specific responses to specific stimuli. In social sciences, this form of knowledge is expressed as detailed behavioral objectives in curricula and assessment (Greeno, Colins, & Resnick, 996; McCowan & Wegenast, 1998).

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.

The implementation of objectives-based training programs in academic and professional settings developed more slowly. John Franklin Bobbitt (1918), a devotee of using business techniques in schools and a pre-eminent force in curriculum reform, stimulated the use of activity analysis to develop objectives, setting the stage for subsequent objectives-based instruction. Ralph Tyler (1950), an early advocate of objectives-based instruction, said that "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).

In the late 1950s and early 1960s, five factors stimulated interest in behavioral objectives.

> Benjamin Bloom and his associates published the *Taxonomy of Educational Objectives*, a major reference for subsequent curriculum design efforts (Bloom, Englehart, Furst, Hill, and Krathwohol, 1956).
>
> B. F. Skinner (1958) developed his theory of operant conditioning which maintained that learning occurred through S/R (stimulus-response) connections between a reinforcement and a response. He maintained that learner behaviors were imprinted by sequencing instructional events in small, self-paced "frames."

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

John Carroll (1963) originated the concept of mastery-based learning (MBL) which was popularized by Bloom (1968; 1971; 1974). MBL assumes that almost everyone can learn material if they have sufficient instructional time. It designs instruction using specific objectives and determines mastery using diagnostic tests.

Robert Gagné (1962; 1965; 1977) developed a model for instructional design based on task analysis, hierarchical sequencing of subordinate skills, and outcomes-based assessment. Analysis of a topic began with the statement of the terminal objective.

CBT is based on clearly written, well-organized behavioral objectives. This paper discusses the following topics related to behavioral objectives and competencies:

Defining Terms

Writing behavioral objectives

Sequencing

Defining domains and competencies

Taxonomies

Chunking

Defining terms

You say eether
And I say eyether,
You say neether
And I say nyther;
Eether, eyther, neether, nyther,
Let's call the whole thing off.
(George Gershwin, *Let's Call the Whole Thing Off*, 1937)

Inadequate definitions limit CBT research. As Berk (1980) noted:

> It is not uncommon to find the terms domain-referenced test, objectives-referenced test, competency-based test, proficiency test and mastery test used interchangeably in the literature. When this problem is coupled with the diverse forms in which the research exists, one is confronted with a body of research that is redundant and fragmented. (p. 4)

From this perspective, it is not surprising to find that the quality of available criterion-referenced tests is not commensurate with the magnitude of the efforts to produce them (Hambleton & Eignor, 1978).

As a result, many training programs are poorly organized because the critical terms of domain, competency, and objective that undergird the curriculum structure are not clearly defined. Inadequate, imprecise definitions make it difficult to develop a clear hierarchy to sequence training competencies and relate instruction to evaluation. Popham (1974) described the problem succinctly in observing that when a domain is not spelled out, it results in a "cloud-referenced test" (p. 614).

Lack of clarity in defining terms results in inconsistent specification of CBT objectives. As Schievella (1968) noted, people write and speak carelessly and use language in a lackadaisical, haphazard manner. Consequently, it is difficult to avoid some degree of misinterpretation. The simple sentence: "I went to the store" has at least five different meanings.

I *(not he or she)* went to the store.
I *(already)* went to the store.
I went to *(not from)* the store.
I went to the *(not just any)* store.
I went to the store *(not anywhere else)*.

Since it is difficult to use words precisely, inconsistencies in level of specification confounds curriculum development and evaluation. It is difficult to develop replicable programs and valid criterion measures if training objectives or competencies are unclear and poorly organized. The model proposed in this monograph operationally defines four terms essential for CBT including objective, competence, domain and job and suggests a taxonomy appropriate for curriculum development.

The two classification systems described below illustrate how objectives can be defined and organized. Each system is based on the level of specificity of training objectives. Obviously, other classification systems for organizing competencies exist, but the two described in this document cover the main issues related to the topic.

The first system, which has been discussed in the literature since the 1960s, classifies objectives into general goals, terminal objectives, and enabling objectives. The idea of moving from the most general, abstract level to more specific concrete level relates to the sequencing of objectives which involves organizing objectives into a sensible arrangement to help trainees master material.

General goals are also called general objectives, instructional aims, institutional goals, or training plans. These are broad in scope, long-range, visionary, and theoretical statements which are appropriate for mission statements such as:

Provide employment for people on public assistance.

Improve foster care services for children.

Improve caseworker performance in permanency planning.

Reduce errors in the administration of medicaid programs.

Terminal objectives describe specific behaviors that trainees perform to show that they mastered the competencies on which the general goals are based. Related terms include attitude, skill, or knowledge, behavioral objective, specific objective, performance objective, training objective, outcome, criterion, and standard. Several examples include:

Classify a child as "safe" or "unsafe."

Assess significant family strengths that protect a child from future risk.

Identify potential barriers to assessing risk.

Understand the impact of changes in household composition.

Enabling objectives are attitudes, skills, or knowledge that trainees must achieve before they can perform a terminal objective. Similar terms include intermediate objective, instructional objective, learning objective, subsidiary objective, support objective, or component objective. For example, before classifying a child as "safe" or "unsafe," trainees must know the legal criteria used to place children in these categories.

The second system provides a structure for curriculum development (McCowan & Wegenast, 1995). They define an instructional objective as an attitude, skill, or knowledge (ASK) as illustrated in Figure 1. When developing curriculum, competencies will include varied numbers and combinations of attitudes, skillls, and knowledge.

Figure 1

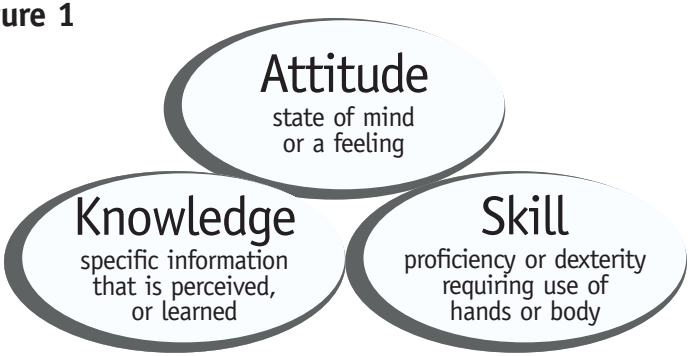
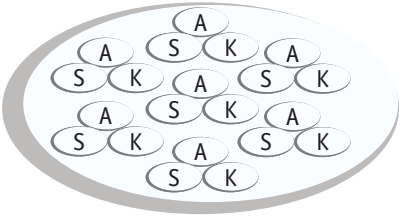


Figure 2 illustrates a competence which is a set of related, specific objectives. *The American Heritage Dictionary of the English Language* (1992) defines a competence as "the state or quality of being adequately or well qualified — a specific range of skill, knowledge, or ability (Competence is synonymous with an amplified objective (Popham, 1980) and accreted competency (Hughes & Rycus, 1989), and a terminal objective (Ammerman & Melching, 1966).

Figure 2



As illustrated in Figure 3, a domain is a set of related competencies. This is similar to the mathematical definition of a domain as "the set of all possible values of an independent variable of a function (*The American Heritage Dictionary,* 1992).

Figure 3

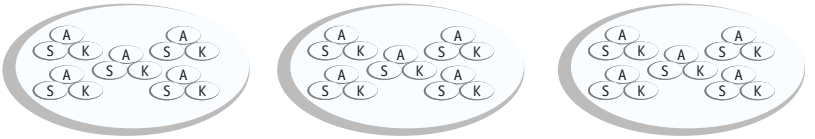


Figure 4 illustrates a job (or profession) which is a cluster of related domains that contains the competencies required for that position.

Figure 4

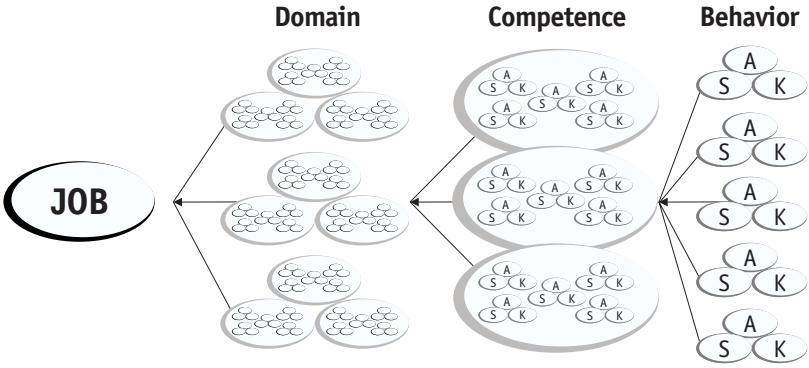


Table 1 summarizes these definitions.

Table 1
Definitions of CBT Terms

Job	Job that requires training in defined content domains
Domain	Set of competencies that define a content domain.
Competence	Cluster of related behaviors.
Behavior	Attitudes, skills, and knowledge required for competence.

At the needs assessment, planning, and evaluation stages of CBT, evaluators should emphasize identification of competences rather than behaviors. As Popham (1990, pp. 193-194) noted, "Educational evaluators should eschew numerous narrow-scope educational objectives, and, instead, focus on a manageable number of broad-scope objectives." Popham's use of the term "broad-scope objectives" is equivalent to the definition of competence offered in this paper. For the design and delivery of training, however, it is important to focus at the level of behaviors using specific attitudes, skills, and knowledge.

Writing behavioral objectives

Many authors have described techniques for writing specific instructional objectives (e.g., Eisner, 1969; Gronlund, 1970; Mager, 1962; Popham, 1969; 1990)., The rules and protocols for writing objectives must be followed carefully because objectives are the foundation for curriculum and evaluation.

Writing an objective is similar to composing a complete sentence with a subject (who will do something), a predicate (a verb that states what will be done), an object (what will have something done to it) and modifiers (adjectives and adverbs which describe how something will be done). As presented in Table 2, these are the **A, B, C, Ds** of training objectives.

Table 2
A, B, C, Ds of Training Objectives

A	Audience	Which trainees will perform the objective? Who will complete training? What is the entry skill level of trainees?
B	Behavior	What behavior will be performed? What specific, observable action will trainees perform?
C	Conditions	Under what conditions will the audience perform the behavior? What resources will be used? What constraints will be imposed when the audience performs the behavior?
D	Degree	What measure defines an acceptable performance level? Have trainees mastered the attitude, skill, or skill required?

Examine the following objective and note its limitations in describing observable learner behavior.

Help mommy.

This objective is weak. Neither the audience nor the conditions is described. No criterion or desired outcome is included. The behavior, as represented by the predicate "help" is vague. The following objective is an improvement.

Provide professional health services to an expectant mother during pregnancy.

Although this objective is more precise, it still has significant limitations. It is more similar to a general goal rather than a specific behavioral objective. Although it is more precise than "help mommy," the audience, behavior, conditions, and degree are broad and vague. The following objective is better.

The obstetrician will assist a pregnant 25 year old female to deliver her newborn child.

This is a substantial improvement, but a step-by-step, measurable procedure is required to guide the physician. The following objective (or series of sequenced objectives) is more adequate.

> *When presented with a 25 year old female gravita* ~~Ŧ~~ ~~Θ~~ *[parazero] term pregnancy who has completed the first stage of labor with the second stage imminent, whose cervix is fully dilated with caput visible, and having blood pressure 180/70, pulse 80, respiration 24, uterine contractions every two minutes lasting 50 seconds and is experiencing rectal pressure with contractions, and with the infant presenting left occiput anterior, with this contraction, as the mother bears down, the obstetrician will . . .*
>
> 1. Ease the head out slowly with slight pressure being put against the perineum.

After the head delivers and mucus is aspirated, and when the infant cries spontaneously, the obstetrician will . . .

2. Deliver the anterior shoulder.
3. Deliver the infant fully.
4. Place the infant on a sterile sheet on the mother's abdomen.

The umbilical cord remains pulsating for 60 seconds, after which . . .

5. The cord is clamped . . .
6. . . . and cut.

Use the following suggestions to avoid common errors in writing behavioral objectives.

Avoid wordy, repetitive terminology.

Example: The following statement can be clarified by appropriate editing:

Revise "Set priorities and adjust to shifts in priorities demanded by the agency, community, and clients." to *"Establish priorities to meet shifting demands."*

Use measureable behavioral verbs. Most books on writing behavioral objectives warn against using emotionally loaded words like "appreciate," "love," and "value" in behavioral objectives. While this is generally good advice, it limits the scope of training programs that focus on affect, feelings, and attitudes. Therefore, if a term can be measured within the context of training, then it can be used. For example, researchers have measured the construct of maternal love by counting the number of times a mother cuddles or fondles her child during a given time period.

Use a single predicate (i.e., one verb) when writing a behavioral objective.

> *Example*: The worker knows how to conduct an assessment and document findings to support a claim; and knows how to pursue the appropriate court process.
>
> *Critique*: This statement includes at least three objectives. The introductory statement (i.e., "The worker knows how to . . " is unnecessary.

Limit objectives to a single direct object.

> *Example*: Describe how physical and mental illness, mental retardation, physical disability and frailty affect adult functioning.
>
> *Critique*: This statement includes five different direct objects (i.e., physical illness, mental illness, mental retardation, physical disability, and frailty). This statement can easily be broken into five objectives, each of which is probably still too broad, because "adult functioning" is an extremely broad concept.

Determine the appropriate level of specificity for the audience.

> *Example*: The worker understands human sexual development and behavior throughout the life cycle. (issues including sexuality and pregnancy in young adults, fact and issues related to STDs, multiple sex partners, homosexuality, sexuality in the elderly, the developmentally disabled, the physically incapacitated and the mentally ill).
>
> *Critique*: This statement is sufficiently broad to be classified as a domain that includes three or four competencies. Realistically it would take at least a graduate course to cover the material.

Truncate objectives into a description of the behavior if the text describes the audience, conditions, and degree of expected performance.

If the audience is the same for several objectives, describe it once in an introductory statement ("After completing training, caseworkers will . . .").

Organize objectives evaluated under similar conditions as a single group ("After completing the 2-week residential Child Welfare Core training program participants will . . .").

Clarify objectives by defining important terms in the narrative.

Decide how performance (i.e., degree) will be measured. Degree can be a percentage of correct answers (75% accuracy, rank among a group (ranks in the upper 25 %), or an absolute level (100 % achievement. In many cases, completing the competency successfully is an adequate indication of success, such as "The pilot landed the plane successfully."

If degree is measured by posttest performance, make note of this in an introductory statement ("Trainee mastery is based on achieving a posttest score of 75% or higher.").

Sequencing

It is important to sequence training objectives when prior knowledge is involved and different elements depend on one another. Although sequencing varies depending on the task and the learner, most training is based on material that can be organized effectively to maximize the impact of instruction for most participants. Briggs (1968) comment regarding learning styles and sequencing is still appropriate:

> ...sequencing is a characteristic of all learning efforts and it thus cuts across whatever "learning types" might eventually become widely recognized, accepted, and used in classifying tasks. (p. 3).

As noted earlier, enabling objectives describe what trainees must learn before they can perform the terminal objective.

Sequencing is most effective at basic levels that involve relatively simple skills, sequencing is readily accomplished. More complex skills, however, are difficult to organize in this manner. Consider, for example, a terminal objective which states: "The trainer will design an evaluation for a 2-week Child Welfare Core training program. The following list of enabling objectives represent only a small number of those which required to complete the terminal objective, and, in turn, each enabling objective requires subsets of other enabling objectives.

Describe the major components of evaluation.

Identify trainee variables that affect performance.

Distinguish between formative and summative evaluation.

Describe resources required for the training program.

Describe the concept of cost-benefit as related to the evaluation

Demonstrate competence in descriptive and inferential statistics.

Most curriculum specialists agree that sequenced instruction improves learning when tasks can be organized in hierarchical structure. As Gagné and Briggs (1978) observed:

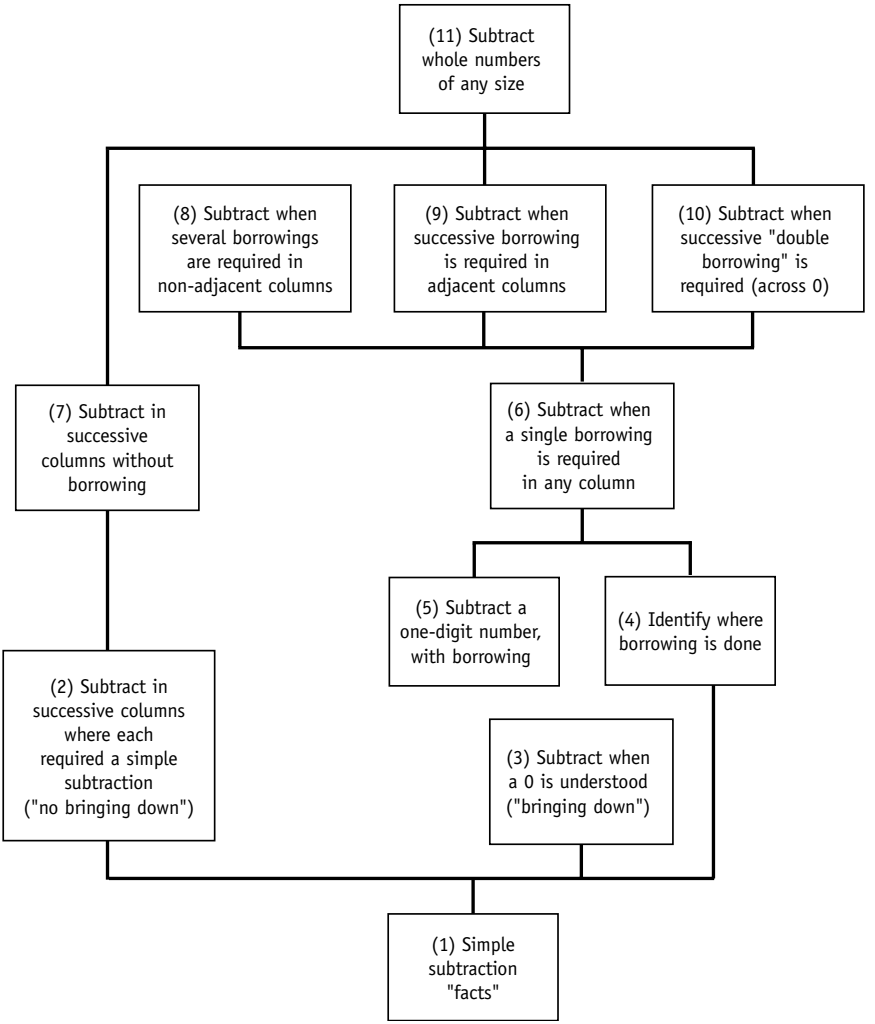
> A course or curriculum must require decisions about the sequencing of objectives, since not all objectives can be taught at once. It is reasonable, them to seek sequences which promote effective learning. One key to effectiveness rests upon the building of sequences which hold learners' interest because the total context of the sequence is meaningful, and because elements within the sequence build from simple (prerequisite) skills to more complex (target) skills which take longer to accomplish. {p. 136)

Despite its logical appeal, research data on sequencing is limited. Tasks examined in many research studies often involve lower level, more easily sequenced topics, rather than those included in more comprehensive curricula. As Gagne (1973) noted:

> Learning hierarchies are most clearly applicable to such components of curricula as single lessons. Sequences of instruction applicable to entire curricula may be designed to account for prerequisite skills and, in this case, may bear a resemblance to learning hierarchies (p. 25).

Some types of material are difficult to sequence, particularly when the parts of a task are independent of each other. In memorizing the Spanish equivalent of 100 different English words, practice and time-on-task are far more important than sequencing. However, solving a mathematical problem, as shown in Figure 5, illustrates a case in which sequencing is highly desirable.

Figure 5



Gagné, R.M. & Briggs, L.J. (1979) p.109

Hierarchies differ from individual to individual, including both trainer and trainee, for different courses of study and instructional settings. People learn using different hierarchies because they have different abilities, backgrounds, and motivations. For example, some people learn to play an instrument without learning how to read music. Research on sequencing involves the analysis of complex interactions, including factors such as trainee characteristics, curriculum, trainer characteristics, instructional methods, learning environment, and types of materials and media used.

When all is said and done, the best way to sequence training involves the expert judgment of trainers and curriculum developers.

Taxonomies of training objectives

Taxonomies, which were originally used in biology to classify life forms, are classifications or sequenced, hierarchial lists that conform to specific rules and follow explicit principles. In 1956, Benjamin S. Bloom and his associates developed the *Taxonomy of Educational Objectives: Handbook 1: The Cognitive Domain*. Initially the book attracted meager attention, and sales were modest. During the 1960s, as interest in specific educational objectives increased, sales were substantial. In 1964, David Krathwohl and his co-workers developed a taxonomy for the affective domain. Over the years scholars developed psychomotor taxonomies, but none has attracted widespread support in the academic community.

The following issues are important regarding these domains:

The cognitive taxonomy is the most explicit and easiest to measure.

Knowledge objectives are based on the cognitive taxonomy.

Skills are derived from the psychomotor taxonomy.

Attitudes are based on the affective taxonomy.

Training objectives should be sequenced to maximize learning, however this theory is speculative for higher-order learning.

Cognitive and affective domains are sequenced in hierarchical order, but the psychomotor domain is not.

The affective domain is less precise and more difficult to measure than the cognitive and psychomotor domains.

Table 2 summarizes three major domains including the cognitive (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956), affective (Krathwohl, Bloom, & Masia,1964)and psychomotor (Harrow,1970; Kibler, Barker, & Miles, 1970). Each domain is categorized into levels ranging from less to more complex. For example, the cognitive taxonomy ranges from "know," which is the recall of information, to "evaluate," which involves judging the value of materials and methods

Table 2
Taxonomies of Objectives

Cognitive

Know: recall specific and universal information including methods, processes, abstractions, patterns, structure, and setting (e.g., list, label, state, match, identify).

Comprehend: understand what is communicated by translation, interpretation, and extrapolation (e.g., estimate, infer, predict, translate, illustrate).

Apply: use abstractions, particularly in concrete situations (e.g., create, produce, sketch, show, compute, modify).

Analyze: identify elements, relationships, and organizational principles included in communications (e.g., analyze, compare, criticize, inspect, select, contrast, outline).

Synthesize: assemble elements and parts to form a whole including unique communications and sets of abstract relations (e.g., arrange, compile, invent, generate, construct, organize).

Evaluate: judge the value of materials and methods for a given purpose using internal and external evidence (e.g., assess, criticize, estimate, discriminate, judge, summarize).

Affective

Communicate: use verbal and written communication (e.g., debate, declare, describe, narrate, relate, sing, tell, write). Receive: attend willingly to stimuli (e.g., accept, choose, locate, name, listen, show).

Respond: respond actively to stimuli (e.g., answer, complete, describe, present, report, specify).

Value: accept a set of values (e.g., adopt, agree, choose, differentiate, initiate, recommend).

Organize: establish relationships among values (e.g., classify, compile, construct, design, manufacture, produce).

Characterize: behave consistently according to a set of values (e.g., act, behave, contradict, declare, defend, integrate, profess).

Psychomotor

Reflex: exhibit involuntary action or response (e.g., blink, hiccup, sneeze, twitch).

Motor: display locomotive and manipulative skills (e.g., raise, run, stand, sit, walk).

Perception: use kinesthetic, visual, tactile, and coordinated actions (e.g., feel, hear, see, smell, sense, taste).

Physical: display strength, agility, dexterity, and endurance (e.g., catch, dance, draw, kick, jump, march, throw).

Nonverbal: use facial and bodily expression and movement (e.g., dramatize, exhibit, gesture, mimic, pantomime, perform).

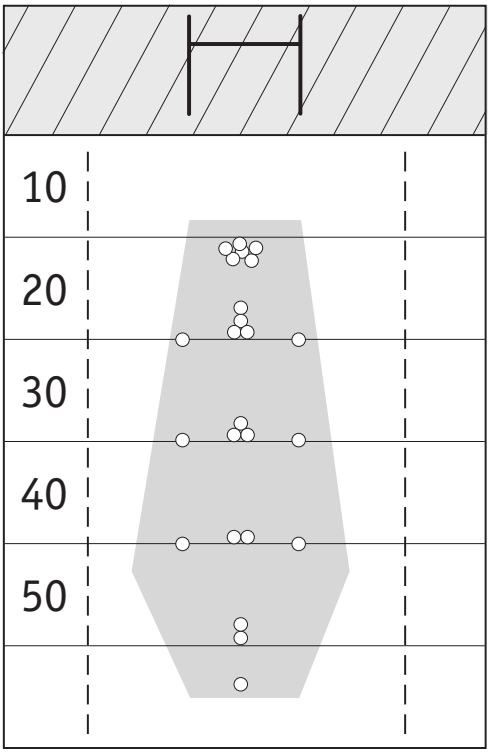
Defining domains

The boundaries and specifications of domains and competencies must be stated clearly and unambiguously. Behavioral objectives (attitudes, skills, and knowledge), including the conditions under which the behavior will be performed and minimum mastery levels, must be specified. To illustrate this process, consider how a professional football coach selects the best field-goal kicker from a pool of three candidates.

The coach first defines the domain in which the kicker will perform. The area in which field-goals are attempted. This area is smaller than the entire football field since it does not include the end zones, the area more than 55 yards away from the goal line, or the distance between the out-of-bounds line and the hash marks. Competencies include kicking extra points from the 12 yard line and field-goals from straight-away and at angles from the right and left sides of the defined kicking domain. The conditions include specific points from which field goals will be kicked under varied conditions (e.g., natural grass and Astroturf, within and outside a domed stadium, during practice or competition). The coach establishes minimum mastery levels of 90 percent for extra points and 75 percent for field goals. Player attitude, such as performance under competitive game conditions and knowledge related to relevant rules are also assessed.

Figure 6 illustrates the defined domain used to test the field goal kickers. The small white circles are points from which kicks will be attempted. These are identical in purpose to test items or outcome measures used to assess trainee performance.

Figure 6



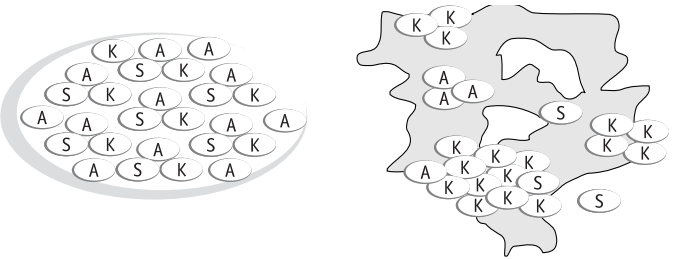
As outlined in Table 3, effective competencies are clear, comprehensive, complete, unique, and sequenced, rather than vague, restricted, incomplete, redundant, and disorganized.

Table 3
Characteristics of Domains and Competencies

Positive	Negative
Clear	**Vague**
Free from doubt or confusion.	Not clearly expressed or inexplicit.
Comprehensive	**Restricted**
Complete in scope and content	Limited in scope - excludes content
Complete	**Incomplete**
Possesses necessary parts or steps.	Omits necessary parts or steps.
Unique	**Redundant**
Exclusive - not shared by others.	Superfluous - needlessly repetitive
Sequenced	**Disorganized**
Organized logically in a hierarchy of skills	Not arranged in logical, hierarchical order

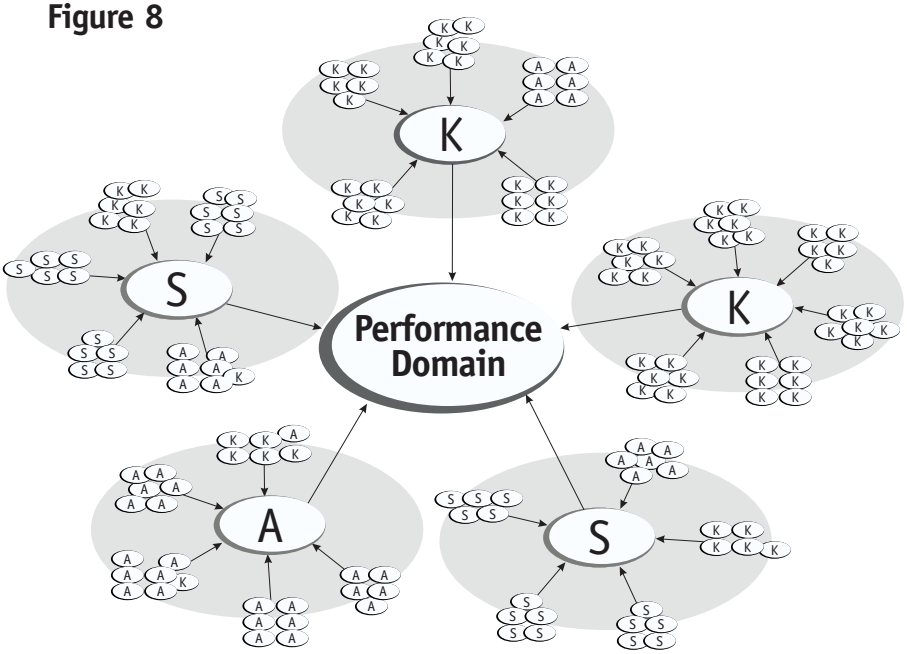
Figure 7 illustrates how these characteristics apply to well-defined and poorly-defined competencies. A well-defined competence is comprehensive since the unique ASKs cover the entire domain. It is clear, orderly, and complete. A poorly-defined competence, on the other hand, covers only selected portions of the domain and includes ASKs that are not contained within its irregular boundaries.

Figure 7



Most competencies include attitude, skill, and knowledge objectives in unique and varied combinations. Figure 8 provides an example of the complexities involved in identifying the ASKs included in a competence. Note that the figure shows that some of the ASKs overlap which illustrates that it is difficult to develop objectives that possess the positive characteristics presented in Figure 8.

Figure 8



Instructional planning, development, and evaluation are significantly enhanced when competencies and objectives are well-defined and clearly written. If the definitions described above are utilized, curriculum designers will take a major step toward achieving this goal.

Chunking

Chunking is the theory that people overcome short-term memory limitations by grouping information into larger units. People who learn large amounts of new information will group data into meaningful, related clusters to form new, larger knowledge sets. This information-processing view of memory is derived from George Miller's (1956) article entitled "The magical number seven, plus or minus two." His theory states that people stretch limited capacity short-term memory by grouping items and using symbols to represent new groups. Gagne and Briggs (1979) discussed the same concept using the terms "chaining" and "association,"

Chunking has implications for CBT in regard to the level of specificity required for objectives. For example, as the level of training increases from novice to experienced worker or supervisor, objectives become less specific and more inclusive. Essentially, people master complex tasks by acquiring knowledge and learning specific skills required to perform a task. Once the task is perfected, it becomes a specific skill required to perform an even more complex skill. For example, first grade children must initially recognize letters before they learn to read. Over time, they master increasingly more complex reading skills. In a similar manner, the supervisory behaviors required of first-line supervisors are less complex than those required of management level staff, so the level of specificity required for training differs at each of these levels.

Level of specificity: People learn complex competencies by mastering a series of specific skills required to perform the task. Once a competence is perfected, it becomes a specific behavior required to perform more complex competencies. For example, first grade children must first recognize letters before they learn to read. As they mature, they master increasingly more complex communication skills. In a similar manner, supervisory behaviors required of first-line supervisors are less complex than those required of management, so the level of specificity d would differ for training at each of these levels. Consequently, as the level of training increases, objectives become less specific and more inclusive.

*Number of objectives: C*hunking implies that people learn by clustering discrete skills into groups ranging from five to nine items. By extending this concept to the number of objectives in a competency, it suggests that competencies should contain no fewer than five and no more than nine objectives. In turn, domains should contain no fewer than five and no more than nine competencies, and a job no fewer than five and no more than nine domains. Whenever the number of objectives, competencies, and domains do not fall within this range, they probably need to be revised by combining or expanding the category.

Table 4 illustrates the benefits of reorganizing competencies and behaviors into content domains by chunking information in segments that are cognitively more manageable.

Admittedly, this extension of chunking into curriculum development is speculative, but it is a reasonable, albeit untested, application of the concept.

Table 4
Reorganizing Competencies into Domains

Original	Reorganized
Competence	**Domain**
Use the NYS Risk Assessment and Service Planning model to assess risk of future abuse, neglect, or maltreatment of children for cases reported to the State Central Register.	Risk Assessment Skills
Behaviors	**Competence 1**
	Use Risk Assessment scales to determine the level of risk for future abuse or maltreatment
Complete Risk Reassessment and Service Plans.	**Behaviors**
Complete Indicated and Closed Risk Assessment	Identify factors for assessing level of risk for abused children.
Complete a Risk Assessment Summary.	Identify potential barriers to risk assessment
Assess family strengths that protect a child from risk.	Identify significant key risk elements during assessment.
Complete a case update that includes "Child Safety Review."	Evaluate how risk elements interact to affect level of risk.
Complete a family history report.	Determine the family's view of identified risk elements.
Analyze information gathered during risk assessment.	Assess the family strengths that protect a child from risk.
Identify a child as "safe" or "unsafe."	Identify a child as "safe" or "unsafe."
Complete Risk Reassessment and Service Plans.	**Competence 2: Document Risk Assessment and Service Plans.**
Identify potential barriers to risk assessment.	**Behaviors**
Complete Initial Risk Assessment.	Complete Initial Risk Assessment.
Complete Comprehensive Risk Assessment.	Complete Comprehensive Risk Assessment.
Complete a Plan Amendment.	Complete a case update that includes "Child Safety Review."
Evaluate how risk elements interact to affect level of risk.	Complete a family history report.
Determine the family's view of identified risk elements.	Analyze information gathered during risk assessment.
Identify factors for assessing level of risk for abused children.	Complete Risk Reassessment and Service Plans.
Determine the family's view of identified risk elements.	Complete Indicated and Closed Risk Assessments.
Identify factors for assessing level of risk for abused children.	Complete a Risk Assessment Summary.
	Complete a Plan Amendment.

Conclusion

This paper considered significant aspects of behavioral objectives as related to competency-based training. The discussion focused on types and taxonomies of objectives and the definition of key terms such as attitude, skill, knowledge, competency, and domain. Suggestions on writing and sequencing objectives were presented, and the concept of chunking was extended for use in developing competency-based curricula.

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Appendix

Verb Lists for Taxonomies

Taxonomies for the cognitive, affective, and psychomotor taxonomy, including behavioral verbs appropriate for each level, are listed below. While the list is comprehensive, it does not exhaust other verbs that might be included. Because of subtle differences in usage, some verbs can be used in several taxonomies and at different levels within taxonomies.

Knowledge

accumulate	demonstrate	grasp	match	realize	repeat
acquire	describe	identify	memorize	recall	reproduce
assimilate	detect	inquire	name	recollect	select
attend	discern	know	note	recognize	spell
collect	discern	label	outline	record	state
comprehend	display	list	perceive	relate	tell
define	gather	master	perform	remember	underline

Comprehension

appreciate	detect	express	identify	master	review
approve	discover	extend	illustrate	perceive	subsume
attribute	discuss	extrapolate	imagine	predict	summarize
comprehend	distinguish	generalize	infer	realize	translate
convert	estimate	give	interpret	recognize	understand
defend	explain	grasp	locate	report	

Application

abstract	design	generate	plan	relate	solve
apply	demonstrate	illustrate	practice	schedule	translate
change	discover	manipulate	predict	shop	use
compute	dramatize	modify	prepare	show	
create	employ	operate	produce	sketch	

Analysis

analyze	conceptualize	diagram	examine	inventory	separate
appraise	conceive	differentiate	experiment	outline	solve
attribute	contract	discern	identify	paraphrase	study
break down	contrast	discriminate	illustrate	question	subdivide
calculate	criticize	distinguish	infer	relate	test
compare	debate	divide	inspect	select	

Synthesis

administer	compile	design	generate	organize	refine
arrange	compose	devise	generalize	plan	relate
assemble	consider	discern	invent	plot	revise
categorize	construct	estimate	judge	prepare	rewrite
collect	create	form	manage	propose	summarize
combine	criticize	formulate	modify	reason	

Evaluation

advocate	commend	discriminate	interpret	rank	score
accept	conclude	estimate	investigate	rate	select
appraise	contrast	evaluate	judge	recommend	summarize
assess	criticize	explain	justify	relate	support
choose	determine	gauge	measure	revise	value
compare	discover	identify	prize	sanction	

Affective Domain

Receive

accept	choose	give	identify	perceive	reply
acquire	describe	give	listen	point	use
ask	follow	hear	locate	receive	
attend	get	hold	name	show	

Respond

answer	comply	greet	practice	report	tell
assist	cooperate	help	present	respond	volunteer
attempt	conform	label	obey	seek	write
collaborate	describe	participate	read	select	
complete	discuss	perform	recite	specify	

Value

admire	choose	differentiate	initiate	recommend	support
adopt	claim	disagree	invite	regard	sympathize
agree	concur	empathize	join	respect	value
appreciate	criticize	evaluate	negate	select	volunteer
approve	decide	explain	praise	study	write
challenge	determine	form	propose	subscribe	

Organize

adjust	compare	engineer	invent	organize	rectify
administer	compile	establish	judge	plan	regulate
appraise	compose	evaluate	legislate	prearrange	revise
appreciate	conceive	extract	manage	prefer	schedule
assemble	construct	fraternize	maneuver	prescribe	shape
assess	control	gauge	manufacture	prioritize	supervise
automate	design	implement	mentor	produce	standardize
build	draft	influence	monitor	project	synthesize
classify	educate	interpret	orchestrate	rationalize	systematize

Characterize

act	believe	decide	determine	integrate	promulgate
affirm	characterize	declare	embrace	maintain	regulate
assimilate	commit	defend	exhibit	profess	value
behave	contradict	demonstrate	initiate	promote	

Psychomotor Domain

Reflex

blink	flinch	hiccup	sneeze	twitch	

Motor

raise	run	stand	sit	walk	wave

Perception

feel	hear	see	smell	sense	taste

Physical

catch	draw	kick	observe	shoot	throw
crawl	execute	leap	pass	skip	wrestle
dance	hit	lift	pick	sort	
dig	hop	manipulate	punt	stir	
dive	jump	march	push	swim	

Nonverbal

affect	exhibit	imitate	play-act	perform	posture
communicate	express	influence	pantomime	portray	role play
dramatize	gesture	mimic			

Communication

communicate	demonstrate	list	project	say	tell
create	depict	narrate	read	sing	type
debate	describe	persuade	relate	state	write
declare	discourse	print			

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