Chapter 4
Curriculum Development and Revision

Chapter 4 Outline

Introduction

Curriculum Development is the term often used to describe both the entire process of assessing the need for courses, designing the program, developing the courses or lesson plans, implementing the training, and evaluating the training, which of course leads to refinement of the courses. As used here, however, "Curriculum Development" is defined as the methods of design and development of courses to meet the needs of a particular audience or the specific needs determined in a needs assessment.

As stated by Oliva, "Curriculum development is basically a decision-making process."[1] Those making the decisions must select the curricular emphasis, methods and organization, but the choices are made easier once viable and seasoned alternatives are articulated. That articulation of alternatives is the specific purpose of this section.

Program Design

Every training curriculum must have aims or objectives. It is necessary to first articulate, in very discrete form, the overarching objective, goal, or mission of the training program. This statement serves the principle of the initiative, guiding it and establishing its parameters. The development of courses for training and education must be consistent with the mission or objective of the initiative.

The organization of this section includes all of the elements necessary to plan and develop curricular content. The topics range from broad determinations of the educational objectives of the specific training courses to the course development methods. The emphasis is on methodology, not specific content. Content is determined by subject matter experts but should be done in a methodologically sound fashion. Matrices are presented to summarize the information but readers should be careful to use the matrices in conjunction with the content of this section, not as proxies or summaries.

Strategic Planning and Curriculum Development

Developing courses and curricula, as well as the assessment of needs, is consistent with the fundamentals of strategic planning. Strategic planning is more fluid and flexible than long range planning and has been applied to curriculum development as content has changed and as technological development has necessitated change in traditional approaches. Course development is clearly a planning activity.

Although planning has been defined many ways, perhaps the simplest and best definition is "the linking of knowledge to action." In framing this definition, Friedmann[2] also asks the questions: What knowledge is relevant and with whose actions are we concerned? Curriculum development seeks to answer the same questions. Strategic planning applied to curriculum development suggests that the following process be utilized:

Assess current and future needs
Establish objectives to meet those needs
Design a strategic plan (courses or curricula) to meet the objectives
Implement the plan (courses or curricula)
Measure the performance against the objectives
Revise the plan (courses or curricula)

This approach is consistent with the literature on strategic planning (for example, Smith[3]), and with the development of curricula for adults (for example, Finch and Crunkilton[4]).

As a concrete example, the process of curriculum development in medical education has been described as a "six-step" approach[5] which includes:

Problem identification and general needs assessment
Needs assessment of targeted learners
Goals and objectives
Educational strategies

Implementation
Evaluation and feedback

This process is the same as is used in the development of strategic plans to address any issue of current interest or necessity.

This section includes discussions on Determining Training Objectives, Determining Curriculum Content, Models of Instruction, Making Decisions in Curriculum, Including Critical Elements of Training Courses, Linking Courses into a Curriculum, and Revising and Evaluating Training.

Determining Training Objectives

Every serious article and book on curricular development stresses the necessity of formulating training and course objectives. The accepted process is to first judge the complexity of the learning exercise (course), design the exercise to address the objective, fit the instructional method to the level of complexity, and appropriately test or evaluate the abilities learned.

As was described in the previous section, two types of objectives are identified in the curriculum development literature: *terminal objectives* and *enabling objectives*. "The terminal objective represents performance in the worker role or a close approximation of that role. It focuses on the way a student should perform when in the intended work situation."[6] The terminal objective is similar to a competency or performance objective and specifies the ultimate standard for an activity. "The enabling objective focuses on what the student must learn to attain the terminal objective. The enabling objective serves to guide students from where they are at the beginning of instruction to where they should be at the end of the instruction."[7] Every course should have objectives. The more extensive courses would have both terminal and enabling objectives and the entire curriculum should have objectives or expectations for the learners. Framing the objectives is a key element in the design of curriculum. Fortunately there is significant literature to direct the development of course and curricular objectives.

Perhaps the most respected body of literature in curriculum development is *Taxonomy of Educational Objectives* often referred to as "Bloom's Taxonomy" in deference to the primary author, Benjamin Bloom[8]. This body of literature addresses three domains: cognitive, affective, and psychomotor.

Cognitive Domain

Most training and educational initiatives are primarily "cognitive" ones so Handbook I, devoted to the cognitive domain will be the first one described here. Usually the focus of a curriculum is the enhancement of intellectual abilities which "refer to situations in which the individual is expected to bring specific technical information to bear on a new problem."[9] Skills combined with knowledge result in abilities. This is the purview of the cognitive domain.

The authors state clearly, "we believe the classification and evaluation of educational objectives must be considered as a part of the total process of curriculum development." Educational objectives are simply the "explicit formulations of the ways in which students are expected to be changed by the

educational process."[10] While this appears to be a very basic part of any curriculum or course, it is one which is often overlooked.

The group of authors, headed by Benjamin Bloom, developed a taxonomy or classification of educational objectives for the cognitive domain. The objectives of a curriculum may range from the simple to the complex. The level of the objective determines the type of curriculum, the type of instruction and the type of evaluation or examination to be used. The taxonomy or classification developed and still referenced frequently in developing curricula, stated briefly, is:

1.0 Knowledge (defined "as those behaviors and test situations which emphasize the remembering, either by recognition or recall, of ideas, material, or phenomena" [11]
- 1.10 Knowledge of specifics
  - 1.11 Knowledge of terminology
  - 1.12 Knowledge of specific facts (dates, events, persons, places, sources, etc.)
- 1.20 Knowledge of ways and means of dealing with specifics
  - 1.21 Knowledge of conventions (ways of treating and presenting ideas)
  - 1.22 Knowledge of trends and sequences (processes and directions with respect to time; order of events)
  - 1.23 Knowledge of classifications and categories (classes, sets, divisions useful for a particular problem or issue)
  - 1.24 Knowledge of criteria (knowledge of criteria by which facts are tested or judged)
  - 1.25 Knowledge of methodology (methods of enquiry, techniques, and procedures employed in a subject field)
- 1.30 Knowledge of the universals and abstractions in a field (knowledge of the ideas, schemes or patterns by which ideas are organized)
  - 1.31 Knowledge of Principles and generalizations
  - 1.32 Knowledge of theories and structures

2.0 Comprehension (being able to make use of material or communication)
- 2.10 Translation (translate relationships expressed in symbols such as maps, tables, diagrams, graphs)
- 2.20 Interpretation (grasp the thought of a work as a whole)
- 2.30 Extrapolation (draw conclusions, predict trends)

3.0 Application (ability to apply generalizations and conclusions to actual problems

4.0 Analysis (breaking down material into its constituent parts, detecting the relationships of the parts and the way they are organized)
- 4.10 Analysis of elements (identifying the constituent parts)
- 4.20 Analysis of relationships (determine the relationships between the parts)
- 4.30 Analysis of organizational principles (assessing the structure and organization of the parts)

5.0 Synthesis (working with the parts of a problem or issue and combining them in a pattern or structure not there before)
- 5.10 Production of a unique communication (skills such as writing a procedure using organization of ideas and statements)
- 5.20 Production of a plan, or proposed set of operations (taking data or specifications and developing a plan of action)

5.30 Derivation of a set of abstract relations (formulate hypotheses or theories)

6.0 Evaluation (making judgments about the value of ideas, methods, solutions or materials)

6.10 Judgments in terms of internal evidence (assess probability of accuracy in reporting facts)

6.20 Judgments in terms of external criteria (application of standards or rules)

This classification, though cumbersome in places, provides an excellent and thoroughly researched method of judging the complexity of the learning exercise (course), fitting the instructional method to the level of complexity, and appropriately testing or evaluating the abilities learned (See, for example, Pelfrey[12]; as well as Pelfrey and Hague[13]). Most decisions related to the development of curriculum are based upon the educational objectives for each course or curriculum. The centrality of educational objectives compels us to use matrices later which include taxonomy-related objectives as a key dimension.

While fitting the curriculum to the learning or educational objective may appear simplistic, it is a step often overlooked in curriculum design. This is why virtually every book in the field stresses the use of a classification of educational objectives, with most using Bloom's Taxonomy. The use of this classification throughout this section will add clarity to the need for such as classification.

Brief Explanations of the Cognitive Taxonomy

Knowledge (recognizing or recalling ideas, material, or phenomena)

Knowledge of terminology: define terms, distinguish words, understand terms and concepts.

Knowledge of Specific Facts: recall facts, dates, recognize events.

Knowledge of ways and means of dealing with specifics: Familiarity with, conscious of, knowledge of rules, understanding continuity, know developmental categories, recognize range of features, know types, familiar with criteria, know basic elements, know how to attack or address problems, know various techniques.

Knowledge of universals and abstractions in a field: Know key principles, know major generalizations, be familiar with key laws, recall major theories, understand interrelationships, understand structural organization.

Comprehension (when confronted with a communication, knowing what is being communicated and how to use it)

Translation: translate from symbolic form, read

illustrations, read maps, tables, diagrams, graphs to or from verbal forms.

Interpretation: grasp a complete thought or situation, distinguish between appropriate and inappropriate conclusions drawn from a body of data or information, interpret social data, draw conclusions and state them effectively, predict trends.

Application (given a new problem, ability to apply correct abstractions without prompting)

Ability to apply generalizations to problems, ability to apply procedures to problems, skill in applying laws to situations.

Analysis (ability to break down material into constituent parts and detect relationships of the parts)

Analysis of elements: ability to recognize unstated assumptions, ability to distinguish facts from hypotheses, skill in identifying motives, distinguish conclusions from the facts supporting conclusions.

Analysis of relationships: comprehending interrelationships and order of relationships, recognizing relevant elements for validation, recognize essential facts, distinguish cause-and-effect, detect logical fallacies in arguments.

Analysis of organizational principles:

Recognize form and pattern in actions and behavior, ability to infer purpose or point of view, ability to infer philosophy, ability to recognize bias.

Synthesis (putting together elements and parts to form a whole)

Production of a unique communication

Ability to write creatively, make extemporaneous speeches.

Production of a plan Ability to purpose ways to test a concept, integrate diverse concepts into a solution, plan a unit of instruction, design tools or machines.

Derive a set of abstract relations: Ability to formulate a theory of action, perceive various was to organize actions or

elements to address an issue or problem.

Evaluation (making judgements about the value of ideas, works, methods, or solutions)

Assessing work, accuracy, or arguments, using certain criteria, comparing facts, theories or generalizations to determine validity; appraise judgements or values.

Affective Domain

The development of educational objectives within the affective domain was a part of the same "Taxonomy Project" which produced the Cognitive Domain objectives described above. This portion, however, was directed by Krathwohl, with the assistance of Bloom and Masia.[14] The authors recognize, again, the value of objectives in producing learning experiences within any domain:

> If affective objectives and goals are to be recognized, they must be defined clearly; learning experiences to help the student develop in the desired direction must be provided; and there must be some systematic method for appraising the extent to which students grow in the desired ways.[15]

Though they attempted to use the same basic assumptions for the affective domain as they did for the cognitive domain, the authors concluded that:

> It was presumed that the affective domain, like the cognitive, would be structured in a hierarchical order such that each category of behavior would assume achievement of the behaviors categories below it. But it did not appear likely that the principles of "simple to complex" and "concrete to abstract" would provided as appropriate a basis for structuring the affective domain as they provided for the cognitive domain.[16]

The continuum they developed did organize the process by which a phenomenon or value moves from a level of basic, general awareness to one of having power or control over the lives of people or becoming a life outlook. This process describes the degree to which a phenomenon is "internalized" or is incorporated within oneself. So, at one end of the continuum, there is the individual "perceiving" the issue, phenomenon, or information while at the other end the person internalizes the acceptance of emotion and feeling toward the phenomenon to the point that the acceptance is actually an integral part of the person's value system.

Kelman described the same process but used internalization as the last stage.[17] Krathwohl and colleagues used internalization as the description of the entire process of the affective domain. They viewed "compliance" as a low-level awareness, "identification" as a mid-range descriptor, and "internalization" as the development of a value complex which is more ingrained.[18]

Before describing and discussion the Taxonomy of Educational Objectives in the Affective Domain, it would be wise to point out that the affective and cognitive domains are not mutually exclusive. As will be obvious, some of the elements of the affective domain, particularly those at the lower

levels of the domain, are similar to some levels of the cognitive domain. The advantage offered by the affective domain is the appreciation of the information or "knowledge" as something more than simply rote memory.

The classification scheme for educational objective in the Affective Domain is:

1.0 Receiving (attending)
- 1.1 Awareness
- 1.2 Willingness to receive
- 1.3 Controlled or selected attention

2.0 Responding
- 2.1 Acquiescence in responding
- 2.2 Willingness to respond
- 2.3 Satisfaction in response

3.0 Valuing
- 3.1 Acceptance of a value
- 3.2 Preference for a value
- 3.3 Commitment (conviction)

4.0 Organization
- 4.1 Conceptualization of a value
- 4.2 Organization of a value system

5.0 Characterization of a value or value complex
- 5.1 Generalized set
- 5.2 Characterization[19]

Receiving, the first level of the continuum, is the sensitivity to a phenomenon or stimuli. The person must be willing to "receive" the message or information. Awareness, as the first subcategory in this level, is almost a cognitive endeavor. It requires that the learner be conscious of something, not for purposes of remembering it (as in the cognitive domain) but just to take it into account. The recognition or awareness is not based on information committed to memory or learned but on feelings, attitudes, and impressions. The recognition of people or events from recent news stories would be an example of "awareness." "Willingness to receive" is the next subcategory within Receiving. "Like awareness, it involves a neutrality or suspended judgement toward the stimulus."[20] It goes beyond simple awareness and extends to tolerance for a stimulus. Some of the terms which would be found in learning objectives at this level of the affective domain include "tolerance for," "accepts differences of," "amenable to," "disposed toward," "inclined toward." It is most often tested using interest inventories to determine things or stimuli the respondent finds not be unpleasant. The third subcategory in "Receiving" in the affective domain, is "Controlled or Selected Attention." The description given for this level which differentiates it from the previous one is "there is an element here of the learner's controlling the attention, so that the favored stimulus is selected and attended to despite competing and distracting stimuli."[21]

Responding is the second level of the taxonomy. "Responding" is used to describe "responses which

go beyond merely attending to the phenomenon. The student is sufficiently motivated that he is not just willing to attend, but perhaps it is correct to say that he is actively attending."[22] It represents a very low level of commitment. The first of the subcategories is "acquiesce in responding." This is synonymous with obedience or compliance and is more passive than active. This "willingness to comply" can be judged by the degree to which one does what they are expected to do. "Willingness to respond" suggests a slightly higher level of compliance in which the learner voluntarily engages in or practices an activity. The next subcategory, "satisfaction in responding" suggests that responding results in a feeling of satisfaction or an emotional response of pleasure to the task, activity, or stimuli. The continuum of subcategories in the second level of the taxonomy show a change from mere compliance to some level of eagerness in and action or activity.

The third tier of the taxonomy is that of "Valuing." It is defined as the recognition that a thing, phenomenon, or behavior has worth. Worth is an abstract concept that is self-defined based on one's own definitions and assessment. The first of the subcategories of Valuing is "Acceptance of a Value." It suggests a desire or a continuing desire or an acceptance of responsibility to do something due to its intrinsic value. "Preference for a value" shows a deeper involvement or interest where one willingly and somewhat enthusiastically accepts responsibility for a task or action because they find the purposes and objectives worthwhile and pleasant. Krathwohl describes the best test for "preference for a value" as a devised situation where a variety of choices of actions, items or criterion are available and the persons selects the one or ones for which they have a preference. "Commitment," the next subcategory, is synonymous with "conviction" and "certainty," not in the cognitive or intellectual sense, but in general reactions, beliefs, or values. It suggests a degree of loyalty to and strong acceptance for an ideology, feeling, or concept.

"Organization," the fourth level of the taxonomy, is a difficult one to describe. It is the initial development of a system of values where dominant and pervasive ones are evident and dormant ones less so. It suggests preferences within a preferred category of values. The first of the subcategories, "Conceptualization of a Value," involves the categorizing, and conceptualizing, though not necessarily in verbal terms, of value preferences. It is determined by evidence that evaluative judgements have occurred through an examination of the interrelationships between feelings and commitments. These are more at the unstated level, however. The second tier in this level of the taxonomy, "Organization of a Value System," does suggest the verbalization of an ordered set of values or relationships within values. It is shown by the degree to which a person can and does weigh alternative policies and practices, not in the intellectual sense, but in the sense of strongly preferred concepts.

The top level of the taxonomy is "Characterization by a Value or Value Complex." It suggests that the person has developed a "philosophy of life" through the integration of values and beliefs. The first of the subcategories is "Generalized Set." It is defined in a number of ways, including:

> a determining tendency, an orientation toward phenomena, or a predisposition to act in a certain way;
>
> a persistent and consistent response to a family of related situations or objects.[23]

While these are vague "definitions" it should be noted that the difficulty is in defining an abstract, almost indefinable concept. The best term which captures the thought of "generalized set" is "attitude cluster" based on judgements and opinions. The next subcategory, "Characterization," is the highest level in the internalization process. It represents a philosophical focus which emerges to the point that it is defined generally and has limits or borders that are relatively known and understood rather than vague and amorphous.

The Taxonomy of Educational Objectives in Affective Domain is somewhat useful in curriculum development. As stated earlier, most of what is done in education and training is cognitive but there is sufficient affective influences to merit inclusion. Most of those which can and should be addressed in curriculum, however, are in the lowest levels of the affective taxonomy. In fact, later, we will group all elements of the affective domain together when we begin to describe clear objectives and instructional techniques.

Psychomotor Domain

Armstrong and colleagues defined the psychomotor domain as behaviors that "place primary emphasis on neuromuscular or physical skills and involve different degrees of physical dexterity.[24] The development of literature addressing this domain has, for whatever reason, been far less prevalent than literature addressing the other two domains. The terminology describing the various taxonomies and the levels tend to use psychological categories. Additionally, there is no single accepted taxonomy for this domain where there is a high level of acceptance for the taxonomies described in the other two domains.

Probably the most widely accepted taxonomy in the psychomotor domain is that developed by Anita Harrow.[25] The model she described has six levels and subcategories within each:

1.00 Reflex Movements
- 1.10 Segmental Reflexes
- 1.20 Intersegmental Reflexes
- 1.30 Suprasegmental Reflexes

2.00 Basic-Fundamental Movements
- 2.10 Locomotor Movements
- 2.20 Non-Locomotor Movements
- 2.30 Manipulative Movements

3.00 Perceptual Abilities
- 3.10 Kinesthetic Discrimination
- 3.20 Visual Discrimination
- 3.30 Auditory Discrimination
- 3.40 Tactile Discrimination

4.00 Physical Abilities
- 4.10 Endurance

4.20 Strength
4.30 Flexibility
4.40 Agility

5.00 Skilled Movements
5.10 Simple Adaptive Skill
5.20 Computed Adaptive Skill
5.30 Complex Adaptive Skill

6.00 Non-Discursive Communication
6.10 Expressive Movement
6.20 Interpretive Movement

While this taxonomy provides great specificity, it may provide more than is useful here. Again, it is expected that most of the educational and training activities occur in the cognitive domain so that is the venue for detailed descriptions. For the psychomotor domain, it might be useful to have a less detailed but more obvious set of categories. Simpson developed such a taxonomy.[26] Actually, Harrow's taxonomy was a refinement of Simpson's. Below is a brief description of Simpson's taxonomy with examples for each general category:

Description of Simpson's Psychomotor Taxonomy[27]

Perception	ability to identify based on feel or touch.
Set	able to demonstrate use of simple tool, instrument, or mechanism.
Guided response	able to imitate an observed movement or procedure.
Mechanism	demonstrate mixing or combining of chemicals.
Complex overt response	operate complex or intricate equipment.
Origination	create original exercise, movement, game, or technique.

The three domains described should account for any and all educational objectives within a training or education curriculum. The development of training and educational objectives require the use of action words - verbs - to describe the behavior expected. Below is a table showing the levels in the three taxonomies and some verbs that would apply to each:

Cognitive Domain Taxonomy and Verbs

Level	Verbs
Knowledge	identify, specify, state
Comprehension	explain, restate, translate
Application	apply, solve, use
Analysis	analyze, compare, contrast
Synthesis	design, develop, plan
Evaluation	assess, evaluate, judge

Affective Domain Taxonomy and Verbs

Level	Verbs
Receiving	accept, demonstrate awareness, listen
Responding	comply with, engage in, volunteer
Valuing	express a preference for, show concern
Organization	adhere to, defend, synthesize
Characterization by value	show empathy, show ethical consideration

Psychomotor Domain Taxonomy and Verbs

Level	Verbs
Perception	distinguish, identify, select
Set	assume a position, demonstrate, show
Guided Response	attempt, imitate, try
Mechanism	make habitual, practice, repeat
Complex overt response	carry out, operate, perform
Adaptation	adapt, change, revise
Origination	create, design, originate

Cognitive: Recall or recognition of knowledge and the development of intellectual abilities and skills.

Affective: Changes in interest, attitudes, and values, and the development of appreciations and adequate adjustments.

Psychomotor: Develop manipulative or motor-skills which are neuromuscular or physical and involve different degrees of physical dexterity.

It is clear that more emphasis here has been placed on the Cognitive Domain. That emphasis is not accidental. While all three domains have bearing on curricular development, "with the exception of work by people like Rousseau, Froebel, Pestalozzi, and Neil, most of the rest of the world ... marches to the beat of the cognitive drummer."[28] The learning objective determine, to a great degree, the content as well as the delivery methods of a curriculum.

Determining Educational Objectives for Courses

There are three elements or components which should be considered in preparing educational objectives.[29] These are:

a. Activity: The behavior expected of the learner
b. Conditions: The conditions under which the behavior is to be demonstrated
c. Standard: The proficiency expected of the learner.

The use of specific verbs to describe the expected behavior or performance of the participant in a learning exercise is, of course, preferred. The more general the "objective," the less it is understood and the less likely it is to be accomplished. It is not necessary that the objective for a course be quantifiable but it should not be so vague that it is meaningless.

The conditions under which the behavior is to be demonstrated is either artificial (classroom) or realistic (simulation or actual practice) and this gives further meaning to the objective as well as the type of educational model, method and delivery.

The proficiency or mastery expected of the participant is key to evaluating performance as well as evaluating instruction. If the instructor cannot articulate the expected proficiency level, which is somewhat different from the behavior expected, there is little opportunity to assess the instruction, the learning, or the effectiveness of the endeavor. Typically, the performance levels differ from the behavioral expectations in terms of the quantifiability of the performance goals. Performance-based and criterion-based objectives and educational approaches are consistent with the last of the three elements.

Methods of Determining Curricular Content

The methods of determining curricular content range from very informal, *lassie faire* approaches to very formal, structured methods. The following discussion describes several methods along with the advantages and disadvantages of each.

DACUM Approach

A quasi-informal but successful method of developing the basic elements of instruction and curriculum is known as **D**eveloping **A C**urricul**UM** or DACUM. This approach was developed by the Canada Department of Manpower and Immigration along with the General Learning Corporation[30] and is a quick, straight-forward approach to developing the key elements of a curriculum. The first step in DACUM is the development of a single sheet skill profile which serves

as the curricular plan. The profile is typically developed by a group of experts or persons skilled in that particular profession or activity. The DACUM group or committee develops the profile which serves as the basis for instructional content and may suggest the evaluation instruments or approaches.

Using the profile as a guide, the committee develops course which, intuitively and based on their expertise, is likely to address the elements of the skill profile. The curriculum may be a single course or a set of course, organized in a logical sequential fashion. A variation of this model is the use of experts, meeting informally, to develop the skill profile while a subsequent group or groups validate the profile and develop the curriculum.

The DACUM method is the method used most often to quickly respond to new issues or problems where action is imperative and, even if the instruction is not exactly on target, it is better than existing approaches and, in the collective wisdom of the experts, is the most appropriate under the circumstances. This method is widely accepted and often used. It is similar to the informal and formal discussions and interviews describe in the previous section. While it may suffer from questions of reliability and validity, it may be the best, most appropriate method for the initial develop of a curriculum on any topic, serving as a starting point from which other, more rigorous methods may spring.

The Delphi Technique

The Delphi process is designed to provide the central or "true" answer to a question or issue. Originally developed by the RAND Corporation,[31] the Delphi Technique is a more formalized process than the DACUM model but retains many of the same elements. A panel of experts (Delphi Panel) is posed a set of questions, often through mailed questionnaires, regarding the future needs in a particular area. The responses are tabulated, grouped and assessed. The process is then repeated with refinements in the issues and questions, until consensus of the experts is attained. Once consensus is attained, the presumption is that the content is the best, from the standpoint of the experts. The Delphi approach is useful in model building and can form the basis for planning future activities, in addition to the development of a curriculum.

The Delphi method is generally expedient, inexpensive, easily understood, and versatile. It can be used wherever expert opinion is believed to exist. It has grown in popularity and has generally been accepted in the fields of education, criminal justice, business, and economics.

A major difference between the DACUM model and the Delphi Technique is the interaction of the experts. In the DACUM model, the experts can and often do discuss and debate the merits of various approaches. While this has the advantage of providing context and informing the next stages of discussion and decisions, it may also bias the results. Dominant or aggressive experts may prevail, even though the basis of their arguments may not be the most compelling. The Delphi Technique keeps separate the experts and only the substance, not the emotion, of their comments and suggestions is evaluated and rated.

This technique is a strong one for predicting future events, needs, or actions but is only as valid as

the presumptions and caveats of the experts. Within the law enforcement arena, the Delphi Technique has been used to predict future needs of police, based on economic, social and demographic, and political variables.[32] As these variables change, as political powers come into or go out of office for example, the validity of the predictions changes. The same is true of a curriculum developed through a Delphi Technique.

Critical Incident Technique

Although this approach appears to be based on some catastrophic event, it frequently is used to identify any skill or performance deficit. In its broadest sense, the Critical Incident Technique responds to the question, What do professionals need to know in order to respond better to an activity or incident? Often supervisors or managers within an organization or group are asked to complete a "Critical Incident Form" on all incidents or situations they can remember that are associated with the type of activity under consideration. These supervisors or managers are not asked to anticipate the future (as experts are often asked to do) but to recollect past events and comment on things the worker did or did not do that could be considered a failure or flaw. These behaviors or activities then represent the universe of actions which need to be corrected through instruction. The activities are grouped and prioritized then incorporated into instruction.

This process has a high level of validity, since it is based on past events and observed behavior, but is still subject of errors of interpretation. Additionally, the supervisors or managers may not be aware of all flaws or deficits. When activities involve multiple professions or occupations, there is little opportunity to have comments which address panoramic problems or flaws or to prioritize the various activities.

Task Analysis Approach

Although the Task Analysis is discussed in the previous section on "Needs Assessment," it is an often-cited approach to determining content of curriculum, not simply the need for a curriculum. In this section, the discussion is limited to content determination applications of Task Analysis.

A task may be the comprehensive body of activities of a profession or occupation or it may be the limited and focused activity associated with a particular function or situation. Task Analysis "can be viewed as an assessment of the specific 'tasks' that need to be performed to appropriately deal with the problem."[33] The "problem" may be an isolated incident or situation which requires particular skills or abilities. The analysis requires complete and comprehensive identification of all activities or tasks associated with the incident or situation. Following the listing of activities or tasks, typically veteran professionals responsible for doing that or similar activities or tasks are asked to validate the list or "inventory" and may indicate the frequency or criticality of the item or task. The result is an inventory of activities or tasks which need to be included in instructing workers on the accomplishment of the problem or training for an occupation. The advantage of this approach is the systematic and quasi-scientific methodology used, suggesting generalizability, reliability and validity. The process is frequently a long one and the effectiveness is determined by the comprehensiveness of the inventory. Task Analysis is often used for entry-level instruction and not for specialty in-service activities however it is unparalleled in its comprehensiveness.

Methods of Determining Curricular Content

Objective (Bloom's Level of Cognition)	DACUM	Delphi	Critical Incident	Task Analysis
Knowledge	XX	XXX	XXX	XXXX
Knowledge of Specifics	XX	XXX	XXX	XXXX
Knowledge - ways to deal with Specifics	XX	XXX	XXX	XXXX
Knowledge of Principles and theories	X	XXX	XXX	XXXX
Comprehension	X	XXX	XXX	XXXX
Translation	X	XXX	XXX	XXXX
Interpretation	X	XXX	XXX	XXXX
Extrapolation	X	XXX	XXX	XXXX
Application	x	X	XXX	XXXX
Analysis	x	X	XX	XXX
Analysis of Elements	x	X	XX	XXX
Analysis of Relationships	x	X	XX	XXX
Analysis of Organizational principles	x	X	XX	XXX
Synthesis	x	X		XX
Evaluation	x	X		XX

X's indicate the perceived strength of the approach at the level of cognition

Models of Instruction

Curricular content is determined by a number of issues, not the least of which is the anticipated model to be used in the instruction. The fields of education and instruction are awash with models and examples of instruction and education. For our purposes, we will focus only on three models which have face validity and which appear to address the types of instruction appropriate to training. The three models discussed here are the Update Model, Competency-based Instruction and Performance-based Instruction.

Update Model

The simplest, most obvious model for professional instruction and training is the Update Model. Under this model, there exists new developments in a field or profession for which a practitioner needs to be updated in order to remain current. This model is the basis for continuing professional education in many fields of practice, including law, medicine, nursing, dentistry, architecture, pharmacy, law enforcement, and many others. The continuing education may be self-directed or directed by the profession. The objective is simple - transfer information through exposure to new approaches or new ideas. This type of instruction is almost always associated with the lower levels of the taxonomy of educational objectives where knowledge, and perhaps comprehension are the objectives. The application of the information is assumed to be self-motivated, as appropriate. It may well be that all of the information provided in the Update Model is not useful to the practitioner or professional. The assumption is that they will utilize that which is appropriate and store away that which is not currently useful or needed.

Legal updates in law enforcement serve as a good example of this model. Many states have continuing education expectations, or "in-service" training requirements for law enforcement. Some

states provide loose guidelines for that training but some mandate that legal updates be a core element representing up to 20 percent of the mandatory training. The legal updates will be useful to some and not useful to others but the information is deemed important enough that all be exposed to the new data.

This model suggests selectivity among the courses offered and those chosen by the professionals. As some point out, "keeping professionals and business people up to date is a means, not an end in itself. When the educator chooses among possible updates to offer, and when the learner selects one update opportunity rather than another, there are criteria at play that carry each well beyond considerations of simply keeping up to date."[34] With this model, courses can be designed quickly and, if modifications need to occur, it will become obvious. To some degree, the demand for courses governs the offerings so there is an assumption that the profession and the professionals know what they need, within limitations, and will select accordingly. Errors in the courses or the content are less egregious since the audience is broad-based and the information is less complex.

Competency-based Instruction

Competency-based instruction is a more recent development and is directed more toward the delivery of a service or skill. "Competence includes a broad range of knowledge, attitudes, and observable patterns [of] behavior which together account for the ability to deliver a specified professional service."[35] This method of educating or instructing has frequently been used in the development of medical curricula. A key general consideration in this approach is the determination of the elements which represent competence in each stage of abilities. These elements represent the specific learning objectives for each course and each program of training. "Generally accepted definitions of competence refer to both the presence of characteristics or the absence of disabilities that render a person fit, or qualified, to perform a specific task or to assume a defined role."[36]

Just as competency is the core element of competency-based instruction, courses, information and materials are included only if they contribute to the development of an individual's competence.[37] Competence must be defined, criteria established, assessment of competence determined and progress charted.

McGaghie[38] suggests that the methods for establishing competence levels are: self-reports by the practitioners, observation by peers, task analyses, critical incidents, and expert's opinions. These methods closely parallel those used in needs assessment and in curriculum development.

Others suggest more objective and quantitative measures of competence. These are, of course, more defensible based on reliability and validity. Competence in knowledge areas at the lower levels of the taxonomy of educational objectives would be judged simply by tests. Competence in areas at the upper levels would be proven by exercises or tasks. As Nowlen says, "competence understood as knowledge and skill is more easily investigated and defined by research" while "richer concepts of competence has to receive more careful attention."[39] Competence-based instruction is individualistic in its focus and its assessment. Competence is assumed to be based on individual criteria which, in many instances, is correct. Some activities require collective work and that suggests another model of instruction and curricula, the performance-based model.

Competency-based instruction, for all of its virtues, does not address all issues. It is most consistent with individualized instruction. Competency, as used in the literature, is primarily an individuals level of activity, at or above an established standard. For group activities, Performance-based Instruction is preferred. The following matrix suggests the purposes of training, by methods of instruction:

Purposes and Methods of Instruction

Purpose of Training	Update Method	Competency-Based	Performance-Based
Mass Awareness and Information	Preferred		
Develop Individual Knowledge, Skills, Abilities	Appropriate In-service	Preferred - Individual Training	Preferred - Group Training
Develop Group Abilities, Skills,			Preferred - Group

Many of the activities in a professional setting are group activities. It is important, therefore, to address the preferred method of group expertise, Performance-based Instruction.

Performance-based Instruction

Another relatively new approach to continuing education and adult education is "performance model" or performance-based instruction. Under this model, performance criteria are established. These criteria are usually based on a proven need or deficit. The difference the learning activity is expected to make in the individual, the activity or the organization is the performance criteria. Performance-based instruction serves as a model for performance-based standards.[40] It is not, however, strictly based on individual performance. "Performance is a function of both individuals and ensembles. Even as an individual matter, performance is the result of interacting social and personal influences."

A very structured approach to performance-based instruction design (PBID) is provided by Pucel.[41] Under this structure, there are seven components: program description, content analysis, content selection, content sequencing, lesson structuring, lesson delivery formatting, and evaluation and feedback procedures. This model allows the development of courses which are simple or complex, individualized or group/organizational exercises, delivered using traditional, modularized, programmed or computerized instruction, and have all of the elements of feedback and revision. It is critical, under this model, to establish course content by functions, by behaviors, and by processes. Objectives are developed and are to be based on performance. While this is the most versatile of the models, it is also the most rigorous and structured in its development.

Models of Training

Objective (Bloom's Level of Cognition)	Update	Competency	Performance
Knowledge	XXX	XXXX	XXXX
Knowledge of Specifics	XXX	XXXX	XXXX
Knowledge of ways to deal with Specifics	XX	XXXX	XXXX

Knowledge of Principles and theories	XX	XXXX	XXXX
Comprehension	X	XXXX	XXXX
Translation	X	XXXX	XXXX
Interpretation	X	XXXX	XXXX
Extrapolation	X	XX	XX
Application		XXX	XXX
Analysis		XXX	XXX
Analysis of Elements		XXX	XXX
Analysis of Relationships		XXX	XXX
Analysis of Organizational principles		XXX	XXX
Synthesis		XXX	XXX
Evaluation		XXX	XXX

X's indicate the perceived strength of the approach at the level of cognition

An interesting application of performance-based training is in the field of law enforcement. Thermer states "simply attending a class and receiving a certificate does not demonstrate learning or satisfactory performance."[42] He points out that "as a performance-based occupation, law enforcement can implement a measurable and valid performance-based system of assessment and unite that with the high standards traditional in law enforcement training." This article focuses on the assessment portions of training but suggests that a valid assess, which is performance-based, will drive the curriculum and the training, making it more appropriate to the field. The process of assessment requires instructors to develop task-oriented, performance measures, in order to evaluate trainees. Ultimately the "portfolio method" of assessment was developed. This method, however, required a framework for "competency" in the accomplishment of tasks. Whether this approach is called "performance-based" or "competency-based" it still represents a valuable effort to develop and apply standards of outcome to instruction. These standards, help to fashion decisions about curricular content as well as assessment decisions.

Whatever the terminology employed, training curricula must consider issues such as essential skills or minimal competencies to be accomplished at various stages in the curriculum process. These issues go to the core of the relevancy of the instruction. If there are no objectives, there can be no confidence in the relevance.

Making Decisions in Curriculum

As the preceding discussions indicate, a training curriculum can be developed using any of several approaches. It can be developed in the *abstract* or it can be developed based on an assessment *current knowledge* including projections of *current and future needs.* Abstract development is the least reliable and valid of the approaches. It may be the necessary approach if curricula must be developed in an entirely new area of inquiry, devoid of knowledge and information. To use this approach when information is available but not being utilized or considered is irresponsible curriculum planning. It would be somewhat arrogant for any agency to assert that it knows what training is needed and for whom, without regard for the needs, gaps and capacities of the persons and agencies receiving the training. We believe that such an approach would be recognized by the recipient as indefensible, therefore shunned or certainly not embraced.

The assessment of current knowledge, current needs, and future needs represents the appropriate predicate for a viable training initiative. This assessment is essential for the development of a valid curriculum on a subject.

As is true of any decision-making process, there are many elements which must be considered. Three basic elements to be considered are: constraints, implications, and needs.

Constraints

Time and resources are two of the key constraints which are most often of concern. If decisions on curricular content must be made quickly due to the criticality of the subject or the demands by professionals, the models used to determine curricular content which are responsive to quick determination are the ones most likely to be employed. These models may help to guide the decision-maker in leaning toward or away from certain elements of the curriculum.

Resources, most frequently funding for an activity, certainly influences which training can and should occur. Again, the decision-maker, as a responsible administrator of resources, must sometimes compromise ideal strategies in consideration of constraints.

Implications

The criticality of issues and training along with the effects of potential mistakes, represent important considerations in selecting curricula. Just as triage is necessary in emergency health care, the identification of the most serious and most important issues should guide the selection of training content. Similarly, the implications of mistakes - including erroneous material or failing to include important material - must be considered. These Type I and Type II errors (Type I error is an error of inclusion while a Type II error is one of erroneous exclusion) can affect both quality and resources. The more critical the issue, the better it is to risk a Type I error and include material that is not germane rather than exclude material that is later found to have been important.

As curricula are evaluated, refined, and revised, the likelihood of errors decreases.

Needs

Curriculum development is a continuous process. Just as curricular content may be determined through a variety of processes, some complex and some simple, the continuing needs of the curricula may be determined using the same processes.

Below are two approaches described earlier which can be used to make decisions associated with training programs and curriculum:

> *Rational Process*. If there is insufficient time or insufficient information on which to proceed but it is essential to proceed quickly, a rational approach, informed by experts on the subject, may be the most viable method to use to make key decisions on the inclusion of information in a curriculum. This method, however, should be restricted to the initial

approaches and not the revision and continued development of the curricula. If the experts on the subject are sufficiently knowledgeable, representative, unbiased, and articulate, the initial curricula should be appropriate and valid. This method is an established one in the development of curricula in training and education. It relies upon the strength of those experts who recommend and design the elements, based on their intuitive and experiential views of needs and gaps.

Assessment Process. The assessment of constraints, implications, needs and gaps, using proper methodology, can serve as the most defensible method of deciding on any curricula. What is suggested here is a general assessment, based on the dimensions described above, of a functional category, not an assessment of specific agencies. Sometimes the clientele or "end-users" are asked to respond to structured (sometimes unstructured but focused) questions regarding their needs and gaps. The curricula, if based on this method, are insured to be responsive to the perceived needs of those receiving the instruction. Subject-matter experts still have a key role to play in this method of curriculum development. The questions must be asked in ways that are performance-based, not terminology based. The responses must also be representative of the groups being surveyed (survey is used in the generic sense here and does not restrict the enquiry).

The "assessment process" can be used in concert with or subsequent to the "rational process" mentioned above. An initial curricula, lesson plan, syllabus, or technique may be based on a "rational process" and subsequent curricula, plans, syllabi, or techniques based on the more reliable, valid, and defensible "assessment process."

Another method incorporating the two would be a "generic" curriculum designed to inform the clientele of the subject so that the subsequent assessment would be more likely to identify the issues associated with the topic. This would be particularly useful in esoteric areas where it is likely that the clientele "does not know what they do not know" and, therefore, could not respond precisely to the issues. It would be essential, however, to follow the generic curriculum with an assessment to determine the most appropriate instruction to be offered subsequently.

Method of Delivery

To demonstrate the centrality of educational objectives, the following table is extracted from information provided by Kern, et al.[43] It provides us with a description of the most appropriate methods of delivery, based on the type or category of the learning objectives and the domains in which they are present:

Instructional Methods	**Type of Objective**				
	Cognitive: Low	Cognitive: High	Affective	Psychomotor: Competence	Psychomotor: Performance
Readings/Video	XXX	X	X	X	
Lecture	XXX	X	X	X	
Discussion	XX	XX	XXX	X	X
Problem-solving exercises	XX	XXX	X		X
Programmed learning	XXX	XX		X	
Learning projects	XXX	XXX	X	X	X
Role projects		X	XX	X	XX
Demonstration	X	X	X	XX	XX
Real-life experiences	X	XX	XX	XXX	XXX
Simulated experiences	X	XX	XX	XXX	X
Video review	X			XXX	X

In this table, the instructional methods can be described as:

Readings/Video - Learner in a passive role.
Lecture - Learner in passive role, information able to be verbalized.
Discussion - Learner in a more active role, feedback immediate.
Problem-solving exercises - Active learning with problem solving skills reinforced.
Programmed learning - Material organized and presented in sequential, modular fashion.
Learning projects- Active, self-paced, ipsative, may involve simulations, involves problem-solving, applications.
Role projects - Appropriate for psychomotor skills, experience different roles.
Demonstration - Passive learning for more complex skills, psychomotor especially.
Real-life experiences - Necessary to understand, appreciate, experience - affective and psychomotor.
Simulated experiences - Evaluative as well as training.
Video review - Evaluation, reassessment, repeat.

The difference in psychomotor competence and psychomotor performance methods are associated with “demonstrated”or formative competence and “proven” or summative performance.

There are as many methods of delivering training as there are methods of communicating. The most appropriate methods again vary by function, anticipated performance, jurisdictional imperatives and, to a lesser degree, incident type. While this topic will be considered in its entirety in a subsequent chapter, some of the locales appropriate for training are:

> *Central Location Training*: Some training courses are best offered in central locations. The reasons for transporting participants to central or regional locations can include issues such as models, rare equipment, instructional continuity, and the like. The important issue to remember is the centrality of the educational objective. It should guide the selection of the material and the selection of the most appropriate location for the dissemination of information. The more complex and technical the instruction, typically, the more likely it will be delivered in a specially suited environment. This environment may well be a centralized location. Another consideration is the heterogeneity of the participants. If economies of scale do not suggest on-site training, they may suggest centralized facility training.
>
> *On-site Training*. This traditional method could be offered at agency-specific locations, jurisdiction-specific locations, or regionally. Traditional methods are most appropriate for many clientele but time and travel restrictions may limit the audience.
>
> *TV/Video Instruction*. Many agencies and clientele would find it difficult if not impossible to attend training sessions of sufficient length to address the issues but could best utilize structured training. Capsulized training or instructional vignettes may be most appropriate for some audiences, depending on the sensitivity of the topic and the information.
>
> *Computer-based Instruction*. This method may incorporate Internet instruction with the now established computer-based models for delivery of instruction to different audiences. This approach offers the most flexibility for the clientele.

Whatever the method or approach to the delivery of instruction, virtually all research and literature on the topic of instruction suggests that there be a reliable and valid assessment of the information assimilated by the participants. Exposure to information does not insure assimilation of information. Some instructional approaches may prove to be better than others in the transfer of information and the development of performance. Learning objectives and behavioral objectives, key elements of any syllabus, are hollow unless measured. Each instructional component, class, video, etc. should have an assessment of information understood and retained by the recipient. Tests may not be the best method of assessing the instructional impact and many other methods are available for consideration. Regardless of the method, the recipients’ ability to synthesize knowledge, skills and abilities is essential and should be measured to judge the impact, efficacy, and appropriateness of the instruction.

Approaches to Training Delivery

Objective (Bloom's Level of Cognition)	Centralized	On-site	TV/Video	Computer
Knowledge	XX	XX	XXX	XX
Knowledge of Specifics	XX	XX	XXX	XX
Knowledge - ways to deal with Specifics	XX	XX	XX	XX
Knowledge of Principles and theories	XX	XX	XX	XX
Comprehension	XX	XX		XX
Translation	XX	XX		XX
Interpretation	XX	XX		XX
Extrapolation	XX	XX		X
Application	XX	XXX		X
Analysis	XX	XX		X
Analysis of Elements	XX	XX		X
Analysis of Relationships	XX	XX		X
Analysis of Organizational principles	XX	XX		X
Synthesis	XX	XX		
Evaluation	X	XX		

Curricula, to be defensible, appropriate, and valid, must consider the elements listed above. This consideration is typically included in a needs assessment which identifies the gaps associated with each element. Gaps are the focus of training because it is not productive to provide training on existing capabilities, unless they are to be revised and altered or applied differently.

Linking Courses into a Curriculum

This step in the process is actually a culmination and synthesis of the other steps. Once the training objectives have been determined, both globally and specifically, using both terminal and enabling objectives, courses are developed to meet the objectives. Logic and expertise have a great deal to do with the linking of courses but perhaps the most important criteria rest in performance and competence standards. In these standards are developed, along with measurable criteria for assessing them, the curriculum should become more evident. Some courses will be prerequisites for others. Typically the progression of courses will be consistent with the progression along Bloom's Taxonomy. These educational objectives, progressing from the simple to the complex cognitive skills, represent the compass for a curriculum. Typically, the steps in the classification can be considered building blocks. The identification of standards for each of the courses allows potential participants to determine the level at which they should enter the curriculum, based on their prior training, knowledge, skills and abilities. Linking courses into a curriculum is verification that the process has objectives and that the objectives can be ordered.

Revising and Evaluating Training

Regardless of the care taken in the development of curricula, it is necessary to evaluate the content and methods of instruction as well as the persons and organizations delivering the instruction. The

evaluations, to be beyond reproach, should be developed and analyzed by individuals and groups independent of the instructional process. The primary objective in evaluating the instruction is to identify needs, gaps, and capacities being met by the curricula and those which are not being met. Another objective is to verify or validate the instructional process, including the method of delivery as well as the persons and organizations delivering the instruction. Of course, a parallel purpose for evaluation is to certify the knowledge, skills, and abilities attained by the participant in the training process. Sponsoring agencies may see this purpose as the central one but our task here is to address the curricular concerns.

Revisions of curricula should be based on the analysis of the evaluations. Continuation of instructors and instructional organizations should be supported by the analysis of participants' reviews of the method, style, and quality of the instruction. Several models of "student evaluations" are available from most universities. These instruments evaluate the quality, impact, and utility of instruction through a series of core questions and other questions which may be selected by the instructor.

The process used to assess the needs and the development of the curriculum should be replicated periodically to verify, validate and revise the educational objectives of each course and the entire curriculum. Evaluation is a feedback loop which informs the earliest stages of the curricular process, a process which is on-going and continuous. Evaluation becomes a process which has been described as a "cycle within a cycle."[44] Specific participant's performance evaluation may be norm-referenced (each participant compared to other participants) or it may be criteria-referenced (standards or criteria exist against which the performance is assessed). Clearly the criteria-referenced approach is preferred for curricular development, assessment and revision. Standards may, however, be evolving in certain disciplines and for certain topics. Through the assessment and evaluation of performance, curricula are assessed and standards emerge which can be applied to next-generation participants.

One of the keys to an appropriate and successful evaluation of a course or a curriculum is the setting of objectives. "Educational literature has provided us a model that states objectives should be set at the outset in planning continuing education programs. … objectives should be set in behavioral terms: what the learner should be able to say or do upon successful completion of the program. Evaluation of the program and participants should be based on accomplishment of the objectives."[45] Phillips[46] rejects the frequently-stated myth that training programs cannot be evaluated, stating that they can and they must be evaluated. He provides several models or approaches to evaluation, one of which is Kirkpatrick's Four Levels of Evaluation:

Level	Question
Reaction	Were the participants pleased with the program?
Learning	What did the participants learn in the program?
Behavior	Did the participants change their behavior based on what was learned?
Results	Did the change in behavior positively affect the organization?

Educational objectives, particularly Bloom's taxonomy, provide insight into the development of objectives and the appropriate methods of evaluating the learning. Pretest, posttest methodologies

can be used to fashion evaluations on the behavioral implications and the outcome or results.

Evaluating the instruction can lead to better instruction. Evaluating the course or program can lead to better courses and programs. Evaluating the learner can lead to standards and measures of competency or performance which can anchor the initiative, give it credibility and durability, and produce a discipline or paradigm. To do anything less suggests that the initiative is temporary and not worthy of serious training.

Summary

This section has accumulated prominent and current literature on the topic of curriculum development. As is evident, there is no "standard" approach to the development of a curriculum, the approach is dependant upon a number of issues. An effort has been made to articulate the issues, define the approaches, and provide matrices to focus the matching of approaches to objectives.

Key to the development of an appropriate training initiative is the development of training objectives. What is presented here is the most widely accepted classification of educational objectives, Bloom's *Taxonomy of Educational Objectives*. This classification guides the selection of training content, methods of instruction and methods of evaluation.

Several methods for determining curricular content are described. All are appropriate and viable, depending upon the instructional model and the decision-making elements. The DACUM approach is one used most frequently during the early stages of a training initiative. As the initiative matures, other approaches such as the Delphi method and Task Analysis method are appropriate for strategic development of training programs.

Again, depending upon the training objectives, it is important to define the training approach as "update," "competency-based," or "performance-based." This determination may vary by course and by audience but it may be one of the most important ones in the development of a curriculum. Competency-based training is more individualized and can easily lead to standards and expectations, by function and by level. Performance-based training is more appropriate for group activities and it, too, can lead to standards and expectations, against which performance can be measured.

Evaluation methods are dependant upon educational objective, level of instruction and type of training. Nonetheless, evaluation is critical and necessary. It is necessary to determine competence, performance and the need for and direction of revision of training courses, curricula, and programs.

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