

Fire Service Course Design--One Week

FSCD-Student Manual

1st Edition, 9th Printing-December 2013



FEMA

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U.S. DEPARTMENT OF HOMELAND SECURITY

PREPAREDNESS DIRECTORATE

UNITED STATES FIRE ADMINISTRATION

NATIONAL FIRE ACADEMY

FOREWORD

The U.S. Fire Administration (USFA), an important component of the Department of Homeland Security (DHS) Preparedness Directorate, serves the leadership of this Nation as the DHS's fire protection and emergency response expert. The USFA is located at the National Emergency Training Center (NETC) in Emmitsburg, Maryland, and includes the National Fire Academy (NFA), National Fire Data Center (NFDC), and the National Fire Programs (NFP). The USFA also provides oversight and management of the Noble Training Center in Anniston, Alabama. The mission of the USFA is to save lives and reduce economic losses due to fire and related emergencies through training, research, data collection and analysis, public education, and coordination with other Federal agencies and fire protection and emergency service personnel.

The USFA's National Fire Academy offers a diverse course delivery system, combining resident courses, off-campus deliveries in cooperation with State training organizations, weekend instruction, and online courses. The USFA maintains a blended learning approach to its course selections and course development. Resident courses are delivered at both the Emmitsburg campus and its Noble facility. Off-campus courses are delivered in cooperation with State and local fire training organizations to ensure this Nation's firefighters are prepared for the hazards they face.

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Glossary

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FIRE SERVICE COURSE DESIGN--ONE WEEK

SCHEDULE

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
AM	Unit 1: Instructional Design	Unit 3: Conducting the Job Task Analysis	Unit 4: Goals and Objectives	Unit 5: Course Organization and Content Considerations	Unit 7: Selecting Instructional Methods and Creating Learning Activities	Unit 9: Course Manuals Step 9: Course Manuals
PM	Unit 2: Needs Assessment Form--Project Groups	Unit 3 (cont'd)	Unit 4 (cont'd)	Unit 6: Determining a Course Evaluation Plan	Unit 8: Selecting Instructional Media	Unit 10: Course Conclusion
EVENING	Review Units 1 and 2 of Student Manual Read Unit 3 of Student Manual Step 1: Conducting a Training Needs Assessment Step 2: Defining a Target Audience	Read Unit 4 of Student Manual Step 3: Conducting a Job Task Analysis	Read Units 5 and 6 of Student Manual Step 4: Write Course Goal and Objectives	Read Units 7 and 8 of Student Manual Step 5: Course Organization Step 6: Determining Course Evaluation Plans	Read Unit 9 of Student Manual Step 7: Selecting Methods of Instruction and Designing Learning Activities Step 8: Selecting Media	

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FIREFIGHTER CODE OF ETHICS

Background

The Fire Service is a noble calling, one which is founded on mutual respect and trust between firefighters and the citizens they serve. To ensure the continuing integrity of the Fire Service, the highest standards of ethical conduct must be maintained at all times.

Developed in response to the publication of the Fire Service Reputation Management White Paper, the purpose of this National Firefighter Code of Ethics is to establish criteria that encourages fire service personnel to promote a culture of ethical integrity and high standards of professionalism in our field. The broad scope of this recommended Code of Ethics is intended to mitigate and negate situations that may result in embarrassment and waning of public support for what has historically been a highly respected profession.

Ethics comes from the Greek word ethos, meaning character. Character is not necessarily defined by how a person behaves when conditions are optimal and life is good. It is easy to take the high road when the path is paved and obstacles are few or non-existent. Character is also defined by decisions made under pressure, when no one is looking, when the road contains land mines, and the way is obscured. As members of the Fire Service, we share a responsibility to project an ethical character of professionalism, integrity, compassion, loyalty and honesty in all that we do, all of the time.

We need to accept this ethics challenge and be truly willing to maintain a culture that is consistent with the expectations outlined in this document. By doing so, we can create a legacy that validates and sustains the distinguished Fire Service institution, and at the same time ensure that we leave the Fire Service in better condition than when we arrived.



FIREFIGHTER CODE OF ETHICS

I understand that I have the responsibility to conduct myself in a manner that reflects proper ethical behavior and integrity. In so doing, I will help foster a continuing positive public perception of the fire service. Therefore, I pledge the following...

- Always conduct myself, on and off duty, in a manner that reflects positively on myself, my department and the fire service in general.
- Accept responsibility for my actions and for the consequences of my actions.
- Support the concept of fairness and the value of diverse thoughts and opinions.
- Avoid situations that would adversely affect the credibility or public perception of the fire service profession.
- Be truthful and honest at all times and report instances of cheating or other dishonest acts that compromise the integrity of the fire service.
- Conduct my personal affairs in a manner that does not improperly influence the performance of my duties, or bring discredit to my organization.
- Be respectful and conscious of each member's safety and welfare.
- Recognize that I serve in a position of public trust that requires stewardship in the honest and efficient use of publicly owned resources, including uniforms, facilities, vehicles and equipment and that these are protected from misuse and theft.
- Exercise professionalism, competence, respect and loyalty in the performance of my duties and use information, confidential or otherwise, gained by virtue of my position, only to benefit those I am entrusted to serve.
- Avoid financial investments, outside employment, outside business interests or activities that conflict with or are enhanced by my official position or have the potential to create the perception of impropriety.
- Never propose or accept personal rewards, special privileges, benefits, advancement, honors or gifts that may create a conflict of interest, or the appearance thereof.
- Never engage in activities involving alcohol or other substance use or abuse that can impair my mental state or the performance of my duties and compromise safety.
- Never discriminate on the basis of race, religion, color, creed, age, marital status, national origin, ancestry, gender, sexual preference, medical condition or handicap.
- Never harass, intimidate or threaten fellow members of the service or the public and stop or report the actions of other firefighters who engage in such behaviors.
- Responsibly use social networking, electronic communications, or other media technology opportunities in a manner that does not discredit, dishonor or embarrass my organization, the fire service and the public. I also understand that failure to resolve or report inappropriate use of this media equates to condoning this behavior.

Developed by the National Society of Executive Fire Officers

A Student Guide to End-of-course Evaluations

Say What You Mean ...

Ten Things You Can Do to Improve the National Fire Academy

The National Fire Academy takes its course evaluations very seriously. Your comments and suggestions enable us to improve your learning experience.

Unfortunately, we often get end-of-course comments like these that are vague and, therefore, not actionable. We know you are trying to keep your answers short, but the more specific you can be, the better we can respond.



Actual quotes from student evaluations:	Examples of specific, actionable comments that would help us improve the course:
1 "Update the materials."	<ul style="list-style-type: none"> The (ABC) fire video is out-of-date because of the dangerous tactics it demonstrates. The available (XYZ) video shows current practices. The student manual references building codes that are 12 years old.
2 "We want an advanced class in (fill in the blank)."	<ul style="list-style-type: none"> We would like a class that enables us to calculate energy transfer rates resulting from exposure fires. We would like a class that provides one-on-one workplace harassment counseling practice exercises.
3 "More activities."	<ul style="list-style-type: none"> An activity where students can physically measure the area of sprinkler coverage would improve understanding of the concept. Not all students were able to fill all ICS positions in the exercises. Add more exercises so all students can participate.
4 "A longer course."	<ul style="list-style-type: none"> The class should be increased by one hour per day to enable all students to participate in exercises. The class should be increased by two days so that all group presentations can be peer evaluated and have written abstracts.
5 "Readable plans."	<ul style="list-style-type: none"> The plans should be enlarged to 11 by 17 and provided with an accurate scale. My plan set was blurry, which caused the dotted lines to be interpreted as solid lines.
6 "Better student guide organization," "manual did not coincide with slides."	<ul style="list-style-type: none"> The slide sequence in Unit 4 did not align with the content in the student manual from slides 4-16 through 4-21. The instructor added slides in Unit 4 that were not in my student manual.
7 "Dry in spots."	<ul style="list-style-type: none"> The instructor/activity should have used student group activities rather than lecture to explain Maslow's Hierarchy. Create a pre-course reading on symbiotic personal relationships rather than trying to lecture on them in class.
8 "More visual aids."	<ul style="list-style-type: none"> The text description of V-patterns did not provide three-dimensional views. More photographs or drawings would help me imagine the pattern. There was a video clip on NBC News (date) that summarized the topic very well.
9 "Re-evaluate pre-course assignments."	<ul style="list-style-type: none"> The pre-course assignments were not discussed or referenced in class. Either connect them to the course content or delete them. The pre-course assignments on ICS could be reduced to a one-page job aid rather than a 25-page reading.
10 "A better understanding of NIMS."	<ul style="list-style-type: none"> The instructor did not explain the connection between NIMS and ICS. The student manual needs an illustrated guide to NIMS.

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UNIT 1: INSTRUCTIONAL DESIGN

TERMINAL OBJECTIVE

Given definitions of the roles of the instructor and course designer, the students will be able to differentiate the roles as they apply to the Instructional System Design (ISD) process.

ENABLING OBJECTIVES

Given a lecture and the ISD model, the students will:

- 1. Discuss the role of the instructor as it applies to the ISD process.*
 - 2. Discuss the role of the instructional designer as it applies to the ISD process.*
 - 3. Identify the components of the ISD process with 100-percent accuracy.*
-

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ORIENTATION TO COURSE

This course will provide you with the skills you need to design courses that can be used effectively by other instructors. It is based on the idea that instruction should be designed **systematically**. For clarity, the individual units of this course parallel the phases of the **Instructional Design System (ISD) process**.

Optional readings from these course textbooks will be suggested throughout the course:

- Leshin, Cynthia B., Joellyn Pollock, and Charles M. Reigeluth. *Instructional Design Strategies and Tactics*. Englewood Cliffs: Education Technology Publication, 1992.
- Rothwell, William J., and H. C. Kazanas. *Mastering the Instruction Design Process: A Systematic Approach*. San Francisco: Jossey-Bass Publishers, 1998.

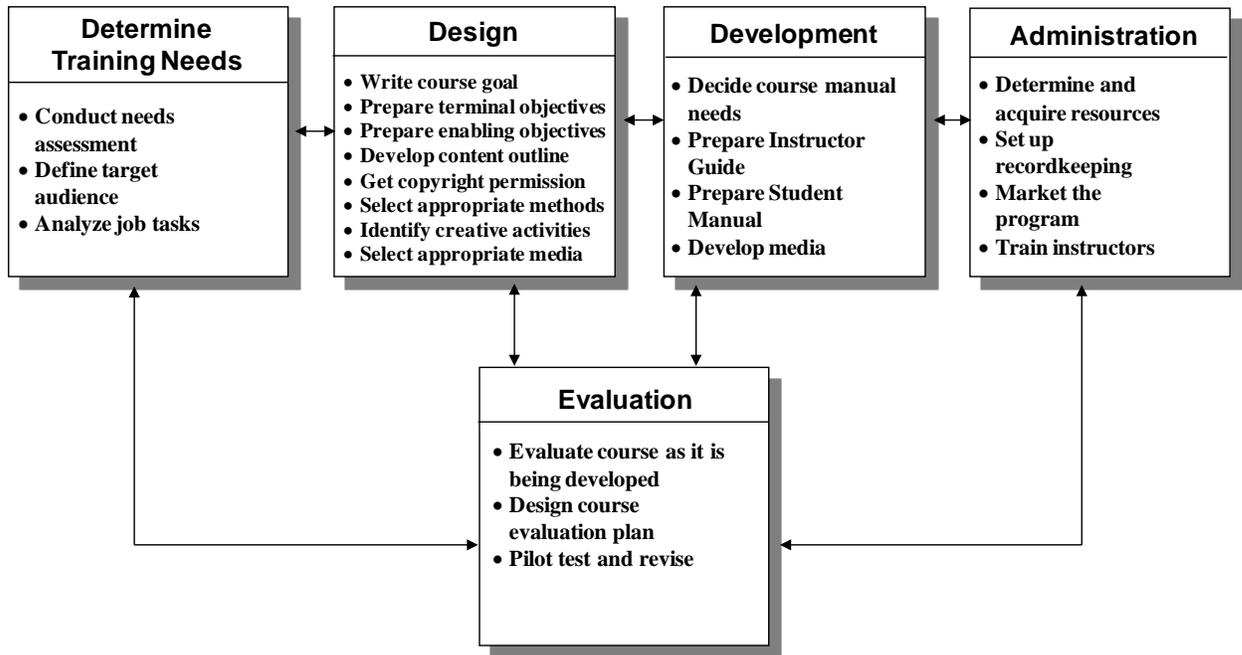
COMPONENTS OF THE INSTRUCTIONAL SYSTEM DESIGN MODEL

ISD began around the time of World War II, with roots in the fields of psychology and military training. It began originally as a systems approach to problem-solving, in which scientific methods of inquiry were applied to instructional planning; this created the systematic design of instruction.

Early instructional designers focused on identifying and defining the elements of instruction. They established (and published) methods for writing objectives, organizing subject matter content, analyzing tasks to determine training needs, using instructional technologies, and evaluating instruction.

More recently, in the 1960's and 1970's, ISD gained popularity as a profession, and many theories of instructional design emerged. ISD professionals tried to put the various instructional elements together in cohesive design models to explain and describe the phenomenon of instructional design. They also worked to define ISD terminology more precisely.

INSTRUCTIONAL SYSTEM DESIGN MODEL FOR COURSE DEVELOPMENT



This model is not the only one available. Instructional designers have created other models to meet their planning needs in particular environments. In practice, instructional designers tend to draw from several different models when they design instruction.

At this point, it is useful to examine the differences and similarities between a **course instructor** and a **course developer**. While there are some functions these two have in common--good content knowledge, understanding of group dynamics, an ability to connect goals and objectives to realistic activities, etc.--here we concentrate on developer responsibilities. Since, in most fire departments, the course instructor is also its developer, your twofold responsibility will provide you with a unique perspective which will be very helpful in taking this course.

ROLE OF THE INSTRUCTOR

The instructor's role includes preparing the material that he/she is presenting to the audience, delivering the new material, and completing an assessment to see that a transfer of learning has occurred.

The instructor controls the learning environment--the optimum conditions for seating, lighting, and temperature--to make the learning experience a pleasant one. His/Her responsibility to handle problem students is through advisement and the possibility of a form of discipline. The instructor administers papers or exams, grades them, and returns them to the students in a timely fashion.

An additional role may be to develop lesson plans, examinations, and/or skills checklists for evaluation of skills-based objectives, and to locate and use instructional aids that benefit the learning experience.

ROLE OF THE COURSE DESIGNER

The course designer has a much more diverse role. He/She conducts a needs analysis to see if a new program needs to be developed or if the problem is not a training problem. The designer conducts task analysis to lay out the plan for writing terminal and enabling objectives.

Course manuals for the instructor and the students must be written with course content to match for the transfer of training to be accomplished. Methods of instruction have to be developed for each of the objectives of the course. Instructional aids have to be located to use, or the designer will have to create them. Evaluation plans are another role of the designer. This plan is based on the task analysis and the objectives that are to be accomplished during the course, and to see that the training has caused a behavior change in the students.

The course designer must develop a marketing plan that starts with the needs analysis and goes through each of the nine steps of the course design process.

These are the differences between instructor and course designer:

Instructor	Course Designer
Implement	Plan
Presentation skills	Understand design process
	Good writing skills
Self-user	Someone else may use
Personal contact--students	Personal contact--resources, other instructors, officers, manuals, management, consultants, peers
Short duration	Long duration
Less complex	More complex
*Deliver as prepared--objective	*Uses subjective judgments, analytical
Completed second	Completed first
*Other than students, primarily works alone	*Works with many people
*Key points	

CHARACTERISTICS OF A GOOD COURSE

What is a good course? Essentially, a good course is one in which:

- Student expectations are met.
- Objectives match job requirements.
- Objectives are addressed by course content and methodology.
- Course materials and assigned projects are challenging.
- Evaluation tools are well-constructed.
- Resources and media are current and relevant.
- Course requirements and expectations are clear.
- Content is current.

All of these elements are addressed by ISD, the use of systematic, planned instruction to enhance the possibility of learning and changing behavior.

BENEFITS OF USING AN INSTRUCTIONAL SYSTEM DESIGN

Instructional designers are valued in today's training programs because their services benefit organizations by:

- assuring what is needed on the job is transferred to the classroom;
- producing satisfactory training results;
- saving the organization time and money;
- making training experiences more meaningful for learners; and
- providing support for instructors.

UNIT 2: NEEDS ASSESSMENT

TERMINAL OBJECTIVES

The students will be able to:

1. *Given methods for determining training needs and the precourse assignment, evaluate if they are working on the correct problem for training.*
2. *Given the precourse assignment and a checklist, describe at least five characteristics of the target audience for their design project.*

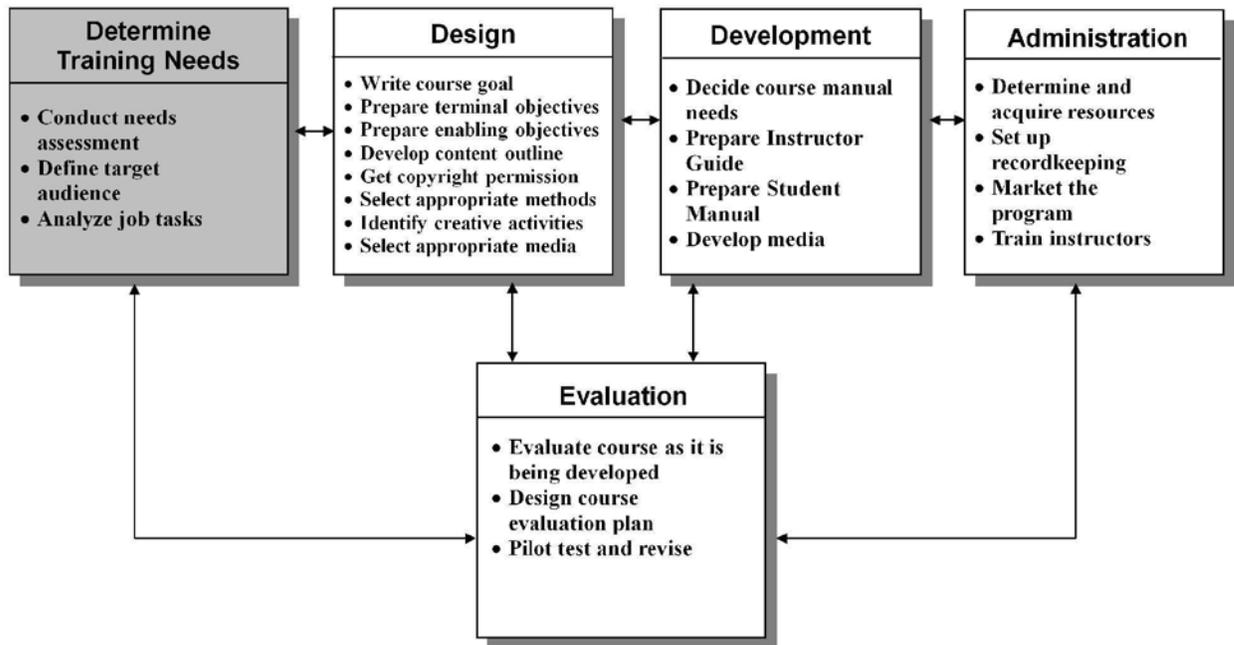
ENABLING OBJECTIVES

The students will:

1. *Given a lecture/discussion, identify the process used to determine training needs, according to the material presented.*
 2. *Given a case study, classify training problems as motivational, training, or environmental, according to the material presented.*
 3. *Given a precourse assignment and the lecture, evaluate the precourse assignment to determine whether the four-step training needs assessment process was applied.*
 4. *Given a precourse assignment, complete the audience analysis checklist from the information according to criteria provided.*
 5. *Review the precourse assignment on audience identification.*
-

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INSTRUCTIONAL SYSTEM DESIGN MODEL FOR COURSE DEVELOPMENT



DETERMINING TRAINING NEEDS

It is the course designer's responsibility to find solutions to problems within an organization. Therefore, one of the most critical tasks is to discover what the organization really needs to improve its performance. When these needs have been identified correctly, it is much easier to find solutions. A training needs assessment establishes the foundation for the course.

With regard to determining **training needs**, your objective is to ensure that you are working on the right problem and that the problem is appropriate for training.

Identifying training needs can be challenging. It also requires a certain amount of political sensitivity in dealing with and questioning members of your organization.

"What is the Problem, Anyway?"

As a trainer, part of your job is to decide what the problem really is and whether training should be part of the solution to that problem. Further, you want to be sure not to use training to solve the **wrong** problem. To help you focus on the real issues, follow this guidance:

- **Watch for "symptoms."** Doctors use the term "chief complaint" to describe a patient's obvious problem, such as stomachache. But often a complaint is a symptom of a deeper problem; for instance, an ulcer. Like the doctor, you should be aware that the chief complaint may be only a symptom that something else is wrong. Use the complaint as a starting point.
- **Look for root causes.** Talk to several people in your organization to get their perspectives and you will begin to see a bigger picture.
- **Whenever possible, observe people at work.** Showing is more efficient and effective than telling.
- **Always ask "why."** People often tell you what they **want** rather than what they really **need**. When they have to explain **why** they need something, the real, underlying need often is revealed.

The training officer needs to focus on challenges that are truly training issues. Oftentimes symptoms of a problem may lead one toward a training issue, but in reality it is mostly another problem such as attitudes or equipment. Some areas to focus on include new subject areas, refresher training, revision of existing materials, and the need to take your responders to the next level of knowledge, skills, or abilities.

A thorough and comprehensive needs assessment will identify gaps in our training. The gap is the difference between our current capabilities and knowledge and where we need to be. As an example, our firefighters are trained to Level I and we need for them to be trained to Level II. Where is the gap? Correct, the gap is the knowledge, skills, and abilities identified in the Job Performance Requirements (JPR) of Firefighter Level II. Another consideration is performing our tasks efficiently, effectively, and in a safe manner.

All of our identified gaps will also need to be evaluated for prerequisite knowledge and skills that are necessary to complete the tasks identified in the gap. Several National Fire Protection Association (NFPA) standards, such as NFPA 1001, *Professional Firefighter Qualifications*, are written in JPR format and are always accompanied with prerequisite knowledge and skills. When looking at our gap, we must also look at prerequisites as well.

In some problems our needs are labeled as training issues while there may be another issue that affects the desired outcome. As an example, the crew of Engine 3 last evening was making an initial attack on a fire on the second floor of a dwelling. After 5 minutes they were seen backing their line out. Today the chief contacted you and instructed you to conduct hoseline management training for Engine 3. When you spoke with the captain of Engine 3 he/she informed you that they backed out after 5 minutes because the floor was sagging and fire was extending vertically through the stud channels. The original perception of the chief was that the personnel were not properly trained. This was not the case and training would have had no impact.

Define the Need--Assess the Gap

A need is a **gap** between what our goal is and what we actually are doing; the gap is where we are falling short. When there is a gap, a change must be made. To determine the nature of that change, we should ask the following questions:

- Are we performing **efficiently**? Are we doing things right?
- Are we performing **effectively**? Are we doing the right things?
- It is possible to do an efficient job, but still be ineffective in reaching our goals because we are "doing the wrong things."

It is easy to fall into the trap of solving the wrong problem or of providing the wrong **solution**. Training is only one of several possible solutions to an organization's problems; it solves some, but not all, problems. The term that describes the difference between the way things should be and the way things are is **gap**. To ensure that training is the appropriate solution to a given problem, carefully assess the gap identified using the following information. Most work-related problems can be classified into the following three items. Trainers may be responsible for solving only the training problems. When these problems have been solved, the gap will be eliminated or reduced.

Training problem/need. When people don't know how to do their job, training can be a solution. When knowledge is deficient, instruction should be provided in the deficient areas. Occasionally, trainees may already "know" how to perform, but need practice to become proficient. In this case, it may be enough to provide for supervised practice without any other formal training. Be sure trainees get feedback so they know how they are doing and what they need to do to improve.

Motivational problem/need. Do people lack motivation? Phrased another way, could they do the given job if their lives depended on it? If the answer is yes, but they aren't now doing the job from day to day, there is a motivational problem. One of the worst mistakes trainers make is trying to train people to do what they can do already. If people don't want to do the task, training will not help; in fact, it will probably make people angry.

Motivational problems usually are caused by organizational factors. To increase motivation, you must change the way an organization rewards, punishes, and acknowledges different behaviors. Put simply, motivational problems are best handled by matching rewards and punishments to positive and negative behaviors, respectively, and by giving feedback and reinforcement.

Environmental problem/need. Occasionally, outside forces can keep people from doing what they know how to do. These outside (or environmental) problems are either **obstacles**, things that can be changed (e.g., poor equipment that can be replaced) or **constraints**, things that can't be changed (e.g., weather conditions).

Sometimes the distinction between an obstacle and a constraint is relative. For example, if there is no money for new equipment, poor equipment becomes constraining (at least temporarily). It is always a good idea to keep an open mind about possible creative solutions, e.g., sharing equipment, upgrading the equipment you have, or raising money for what you need.

WHAT IF THE PROBLEM IS NOT A TRAINING PROBLEM?

Based on the preceding steps, you are now ready to make recommendations. These should address the needs that you have identified and should cover all significant aspects of the problem and the proposed solution(s), e.g., the training and practice to be provided (if any), any organizational changes that are needed, ways of coping with major environmental constraints, etc.

Note that training can be all or only part of the solution. In these latter cases, it is important to develop an overall strategy that combines training and organizational changes.

After determining your training topic, you should identify your training audience by conducting an **audience analysis**. This is done by gathering relevant information about your intended audience. While the specific information you need varies, depending on your instructional situation, components of the audience analysis generally include

- **academic factors:** academic background and training level completed, reading level, background in subject matter, and special or advanced courses completed relating to subject matter; and/or
- **personal and social factors:** age and maturity level, special talents, expectations and vocational aspirations, motivation and attitude toward subject matter, learning styles, and special learning needs.

WAYS TO IDENTIFY THE TRAINING NEEDS OF AN ORGANIZATION

There are several methods--each with its own advantages and limitations--for identifying the training need "gaps" of an organization. Brief descriptions of these methods follow.

Interviews reveal feelings, causes, and possible solutions as well as facts; they also allow maximum opportunity for free expressions of opinion and the giving of suggestions. The limitations of interviewing as a tool for identifying training needs are

- time-consuming (i.e., you can reach relatively few people);
- its results may be difficult to quantify; and
- it may make subjects feel that they are being put "on the spot."

Questionnaires can be used to reach many people in a short time. They are relatively inexpensive, permit people to express themselves without fear of embarrassment, and yield data that can be summarized and reported easily. Limitations on the use of questionnaires are

- makes little provision for free expression of unanticipated responses;

- it may be difficult to construct; and
- it has limited effectiveness in targeting the causes of problems and their possible solutions.

Tests are useful as diagnostic tools to identify specific areas of deficiencies. They can help in selecting those potential trainees who can be trained most profitably, and their results are easy to compare and report. On the other hand, there is the issue of validation: there are many specific situations for which validated tests are not available, and tests validated elsewhere may prove invalid in new situations. Another drawback is the fact that test results can only give clues as to what the problem might be. Finally, tests are only second-best evidence for determining job performance.

Group problem analysis has the same advantages as the interview method, plus it permits the synthesis of different viewpoints, promotes general understanding and agreement, and builds support for needed training. In fact, group problem analysis is in itself good training. The method's limitations are

- it is time-consuming;
- it is initially expensive; and
- its results may be difficult to quantify.

Further, because of its time-consuming nature, supervisors and executives may not want to participate.

Job analysis and performance review produce specific, precise information about jobs and performance; they are tied directly to actual jobs and on-the-job performance. Additionally, these methods break jobs into segments that are manageable for both training and appraisal purposes. However, these methods are time-consuming and difficult for people not specifically trained in job analysis techniques. Supervisors often dislike reviewing employees' inadequacies with them. In addition, these techniques reveal the training needs of **individuals**, but not those based on the needs of the **organization**.

A records and reports study provides both excellent clues to trouble spots and the best objective evidence of results of problems. Further, it is usually of concern to, and easily understood by, operating officials. Such a study, however, does not show the cause of problems or possible solutions. Also, it may not provide enough cases (e.g., grievances) to be meaningful, and it may not reflect a current situation or any recent changes.

**Table 2-1
Methods of Needs Determination**

Method	Advantages	Limitations	Do's and Don't's
Interview	<p>Reveals feelings, causes, and possible solutions as well as facts.</p> <p>Affords maximum opportunity for free expression of opinion, giving of suggestions.</p>	<p>Is time-consuming; can reach relatively few people.</p> <p>Results may be difficult to quantify.</p> <p>Can make subject feel he/she is "on the spot."</p>	<p>Pretest and revise interview questions as needed.</p> <p>Be sure interviewer can and does listen, doesn't judge responses.</p> <p>Do not use to interpret, sell, or educate.</p>
Questionnaire	<p>Can reach many people in a short time.</p> <p>Is relatively inexpensive.</p> <p>Gives opportunity of expression without fear of embarrassment.</p> <p>Yields data that can be easily summarized and reported.</p>	<p>Little provision for free expression of unanticipated responses.</p> <p>May be difficult to construct.</p> <p>Has limited effectiveness in targeting causes of problems and possible solutions.</p>	<p>Pretest and revise questions and form as needed.</p> <p>Offer and safeguard anonymity.</p> <p>Use only if prepared to</p> <ul style="list-style-type: none"> • report findings, both favorable and unfavorable, and • do something about them.
Test	<p>Useful as a diagnostic tool to identify specific areas of deficiencies.</p> <p>Helpful in selecting from among potential trainees those who can most profitably be trained.</p> <p>Results are easy to compare and report.</p>	<p>Tests validated for many specific situations often are not available. Tests validated elsewhere may prove invalid in new situations.</p> <p>Results give clues, are not conclusive. Tests are second-best evidence in relation to job performance.</p>	<p>Know what test measures. Be sure it is worth measuring here. Apply results only to factors for which test is good.</p> <p>Don't use tests to take blame for difficult or unpopular decisions that management should make.</p>
Group Problem Analysis	<p>Same as for interview method, plus:</p> <p>Permits synthesis of different viewpoints.</p> <p>Promotes general understanding and agreement.</p> <p>Builds support for needed training. In itself is good training.</p>	<p>Is time-consuming and initially expensive.</p> <p>Supervisors and executives may feel too busy to participate, want work done for them.</p> <p>Results may be difficult to quantify.</p>	<p>Do not promise or expect quick results.</p> <p>Start with problem known to be of concern to group.</p> <p>Identify all problems of significant concern to group.</p> <p>Let group make own analysis, set own priorities.</p>

**Table 2-1 (cont'd)
Methods of Needs Determination**

Method	Advantages	Limitations	Do's and Don't's
Job Analysis and Performance Review	<p>Produce specific and precise information about jobs, performance.</p> <p>Are tied directly to actual jobs and on-job performance.</p> <p>Break job into segments manageable both for training and for appraisal purposes.</p>	<p>Time-consuming.</p> <p>Difficult for people not specifically trained in job analysis techniques.</p> <p>Supervisors often dislike reviewing employees' inadequacies with them.</p> <p>Reveal training needs of individuals but not those based on needs of organization.</p>	<p>Brush up on job-analysis techniques, arrange special training for those who are to do it.</p> <p>Be sure analysis is of current job and current performance.</p> <p>Review with employee both:</p> <ul style="list-style-type: none"> • analysis of job, and • appraisal of performance.
Records and Reports Study	<p>Provides excellent clues to trouble spots.</p> <p>Provides best objective evidence of results of problems.</p> <p>Usually of concern to and easily understood by operating officials.</p>	<p>Does not show causes of problems, or possible solutions.</p> <p>May not provide enough cases (e.g., grievances) to be meaningful.</p> <p>May not reflect current situation, recent changes.</p>	<p>Use as checks and clues, in combination with other materials.</p>

Once the needs determination process has been identified and a gap has been determined you should ask yourself if the problem is consistent throughout the whole organization, associated with one person or group, a single component or a larger block of knowledge, or does the gap exist due to the potential for new challenges for our organization? Are there prerequisite skills or areas of knowledge that are identified in the gap. Oftentimes new tasks and gaps result of new equipment, new building construction technologies, or changes in occupancies.

Low frequency/High risk needs will identify potential responses that may happen very infrequently, but if they do the consequences to both the civilians and responders could be high. Responders may have limited knowledge or skills in a low frequency response and few events of similar nature that were successfully mitigated. Responses such as fires in mid or highrise structures, water or ice rescue, incidents involving high voltage power lines, incidents involving petroleum or gas transmission lines, and so on. While a response to this type of incident may be rare, it comes with a high risk. Resources such as electronic data collection sites record close calls for firefighters. Fire journals may provide insight as to the type of incidents that occur across the country, National Institute of Occupational Safety and Health (NIOSH) Firefighter Fatality Reports, and other sources can be used to identify potential responses where additional training is needed.

Decisionmaking and response procedures require a process to make safe and pertinent decisions of how best to act and respond to the situation. An engine company of experienced firefighters responding to an automobile fire go to work soon after arrival to mitigate the incident. The decisionmaking process that allows them to make quick decisions and initiate their actions is based on experiences at previous incidents of a similar nature that were safely and successfully mitigated. This process is called the Naturalistic Decision Making process or Recognition Prime Decision Making. A hazardous materials unit arriving at a spill of methyl ethyl either may or may not make an entry into the hazard zone since they are using the Classical Decision Making process where every aspect of the incident are evaluated and a safe plan developed.

CLASSICAL AND RECOGNITION PRIME DECISION MAKING

The Classical Decision Making process carefully evaluates the problem, looks at potential solutions, and determines the best solutions and all risk management procedures that must be implemented and followed. A hazardous materials response team normally uses this decision-making process.

The Naturalistic Decision Making process (also known as Recognition Prime Decision Making process) uses knowledge from a person's previous experience and actions to make decisions about a current situation. An experienced fire officer arrives at a car fire in the passenger compartment. They immediately go to work to suppress the fire and examine the other compartments. In this instance, the officer did not spend a great deal of time gathering information, developing an action plan, identifying appropriate strategic goals and tactical objectives, and reviewing risk management procedures. Their knowledge base gained from other similar incidents provided the knowledge and skills to quickly take action to suppress the fire.

This Gordon Graham video looks at the process to identify those response considerations where the responders may not have all the necessary knowledge to safely proceed in a quick manner, but need to slow down and use the Classical Decision Making method.

The video will discuss low frequency/high risk events. Graham's discussion is based on the Classical Decision Making process versus the Naturalistic Decision Making process. Those incidents that fall in the high risk/low frequency box on the Frequency/Risk Matrix must be evaluated to make sure a needs assessment is considered.

The Frequency/Risk Matrix can be used to evaluate the potential risk for all the major functions and responses for your organization. Prepare a list of all the critical tasks or responses and place them in the appropriate box on the matrix. All incidents identified can be placed in a box of the matrix. The boxes are high frequency/low risk, high frequency/high risk, low frequency/low risk, and low frequency/high risk. Graham discusses incidents in the low frequency/high risk box and divides them into either the time to think it through and plan versus those items that do not provide for a great deal of thought time. You are the captain on Engine One and respond to the call for a residential fire. Upon arrival you are met by a female screaming that her seven year old child is trapped on the second floor. This may be a low frequency/high risk event for your organization with little time to plan for the search. This would be one of the incidents that may fit into the category where responders must be trained to go to work on short notice.

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Activity 2.1

Needs Assessment and Gap Identification

Purpose

To provide you the opportunity to evaluate a training need, determine the gap, and identify appropriate actions to be taken.

Directions

1. You will be divided into four groups.
2. Each group will be assigned a training needs assessment scenario.
3. You will have 15 minutes to consider the needs assessment task and answer activity questions.
4. Your group will select a spokesperson and report your findings to the class.

Scenario 1

The members of platoon A have great difficulty implementing positive-pressure ventilation. All four engine companies and one ladder company of the platoon seem to have difficulty in accomplishing the tactical objective. As the training officer, you prepare training materials for shift commanders to present and activities to reinforce positive results.

The positive-pressure ventilation curriculum consists of a 20-minute lecture followed by a 20-minute video. An activity consisted of using the station as the training location to implement positive-pressure ventilation.

Both platoons B and C, during your needs assessment process, did not raise a concern regarding positive-pressure ventilation. In fact, they praised the lesson material as one of the best in a long time and stated it should be used as a model for future training programs. While the Deputy Chief raised the concern over positive-pressure ventilation as being a training need, all the examples of failure involved platoon A. When questioned, the deputy felt that the main problem was with the platoon A. The Battalion Chief of platoon A strongly defended his training and saw no problems on his shift. When questioned about the delivery of the training and the practical exercise, he was very evasive and became very defensive. He stated that the training materials provided stunk, were subpar, and if he was the department training officer, he would do it differently. He is very busy and has to choose his priorities every single shift.

Scenario 2

Our municipality is getting its first midrise building. A developer is constructing a new six-story senior citizen apartment building which is due to open in 60 days. The largest building our community currently has is a three-story bank where the third floor is only used occasionally for

a meeting because the building does not have an elevator. We have never worked with standpipe hoselines, pressurized stairwells, and areas of safe refuge. Our pump operators have never pumped into an automatic sprinkler system or a standpipe. Our department has had training on emergency elevator usage (one time several years ago). The department training officer is not familiar with rescue and firefighting principles and practices since we have never had the challenge.

Scenario 3

Our community has a small lake in the park on the West side of the city. We also have a medium size river that runs through the city. The river has a 15-ft low head dam that backs up the water for the municipalities water supply. During periods of heavy rain or high water, the water cascading over the dam creates a very strong hydraulic action at the face of the dam. Water levels above the dam may be 25 ft in some places while levels immediately below the dam may be 10 ft in depth. In the summer months, the river at the dam is a popular swimming location. During cold weather months, the lake freezes over and ice builds up on the river. Our department does not have a specific water rescue unit, but Engine 1 is assigned a 14-ft boat with a 20 horse power motor. Often, the company drills on the use of the boat in nice summer months. We have never had a problem at either water source and we have a boat--what more could we need? All members joining the department must demonstrate that they can swim and members operating in the boat must wear a life jacket.

Scenario 4

Our company of 25,000 citizens houses a petroleum tank storage farm. Flammable and combustible liquids are piped in through several pipelines at pressures of up to 100 psi. There are three companies adjacent to each other with a total of 17 storage tanks. They routinely store gasoline, diesel fuel, home heating oil, and one tank stores "Jet A" fuel. All storage tanks are located within a containment dike and a drill is held annually to practice containing product, but allowing water to escape from the containment. The tank farm supplies fuel to approximately 40 companies that cover a 200-mile distribution range. Several years ago, a separate tax district was created for the fuel tank farms and a special Class A foam unit was purchased. The unit has a 1,500 pump, 1,000 gallons of foam concentrate, foam monitor, and four foam handlines.

Each of the three companies are currently constructing 10,000-gallon tanks to house ethanol. The ethanol will be used in blending with gasoline. In a recent meeting with the facility owners, it was discovered that our Class A foam unit may not be appropriate for an ethanol fire. Ethanol will be transported in 8,000-gallon stainless steel MC 306 transport tank trucks. The commodity flow route takes them through the main streets, past a nursing home, elementary school, and an area with lots of multiple-family dwellings.

Previous training consisted primarily on the use of the foam engine and control valves at the containment dikes. We have never had a problem here, but did have a pipeline leak on the property of the State University creating a large pool of gasoline on the ground. The foam truck was used to place a foam blanket on the product until vacuum trucks could remove the product.

Activity 2.1 (cont'd)

Questions

1. What training needs can be identified from the assigned scenario?

2. What is the problem?

3. Using the information gained from the needs assessment, what appears to be a gap between where the agency is today and where the needs assessment says they should be?

4. Is the problem universal to the entire organization, or are there needs to be tailored to a specific component of the agency?

5. Is the need one that could be faced on a regular basis or could it be considered a low-frequency/high-risk event?

6. As a training officer for this organization, what would your recommendation be for your scenario?

Activity 2.2

Needs Analysis--Problem Classification

Purpose

To identify potential problem areas for what has been identified as a training need. Not all problems identified as a training need are most effectively solved through a new or revised training program. Oftentimes, the problem is motivational or environmental.

Directions

1. You will be divided into small groups.
2. You will read the three scenarios below.
3. After reviewing and evaluating the three scenarios, determine which of the three problems would most closely be identified as a training issue, attitude/motivational issue, or an environmental problem.
4. Select and assign the statement that your group most closely feels represents the heart of the problem statement. You may use the following statements only once (each scenario will have a different choice):
 - a. Training issue.
 - b. Attitude/Motivational issue.
 - c. Environmental issue.

Keep in mind that each scenario may have some aspect of one or all problems. For this activity, choose the one that is the predominant problem for scenario.

5. Select a spokesperson to report your group's conclusions.

Scenario 1

The Old Faithful Fire Department has had several eye and facial injuries in the past few months while using the chain and rotary saw on Truck 1. This was identified as a problem last year and one solution was to place a full face shield in the compartment with the saws. This compartment also contains fuel and oil containers. No one used the face protection since it was always covered with oil and smelled like gasoline. The truck captain cleaned the face shields and then placed them in plastic bags. The bags soon became torn and, once again, no one wore the protective equipment. The department has now purchased new face shields and placed them in a

compartment on the opposite side of the truck with salvage corners. The units are clean, however, no one seems to remember to go to the other side of the truck to retrieve the protective devices. Once firefighters are about to use the saw they remember the protective equipment, but do not want to take the time to retrieve it.

Scenario 2

The Company Officers and department Incident Safety Officer have consistently complained that the firefighters do not take the time to buckle their coats, fasten all the straps on their SCBA, and are often operating in smoke conditions without wearing their face piece and using tank air. It seems that we consistently have members treated for smoke inhalation and steam burns on their chest and hand areas. At the last officers meeting, you were asked to put on a training program to solve this problem.

Scenario 3

A new high volume positive-pressure fan was delivered last week. The chief immediately placed it on Engine 1 with a short set of directions on its usage attached to the fan. Last night, we had a fire in a sporting goods store. The fire was located near the rear of the store in an office area. Engine 3 made an initial entry with a 1-3/4-inch hoseline from the main (front) door and advanced down the main aisle toward the seat of the fire. The store was a one-story Type 2 (noncombustible) building with a grid and tile dropped ceiling between the roof and the sales area. Engine 1, upon arrival, decided to place the new fan in service and placed it at the front entrance (only door open into structure at this time) and started the high volume fan. Within seconds, the fire was blown up the back wall and above the dropped ceiling. Soon thereafter, significant fire was blowing down from the ceiling adjacent to the front door. The two firefighters from Engine 3 on the initial attack line were burned while making their escape.

EVENING ASSIGNMENT

Step 2: Defining a Target Audience

For evening work review Units 1 and 2 in your Student Manual (SM) and individually complete Step 2 in the Project manual. Relevant forms follow.

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Step 2

Defining a Target Audience

The next step in your course design is to define your target audience more clearly. Produce a list, no more than one page in length, that describes your target audience. You may use bullet items as provided in the example on the following page.

Use the checklist on the next page as a guide.

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Checklist

Defining a Target Audience

- Have I defined the educational level of the audience?
- Have I defined their entry skill level?
- Do I know what participants might know about the subject already?
- Have I defined the rank of participants?
- What special talents might participants bring to this course?
- How many people need this training?
- Is it a department-wide audience or is it limited to one company/station?
- What are their attitudes about the subject of the program? How do they need to change their attitudes?

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APPROVAL SHEET

I. COMMENTS ON TASK:

II. SUGGESTIONS TO IMPROVE TASK:

_____ Approval granted

_____ Approval, pending correction of suggestions

Student Colleague _____ Date _____

Instructor Approval Signature _____ Date _____

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UNIT 3: CONDUCTING THE JOB TASK ANALYSIS

TERMINAL OBJECTIVE

Using their approved project topic, the students will be able to complete two job task analyses according to the criteria provided in this unit.

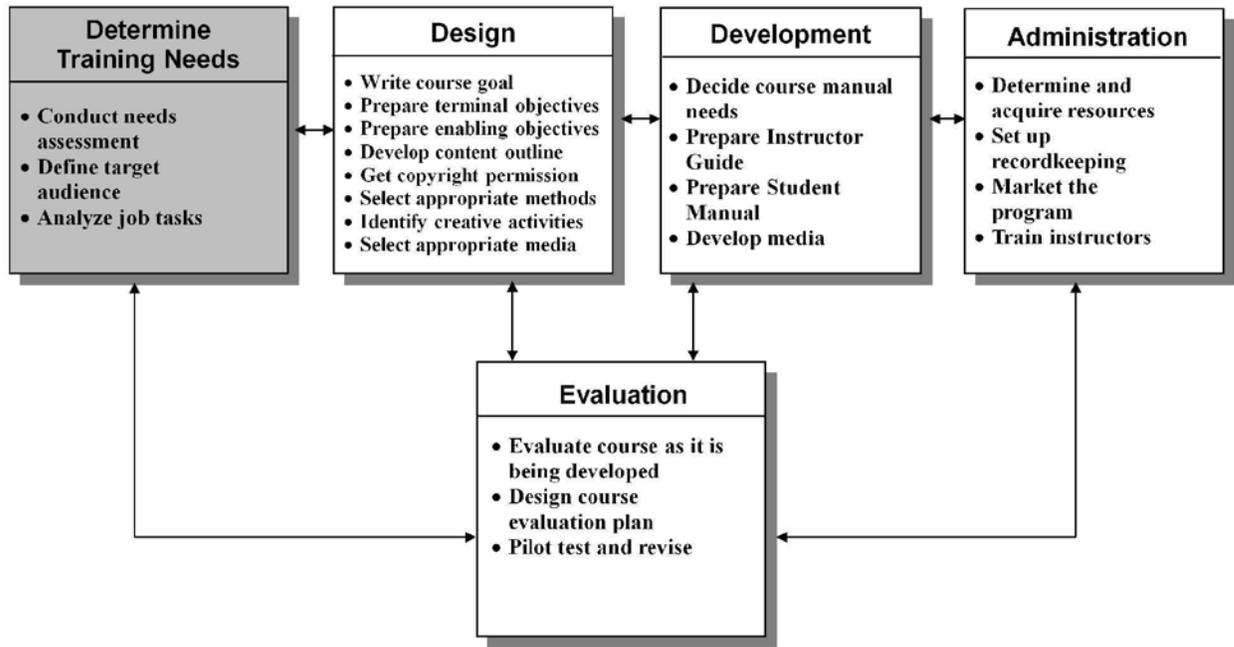
ENABLING OBJECTIVES

Given the information from this unit, the students will:

- 1. Describe the three methods for conducting a job task analysis.*
 - 2. Identify the eight components of the job task analysis.*
 - 3. Evaluate the job task analysis by completing the Assessment Checklist with 100-percent accuracy.*
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**INSTRUCTIONAL SYSTEM DESIGN MODEL
FOR COURSE DEVELOPMENT**



METHODS OF CONDUCTING A JOB TASK ANALYSIS

A course designer always performs a job task analysis following a needs assessment. The compatibility between the course designer and content experts has nothing to do with the method you select for a job task analysis.

Small Group Method

Some Reasons for Using the Small Group Method of Job Task Analysis

- Tasks for new and emerging technologies must be analyzed.
- Group leader is not a technical expert.
- Existing resources need to be updated.
- Job task analysis must be completed in a short period of time.
- Cross-section of business/industry is important.

Some Strengths of the Small Group Method

- Synergy: When incumbent workers begin discussion of steps and components of job task analysis, involvement is activated and a great deal of information is generated.
- A variety of experts are drawn upon.
- Business and industry are involved actively.
- State-of-the-art information is provided.

Some Weaknesses of the Small Group Method

- It is sometimes difficult to get a good cross-section of incumbent workers.
- Some members may monopolize the session.

Recommended Participants for the Small Group Method

- At least three incumbent workers.
- One facilitator must be trained in job task analysis procedures and small group processes.
- One recorder who is not an incumbent worker.
- Additional incumbent workers to verify completed job task analysis.

Job Observation Method

Some Reasons for Using the Job Observation Method of Job Task Analysis

- No resource materials exist.
- The quality of resources is suspect.
- New and emerging technologies must be analyzed.
- Specific detail is needed.
- Site-specific training must be developed.

Some Strengths of the Job Observation Method

- It is most representative of actual worker performance of tasks.
- It is most accurate in detail of worker performance.
- It directly involves business and industry.
- It is the best way to see state-of-the-art equipment in operation.

Some Weaknesses of the Job Observation Method

- Jobs must be observed over a period of time.
- Jobs often are site-specific.
- Workers may perform the task differently under observation.
- Scheduling problems may occur.

Recommended Participants for the Job Observation Method

- One person must be trained in job observation techniques, including interviewing.
- Skilled worker(s) to be observed.
- Incumbent workers to verify completed job task analysis.

Research Method

Some Reasons for Using the Research Method of Job Task Analysis

- Adequate resources are available.
- Established occupations are to be analyzed.
- Time is not a critical factor.

Some Strengths of the Research Method

- A quick start is possible when resource materials are available.

- A variety of resources and experts can be used.
- Flexible scheduling is possible.

Some Weaknesses of the Research Method

- Adequate resources may not be available.
- Resources may not be up to date.
- Resources may be incomplete.
- It is time-consuming to locate and evaluate resources.

Recommended Participants for the Research Method

- One person with technical expertise must be trained in job task analysis procedures.
- Incumbent workers to verify completed job task analysis.

**Table 3-1
Three Methods of Job Task Analysis**

Small Group Method	Research Method	Job Observation Method
<p>Appropriate Uses</p> <ul style="list-style-type: none"> • For new and emerging technologies • When group leader is not a technical expert • To update existing resources • When speed of completion is critical • When a business/industry cross-section is important <p>Strengths</p> <ul style="list-style-type: none"> • Synergy • Draws on a variety of experts • Actively involves business and industry • Provides state-of-the-art information <p>Weaknesses</p> <ul style="list-style-type: none"> • Difficult to get a good cross-section of incumbent workers • Some members may monopolize the session <p>Participants</p> <ul style="list-style-type: none"> • At least three incumbent workers • One facilitator trained in job task analysis • One recorder who is not an incumbent worker 	<p>Appropriate Uses</p> <ul style="list-style-type: none"> • When adequate resources are available • When analyzing established occupations • When time is not a critical factor <p>Strengths</p> <ul style="list-style-type: none"> • Quick start when resource materials are available • Draws on a variety of resources and experts • Flexible scheduling <p>Weaknesses</p> <ul style="list-style-type: none"> • Resources may not be available • Resources may not be up-to-date • Resources may be incomplete • Time-consuming to locate and evaluate resources <p>Participants</p> <ul style="list-style-type: none"> • One person with technical expertise who is trained in job task analysis procedures • Incumbent workers to verify completed job task analysis 	<p>Appropriate Uses</p> <ul style="list-style-type: none"> • When no resource materials exist • For new and emerging technologies • When exact detail is needed • For developing site-specific training • When quality of resources is suspect <p>Strengths</p> <ul style="list-style-type: none"> • Most representative of actual worker performance • Most accurate in detail of worker performance • Direct involvement with business and industry • Best way to see state-of-the-art equipment in operation <p>Weaknesses</p> <ul style="list-style-type: none"> • Job observed over a period of time • Often site-specific • Workers may perform differently under observation • Scheduling problems <p>Participants</p> <ul style="list-style-type: none"> • One person trained in job observation techniques including interviewing • Skilled workers(s) to be observed • Incumbent workers to verify job completed task analysis

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STEPS FOR PERFORMING A JOB TASK ANALYSIS

Sample Job Task Analysis	
Target Audience	Firefighter recruits.
Task	Place the tip of a 24 extension ladder at a designated location so that the appropriate climbing angle is achieved.
Performance Standard	Ladder must be set in accordance with manufacturer's recommended procedures.
Steps	<ol style="list-style-type: none"> 1. Review appropriate safety and lifting practices. 2. Remove ladder from apparatus. 3. Carry ladder, butt and first, to the location appropriate to engage the target and achieve the appropriate climbing angle. 4. Extend fly section to appropriate height and set dogs. 5. Lower ladder into building. 6. Assure both beams are solidly on the ground. 7. Tie halyard in center of rungs. 8. First person to climb double checks dogs to make sure both sides are engaged.
Knowledge	<ul style="list-style-type: none"> • Must be familiar with operating parts of a ground ladder. • Must know where ladders are stored on fire apparatus. • Understand how the locking mechanism works on ladder rack.
Attitudes	Must be able to position ladder accurately for firefighting operations.
Safety	<ul style="list-style-type: none"> • Be aware of overhead obstructions. • Know proper lifting and carrying techniques. • Keep hands and feet clear of fly section beams and rungs.

If necessary for proper angle, carefully move the ladder closer or farther away from building.

Equipment

Fire department apparatus with 24 foot extension ladder, personal protective equipment, and suitable location to raise ladder for second story window.

Source of Analysis

National Fire Protection Association (NFPA) 1001, *Standard for Firefighter Professional Qualifications*; International Fire Service Training Association (IFSTA); Delmar or Jones and Bartlett Firefighter Training Manuals.

STEP 1: IDENTIFY THE JOB TASKS

These tasks can be identified from NFPA 1001, Occupational Safety and Health Administration (OSHA) Standards, manufacturer's training requirements, and new Standard Operating Procedures (SOP's) and Standard Operating Guidelines (SOG's).

Tasks must contain action verbs and require at least two steps to complete.

STEP 2: PERFORMANCE STANDARDS FOR THE JOB

Performance standards are specific, observable, and measurable criteria of acceptable performance that a worker must meet when performing a task. Performance standards include the following:

- the characteristics of an acceptable skill; and/or
- the acceptable process or the acceptable sequence of steps a worker must follow when performing a task.

Some sample performance standards include these:

- Process standard:
Fire must be extinguished using the appropriate fire extinguisher.
- Product standard:
Fire extinguisher must be filled with appropriate agent according to equipment manual. Extinguisher must be in operating order.

Product standards may be written before completing the entire job task analysis. Process standards are more easily written after the steps are completed, as the detailed steps are needed to help determine the process standards. If resources do not contain the standards, incumbent workers will need to generate or verify the standards.

Determining performance standards: Performance standards must be industry-based, not teacher-based.

Ask these or similar questions when you need to determine the performance standards for a task:

- What standard must the workers meet when performing this task?
- What steps must be performed in a given sequence? (In some tasks, the steps must be performed in a given sequence in order to be successful.)
- What degree of tolerance is acceptable?

- What are the acceptable time limits?
- What appearance must the final product have? (Often several conditions apply, e.g., smooth, shiny, or rounded.)
- On what basis (e.g., tolerance, color, or composition) would you judge that the product or task was performed accurately or correctly?
- Are there any rules, guidelines, regulations, or industry standards that cause a worker to perform the task in a certain manner?

Follow these guidelines when determining performance standards for a task:

- list only industry standards; and
- list the appearance, tolerance, or other bases for judging product quality.

STEP 3: JOB STEPS

Steps are those procedures, activities, or thought processes that a worker does to complete a task.

Steps

1. Actions.
2. Activities.
3. Thought processes.

Sample Steps for Performing a Job Task

1. Remove ladder from apparatus.
2. Carry ladder to building that is to be laddered.
3. Raise ladder.
4. Extend ladder to appropriate length.
5. Lower ladder to building.
6. Assure that proper angle is achieved.

The following questions may be helpful when determining the steps for a task using the small group or research methods.

- What are the steps in performing the task?
- How do you get started?
- When do you perform the task?
- Where is the task performed?
- Why do you do it?
- How do you do it? Describe the steps for me.
- How do you know when you are finished doing it?
- Are there any decisions that must be made while performing the task?
- How do you know when a decision is to be made, i.e., what cues are there?
- Do the steps have to be done in a particular order?
- Are there any consequences that may occur from an incorrect decision or if the steps are done the wrong way (errors)?
- Is there another way to do the task? If so, why do you do the task this way in your job?

The following are sample questions to keep in mind when using the job observation method.

- What did the worker do first?
- How did the worker get started?
- What steps did the worker perform in completing the task?
- Were decisions made while performing the task? If yes, what cues were given? What errors will result from a wrong decision?
- Where was the task performed?
- When was the task performed?
- When was the task completed or finished?

- What resources were used to perform the task (equipment, tools, materials, supplies, or human resources)?

Follow these guidelines when determining the steps for a task.

- There must be at least two steps.
- List only worker steps.
- List steps in chronological order--or in their normal sequence of what a worker does in performing the task, if there is a sequence.
- Begin steps with a present tense action verb that helps describe the activity (choose, determine, select, differentiate, identify, distinguish, isolate, separate, etc.).
- Determine the level of detail that is appropriate in the steps. Do not go into detail. This will be done when the instructional materials are prepared.
- If there is more than one acceptable method for performing a task, list both methods and their steps.
- List decisions that are made by workers as they perform the task. Decisions should be noted at any step where a choice is necessary. Also include in the step the cues that indicate a decision needs to be made. Finally, include errors that may result from the wrong decision or action by a worker.

STEP 4: KNOWLEDGE OF THE JOB TASK

As a task is analyzed, it will become evident that certain types of knowledge are necessary to perform the task.

Knowledge

- **Technical job knowledge** is information that the worker must have or use in order to perform the task.
- **Related job knowledge** is information needed by a worker to perform a task, but not "directly related" to a specific step in performing the task. Related job knowledge can be viewed as generalized skills, and may include math skills, science concepts, language, or helpful information that supports the accurate performance of a task.

Sample knowledge statements:

- identify parts of a self-contained breathing apparatus (SCBA);
- identify procedures to log on and off a computer;
- locate and use a Halligan bar to open a door; and
- input commands to print and store (save) individual employee training records.

Determining Knowledge

The following are sample questions that may be helpful when analyzing the knowledge components of a job task. To determine the knowledge needed to perform the task, return to the steps already listed. Consider each step, one by one, and ask these questions.

- What do workers need to know in order to perform this step?
- What terminology is required?
- What procedures must be followed to perform the task?
- What operation of tools and equipment is required?
- What theories or principles are needed to complete the task?
- What calculations have to be performed?
- Are the techniques of problem-solving, diagnosis, and troubleshooting required?
- Is planning involved?
- Is the selection of strategies involved?
- Must the task be performed in accordance with briefing instructions?
- Is knowledge of "why" important to the procedure?
- Is awareness of a systems approach to the job important to the successful performance of the task?
- What problem-solving skills are necessary for the successful performance of the task?
- What scientific principles, rules, or concepts must the worker know, use, or apply?
- Must the worker interpret scientific charts, graphs, or other data?

- What types of calculations must the worker make?
- What specific math concepts, skills, or functions must the worker apply?
- What specific communication or language skills must the worker possess?
- What reading, writing, speaking, and listening skills are required of the worker?
- What transition and coping skills are necessary for the successful performance of the task?

Guidelines for Determining Knowledge

Follow these guidelines when listing the technical and related knowledge components of a task.

- Identify all technical job knowledge needed to perform the task. Look at each step and ask, "What technical knowledge is needed by the worker to perform this step?"
- Omit nice-to-know knowledge.
- Use action verbs to begin the knowledge statements. (Avoid the use of vague words, such as know, understand, appreciate, and other nonmeasurable verbs.)
- List knowledge statements from the standpoint of what a worker needs to know--not what an instructor needs to teach a student.
- List the scientific principles, rules, or concepts that must be used or applied by the worker.
- List the types of charts or graphs that must be interpreted.
- List the types of calculations that the worker must make.
- List the specific math concepts, skills, or functions that must be applied or used by the worker.
- List specific communication or language skills needed by the worker.
- List reading, writing, speaking, and listening skills required.
- List any transition or coping skills needed by a worker.

STEP 5: ATTITUDES NECESSARY TO PERFORM THE JOB TASK

Attitudes are those unique behaviors or traits a worker exhibits in order to perform the task successfully.

Attitudes include a worker's:

- disposition;
- opinion;
- manner of acting, thinking, or feeling; and
- work habits.

Sample attitude statements:

- function as a member of a firefighting team; and
- respect patient's privacy and sensitivity.

Determining Attitudes

The following are sample questions that may be asked when analyzing the attitude component of a task. Ask what attitudes or worker traits (if any) are important to the performance of each step of the task.

- What behaviors, attitudes, or worker traits are important to the successful performance of this task?
- Is working as a team member important to the successful performance of this task?
- Does the worker have to interact with others while performing this task?
- What attitudes reflect positive worker behavior versus unacceptable worker behavior?

Follow these guidelines when determining the attitudes for a task. Look at each step, one by one, to determine any attitudes or worker traits needed to perform the job task.

- List only attitudes, behaviors, or worker traits unique to the performance of this task.
- Use industry language.
- Approach the attitudes from a "job standpoint."
- Begin each attitude statement with an action verb.

STEP 6: SAFETY FOR THE JOB TASK

Identify all safety-related knowledge, practices, and procedures that support the safe performance of a task.

Safety statements include

- safety factors or hazards that may be encountered by a worker while performing a task, and
- safety practices and procedures.

Sample safety statements:

- use safe practices when bending and stretching;
- identify overhead obstructions when raising ladders;
- ensure that utilities are off when cutting into walls;
- keep personnel records in a safe and secure location;
- use safe carrying practices for fire axes;
- handle chemicals with care; and
- use proper ventilation.

Determining Safety

The following are sample questions to ask when analyzing the safety component of a task.

- What safety procedures must be followed by the worker for each step of this task?
- What hazards should the worker be aware of while performing this task?
- What unique safety information is necessary for performing this task?
- What safety factors must the worker be aware of while performing this task?
- What precautions need to be observed while performing this task?

Follow these guidelines when determining the safety statements for a task.

- List only unique safety factors or hazards that may be encountered by a worker while performing each step of the task.
- Begin each safety statement with an action verb.
- Use industry language.
- List safety practices and procedures.

STEP 7: EQUIPMENT AND MATERIALS FOR THE JOB TASK

Identify unique or highly specialized tools, equipment, materials, supplies, and/or human resources needed to perform the task.

Equipment and materials include unique:

- tools;
- equipment;
- materials;
- supplies; and
- people, patients, or helpers needed to perform the task.

Sample Equipment and Materials

- SCBA;
- accident victims;
- gloves;
- 1-1/2-inch nozzle;
- stethoscope;
- ladder; and
- battery-operated smoke detectors.

Determining Equipment and Materials

These questions may be helpful when you must determine the tools, equipment, materials, supplies, and resources needed to perform a task.

- What unique tools are needed to perform this task?
- What unique equipment is needed to perform this task?
- What unique materials are needed to perform this task?
- What unique supplies are needed to perform this task?
- What unique people are needed to perform this task?

Follow these guidelines when analyzing the tools, equipment, materials, supplies, and resources component of a task.

- List the tools unique to the performance of this task.
- List the equipment unique to the performance of this task.

- List the materials unique to the performance of this task.
- List the patients or helpers unique to the performance of this task.
- Use generic names, not trade names, to describe tools, equipment, materials, or supplies.

STEP 8: SOURCE OF ANALYSIS FOR THE JOB TASK

Sources of analysis include persons or organizations from which information has been received.

Sample sources of analysis:

- NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications*;
- team of incumbent workers; and
- OSHA 1910-120.

Determining Source of Analysis

These are examples of questions to ask when listing the source of analysis for a task.

- What people participated in the analysis and/or what industry did they represent?
- What were the major resource materials used for the analysis?
- Where did the job observation take place?
- When did the analysis take place?

Follow these guidelines when developing the source of analysis component of a task.

- List the team of incumbent workers.
- List the names and titles of the people who participated in the analysis (if applicable).
- List the titles of major resource materials used for the analysis (if applicable).
- List the names and titles of the skilled workers observed and the name of the company or place of observation (if applicable).
- List when the analysis took place.

CURRICULUM OUTLINE

A good job task analysis and job description will become the basis for your curriculum outline. The better the job done with this step the better the project outcome.

- Needs assessment is the course title.
- The job task analysis list is the chapter headings (main sections).
- The steps identified are the smaller headings for the chapter.
- The methodology, job information, and instructional information follows the major subject headings within the chapter.

Example:

Course title: Raising, using, and caring for 24-foot ground ladders.
(Needs Assessment)

Chapter one: I. Introduction to and use of ground ladders.
(Steps)

Chapter two: II. Carrying and raising ground ladders.
(Steps)

Content: A. Review appropriate safety and lifting practices.

 1. Lifting techniques.

 2. How ladder is secured on apparatus.

 3. Two person ladder carry.

 4. Placement of ladder prior to raising.

Content: B. Remove ladder from apparatus.

 1. Preparing to remove ladder from apparatus.

 2. Lowering and/or unlocking ladder.

Some ladders may be nested on top of each other on a ladder truck.

- Content:
- C. Carry ladder, butt end first, to the location appropriate to engage the target and achieve the appropriate climbing angle.
 - 1. Person on butt end placed one hand in front to prevent anyone from walking into ladder.
 - 2. Determine target to be laddered and purpose of the ladder.
 - a. Hoseline.
 - b. Rescue.
 - c. Entry into structure.

Chapter three:
(Steps)

III. Extend fly section to appropriate height a set dogs.

- Content:
- A.
 - 1.
 - a.
 - b.

Activity 3.1

Methods of Conducting a Job Task Analysis

Purpose

To research an OSHA standard to identify training criteria for a particular aspect of the standard.

Directions

1. The instructor will divide the class into four or five groups.
2. Your group will be assigned a particular component of OSHA 1910.120 (q)(6) to research and identify training components that would be needed to meet the provision of their section.
3. Your needs assessment has identified a need to provide training in hazardous materials since it is a required training element. You are currently looking at one particular element of the regulation. After you read the particular element of the regulation, you should now perform a job task analysis which will list all training elements needed to satisfactorily and safely perform the required element. Create a job task analysis list on your easel pad.
4. You will have 30 minutes to perform a job task analysis of your researched document and make a list on your easel pad of the major components of training required to accomplish the assigned task. The tasks do not need be in their final sequential order at this time.
5. Each group should designate a spokesperson and report your findings.

Group 1

OSHA 1910.120 (q)(3)(ii) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.

Identify the following training components:

1. Knowledge of the basic hazard and risk assessment techniques.

CONDUCTING THE JOB TASK ANALYSIS

2. Know how to select and use proper personal protective equipment provided to the first responder at the operations level.

3. An understanding of basic hazardous materials terms.

4. Know how to perform basic control, containment, and/or confinement operations within the capabilities of resources and personal protective equipment available with their unit.

5. Know how to implement basic decontamination procedures.

6. An understanding of the relevant SOPs and termination procedures.

Group 2

OSHA 1910.120(q)(3)(iii) Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations, and assure that the personnel protective equipment worn is appropriate for the hazards to be encountered.

However, the personal protective equipment shall meet, at a minimum, the criteria contained in 29 CFR 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage for any incident or site.

Identify the following training components:

1. Knowledge of the basic hazard and risk assessment techniques.

2. Know how to select and use proper personal protective equipment provided to the first responder at the operations level.

3. An understanding of basic hazardous materials terms.

4. Know how to perform basic control, containment, and/or confinement operations within the capabilities of resources and personal protective equipment available with their unit.

5. Know how to implement basic decontamination procedures.

6. An understanding of the relevant SOPs and termination procedures.

Group 3

OSHA 1910.120 (q)(3)(iv) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in emergency response, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposure to employees.

Identify the following training components:

1. Knowledge of the basic hazard and risk assessment techniques.

2. Know how to select and use proper personal protective equipment provided to the first responder at the operations level.

3. An understanding of basic hazardous materials terms.

4. Know how to perform basic control, containment, and/or confinement operations within the capabilities of resources and personal protective equipment available with their unit.

5. Know how to implement basic decontamination procedures.

6. An understanding of the relevant SOPs and termination procedures.

Group 4

OSHA 1910.120 (q)(6)(ii) First responder operations level. First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operations level shall have received at least 8 hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

1. Knowledge of the basic hazard and risk assessment techniques.

CONDUCTING THE JOB TASK ANALYSIS

2. Know how to select and use proper personal protective equipment provided to the first responder at the operations level.

3. An understanding of basic hazardous materials terms.

4. Know how to perform basic control, containment, and/or confinement operations within the capabilities of resources and personal protective equipment available with their unit.

5. Know how to implement basic decontamination procedures.

6. An understanding of the relevant SOPs and termination procedures.

Group 5

OSHA 1910.120 (q)(6)(v) On scene incident commander. Incident commanders, who will assume control of the incident beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

CONDUCTING THE JOB TASK ANALYSIS

1. Know and be able to implement the employer's ICS.

2. Know how to implement the employer's emergency response plan.

3. Know and understand the hazards and risks associated with employees working in chemical protective clothing.

4. Know how to implement the local emergency response plan.

5. Know of the State emergency response plan and of the Federal Regional Response Team.

6. Know and understand the importance of decontamination procedures.

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Activity 3.2

Identifying Well-Written Job Tasks

Purpose

To recognize well-written job task statements that provide enough information to determine what is required of the task.

Directions

Part 1

Do the following statements contain an action statement or word (verb) and enough information so that you could start curriculum development for tasks listed?

1. Save a structure.
2. Lead firefighters.
3. Measure depth of char.
4. Don PPE, including SCBA.
5. Raise a ladder.
6. Have responsibility for firefighters.
7. Place pump on Engine 1 into pump gear.
8. Use the four gas meter to measure carbon monoxide level in a dwelling.
9. Fill the tank.
10. Sweep the sidewalk in front of the station to clear the fallen leaves.

Part 2

Write one job task for your project that represents one task or part of task that will need to be completed during the project.

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Activity 3.3

Determining the Steps in a Job Task Analysis

Purpose

To practice breaking a need into a job task list for the particular function. At this time, we are not concerned with the order of the steps. After all steps are identified, we will then place them in the proper sequence.

Directions

1. The instructor will assign your group a need from the following list.
 - a. Roll a 2-1/2-inch into a single donut roll.
 - b. Use a 2-1/2-pound dry chemical fire extinguisher to extinguish a fire in a pan of oil on a stove top.
 - c. Engage a fire pump on an engine and discharge water through a 1-3/4-inch attack line at 125 psi while working from tank water with the final step of engaging the pressure relief valve or governor to maintain the 125 psi.
 - d. Instruct a 4th grade class of students on how to develop and practice a home escape plan.
 - e. Select and operate the appropriate power saw to open a plywood/shingle roof and a slate tile roof while following appropriate safety procedures.
2. In your groups, conduct a job task assessment and list all the critical steps needed to successfully and safely complete the function.

Remember, steps are usually sequenced, contain behavioral change (verbs), and should be specific enough that curriculum could be developed from the task list.
3. Refer to the sample below if necessary. Use the Job Task Analysis form on the following page.
4. Place your group's findings on an easel pad.
5. Select a spokesperson to report your group's findings.

Example

Task

Place the tip of a 24-extension ladder at a designated location so that the appropriate climbing angle is achieved with two firefighters.

Steps

1. Review appropriate safety and lifting practices.
2. Remove ladder from apparatus.
3. Carry ladder, butt end first, to the location appropriate to engage the target and achieve the appropriate climbing angle.
4. Extend fly section to appropriate height and set dogs.
5. Lower ladder into building.
6. Assure both beams are solidly on the ground.
7. Tie halyard in center of rungs.
8. First person to climb double checks dogs to make sure both sides are engaged.

Activity 3.3 (cont'd)

Step 3: Job Task Analysis

Target Audience

Task

Performance Standard

Steps

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Knowledge

Attitudes

Safety

Equipment & Materials

Source of Analysis

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Activity 3.4

Evaluation of Knowledge for Task Completion

Purpose

To identify the specific knowledge that will be required to complete a specific job identified in the job task analysis.

Directions

1. You will be assigned to the same groups used for Activity 3.3.
2. You will select one job task from the Job Task Analysis completed in Activity 3.3.
3. Break that task down into what knowledge, skills, or abilities will be required to successfully and safely perform that function and record the information on the Job Task Analysis worksheet.

The job task analysis determines the steps in the task that must be done. The next step is to determine what information or knowledge will need to be included in the curriculum so that the task can be successfully and safely completed.

4. You will have 20 minutes to determine specific knowledge, skills, or abilities for one job task.
5. Your group will select a spokesperson to report your findings.

Example

Task

Place the tip of a 24-foot extension ladder at a designated location so that the appropriate climbing angle is achieved with two firefighters.

Job Task #4

Extend fly section to appropriate height and set dogs.

Example of Components for Job Task #4

1. Determine ladder position in front of target.
2. Raise ladder to vertical position and stabilize.

3. Untie halyard knot.
4. Give command for hands and feet clear. Grasp beam of ground section of the ladder and keep feet from under fly section. The reason being in case halyard breaks or person raising ladder loses grip and fly section falls to ground no body parts are in the way.
5. Person raising ladder securely grasp halyard and hand over hand pull rope to extend fly section.
6. When desired length is achieved, person raising halyard secures the ladder dogs.
7. Once fly extension is completed and dogs are locked, both members secure the ladder in the vertical position in preparation for lowering the ladder into the target.

Activity 3.5

Completion of Job Task Analysis Worksheet

Purpose

To have the students determine the information required to complete the Job Task Analysis.

Directions

1. You will work in the same groups that you had for the previous activities.
2. You will have 15 minutes to complete the Job Task Analysis that was used in Activities 3.3 and 3.4.
3. Your group will select a spokesperson to report your group's answers to the questions on the worksheet.

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Activity 3.6 (Evening Assignment)

Step 3: Conducting the Job Task Analysis

Purpose

To complete a Job Task Analysis sheet for each task you have identified for your course.

Directions

1. Step 3 in your Course Design Project is to perform a job task analysis. The time and thought you put into doing a careful job task analysis will be well spent. Any steps that you forget in your task analysis will come back to haunt you throughout your course project.
2. Your SM has an example of each step completed correctly. Please use that example and other information in the SM as a guide.
3. Using the Job Task Analysis forms in your Project Manual, first complete the line titled Target Audience. You will be describing the people for whom your course is designed that you developed in Step 2. Some of you may have only one title, while others may be listing several titles.
4. After a need has been identified the next critical step is to identify the major tasks required to complete the function identified. For each chapter or unit of your curriculum, you will identify a number of job tasks that have to be performed. Once the job tasks are identified (what needs to be done) the next step is to identify the pertinent steps required to successfully and safely complete the task or function. Consider the Job Task as the heading or title for your unit. The job steps are the major units of the curriculum (A, B, C, D, etc.) which will explain how to perform the task of function. A problem or need will have several job tasks and steps.
5. If you do a good job of writing your tasks, the rest of the job task analysis steps will flow very smoothly.
6. To check the completeness and accuracy of your Job Task Analysis, refer to the Assessment Checklist that follows.
7. You are encouraged to use the group method or research method to assist you with this step. Students in the class are excellent resources. Your instructor will assign you to a small working group of people who are designing similar courses. The campus LRC is another excellent source of materials. Ultimately, your instructor will be your final checkpoint.

Steps to be completed this evening:

1. Complete three job task analysis worksheets for any component of your project.
2. Use checklist to determine if all five job task analysis worksheets are developed within scope and address the critical components.

Activity 3.6 (cont'd)

Step 3: Job Task Analysis

Target Audience

Task

Performance Standard

Steps

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Knowledge

Attitudes

Safety

Equipment & Materials

Source of Analysis

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Activity 3.6 (cont'd)

Assessment Checklist

Job Task Analysis Product/Performance Checklist

Use the following checklist to analyze your completed job task analysis. For acceptable performance, all items must be answered "Yes" or "N/A."

Task	Yes	No	N/A
1. Is the job task statement an exact repeat from the job performance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performance Standard			
2. Are the performance standards job standards, not teaching standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Do the standards clearly identify the end product or process desired?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steps			
4. Do the steps begin with present tense action verbs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Are the steps stated in chronological order or in their normal order of performance by a worker?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Are all steps listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Are at least two steps listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are the steps worker steps for task performance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Are details omitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Are decision points identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. If there is more than one acceptable method for performing a task, are both methods listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Are cues listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13.	Are the results of errors listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.	Are danger points identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge				
15.	Is the knowledge needed to perform the job task listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Are the statements based on what a worker needs to know to perform the task and not on what an instructor needs to teach?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Do the knowledge statements begin with action verbs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attitudes				
18.	Were the attitudes approached from a job standpoint?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Are attitudes or work habits unique to the performance of the job task listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	Do the attitude statements begin with present tense action verbs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	Was industry language used in the statements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety				
22.	Are unique safety factors listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.	Are hazards that may be encountered by a worker while performing the task listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24.	Do the safety statements begin with an action verb?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.	Was industry language used in the safety statements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Equipment				
26.	Is equipment needed to perform the task listed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sources of Analysis

27. If the job task analysis was done by the small group method, are members listed?
28. If the job task analysis was done by the research method, are the specific resources listed?
29. If the job task analysis was done by the job observation method:
- a. Is the place of observation listed?
 - b. Are the workers who were observed listed?

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APPROVAL SHEET

I. COMMENTS ON TASK:

II. SUGGESTIONS TO IMPROVE TASK:

_____ Approval granted

_____ Approval, pending correction of suggestions

Student Colleague _____ Date _____

Instructor Approval Signature _____ Date _____

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APPENDIX
OSHA 29 CFR 1910.120 (PARAGRAPH q)

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implement the site emergency response plan.

(q) *Emergency response to hazardous substance releases.* This paragraph covers employers whose employees are engaged in emergency response no matter where it occurs except that it does not cover employees engaged in operations specified in paragraphs (a)(1)(i) through (a)(1)(iv) of this section. Those emergency response organizations who have developed and implemented programs equivalent to this paragraph for handling releases of hazardous substances pursuant to section 303 of the Superfund Amendments and Reauthorization Act of 1986 (Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. 11003) shall be deemed to have met the requirements of this paragraph.

(1) *Emergency response plan.* An emergency response plan shall be developed and implemented to handle anticipated emergencies prior to the commencement of emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives and OSHA personnel. Employers who will evacuate their employees from the workplace when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan in accordance with § 1910.38(a) of this part.

(2) *Elements of an emergency response plan.* The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following to the extent that they are not addressed elsewhere:

- (i) Pre-emergency planning and coordination with outside parties.
- (ii) Personnel roles, lines of authority, training, and communication.
- (iii) Emergency recognition and prevention.
- (iv) Safe distances and places of refuge.
- (v) Site security and control.
- (vi) Evacuation routes and procedures.
- (vii) Decontamination.
- (viii) Emergency medical treatment and first aid.
- (ix) Emergency alerting and response procedures.
- (x) Critique of response and follow-up.
- (xi) PPE and emergency equipment.
- (xii) Emergency response

organizations may use the local emergency response plan or the state emergency response plan or both, as part of their emergency response plan to avoid duplication. Those items of the emergency response plan that are being

properly addressed by the SARA Title III plans may be substituted into their emergency plan or otherwise kept together for the employer and employee's use.

(3) *Procedures for handling emergency response.* (i) The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS assisted by the senior official present for each employer.

Note to (q)(3)(i).—The "senior official" at an emergency response is the most senior official on the site who has the responsibility for controlling the operations at the site. Initially it is the senior officer on the first-due piece of responding emergency apparatus to arrive on the incident scene. As more senior officers arrive (i.e., battalion chief, fire chief, state law enforcement official, site coordinator, etc.) the position is passed up the line of authority which has been previously established.

(ii) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.

(iii) Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations, and assure that the personal protective equipment worn is appropriate for the hazards to be encountered. However, personal protective equipment shall meet, at a minimum, the criteria contained in 29 CFR 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage for any incident or site.

(iv) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in emergency response, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees.

(v) The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to incident or site hazards, to those who are actively performing

emergency operations. However, operations in hazardous areas shall be performed using the buddy system groups of two or more.

(vi) Back-up personnel shall stand by with equipment ready to provide assistance or rescue. Advance fire support personnel, as a minimum, also stand by with medical equipment and transportation capability.

(vii) The individual in charge of the ICS shall designate a safety official knowledgeable in the operation implemented at the emergency response site, with specific responsibility to identify and evaluate hazards and provide direction with respect to safety of operations for the emergency at hand.

(viii) When activities are judged to be in an IDLH condition and/or to involve an immediate danger condition, the safety official shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at an emergency scene.

(ix) After emergency operations are terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.

(x) When deemed necessary for meeting the tasks at hand, appropriate self-contained compressed air breathing apparatus may be used with appropriate cylinders from other approved contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure. All compressed air cylinders used with self-contained breathing apparatus shall meet U.S. Department of Transportation and National Institute for Occupational Safety and Health criteria.

(4) *Skilled support personnel.* Personnel, not necessarily an employer's own employees, who are skilled in the operation of certain equipment, mechanized earth moving or digging equipment or crane and hoisting equipment, and who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a traditional fashion by an employer's own employees, and who will be or are exposed to the hazards at an emergency response scene, are not required to have the training required in this part for the employer's regular employees. However, these personnel shall receive an initial briefing at the site prior to their participation in any emergency response. The initial briefing shall

include instruction in the wearing of appropriate personal protective equipment, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to the employer's own employees shall be used to assure the safety and health of these personnel.

(5) *Specialist employees.* Employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge, shall receive training or demonstrate competency in the area of their specialization annually.

(6) *Training.* Training shall be based on the duties and function to be performed by each responder of an emergency response organization. The skill and knowledge levels required for all new responders, those hired after the effective date of this standard, shall be conveyed to them through training before they are permitted to take part in actual emergency operations on an incident. Employees who participate, or are expected to participate, in emergency response, shall be given training in accordance with the following paragraphs:

(i) *First responder awareness level.* First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

- (A) An understanding of what hazardous materials are, and the risks associated with them in an incident.
- (B) An understanding of the potential outcomes associated with an emergency created when hazardous materials are present.
- (C) The ability to recognize the presence of hazardous materials in an emergency.
- (D) The ability to identify the hazardous materials, if possible.
- (E) An understanding of the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.

(F) The ability to realize the need for additional resources, and to make appropriate notifications to the communication center.

(ii) *First responder operations level.* First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

- (A) Knowledge of the basic hazard and risk assessment techniques.
- (B) Know how to select and use proper personal protective equipment provided to the first responder operational level.
- (C) An understanding of basic hazardous materials terms.
- (D) Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
- (E) Know how to implement basic decontamination procedures.
- (F) An understanding of the relevant standard operating procedures and termination procedures.

(iii) *Hazardous materials technician.* Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- (A) Know how to implement the employer's emergency response plan.
- (B) Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment.
- (C) Be able to function within an assigned role in the Incident Command System.

(D) Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.

(E) Understand hazard and risk assessment techniques.

(F) Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.

(C) Understand and implement decontamination procedures.

(H) Understand termination procedures.

(I) Understand basic chemical and toxicological terminology and behavior.

(iv) *Hazardous materials specialist.* Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local and other government authorities in regards to site activities. Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

- (A) Know how to implement the local emergency response plan.
- (B) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.
- (C) Know of the state emergency response plan.

(D) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.

(E) Understand in-depth hazard and risk techniques.

(F) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.

(C) Be able to determine and implement decontamination procedures.

(H) Have the ability to develop a site safety and control plan.

(I) Understand chemical, radiological and toxicological terminology and behavior.

(v) *On scene incident commander.* Incident commanders, who will assume control of the incident scene beyond the

first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- (A) Know and be able to implement the employer's incident command system.
- (B) Know how to implement the employer's emergency response plan.
- (C) Know and understand the hazards and risks associated with employees working in chemical protective clothing.
- (D) Know how to implement the local emergency response plan.
- (E) Know of the state emergency response plan and of the Federal Regional Response Team.
- (F) Know and understand the importance of decontamination procedures.

(7) *Trainers.* Trainers who teach any of the above training subjects shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the U.S. Fire Academy, or they shall have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach.

(8) *Refresher training.* (i) Those employees who are trained in accordance with paragraph (g)(9) of this section shall receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate competency in those areas at least yearly.

(ii) A statement shall be made of the training or competency, and if a statement of competency is made, the employer shall keep a record of the methodology used to demonstrate competency.

(9) *Medical surveillance and consultation.* (i) Members of an organized and designated HAZMAT team and hazardous materials specialists shall receive a baseline physical examination and be provided with medical surveillance as required in paragraph (f) of this section.

(ii) Any emergency response employees who exhibits signs or symptoms which may have resulted from exposure to hazardous substances during the course of an emergency incident, either immediately or subsequently, shall be provided with medical consultation as required in paragraph (f)(3)(ii) of this section.

(10) *Chemical protective clothing.* Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or

to be used by hazardous materials specialists, shall meet the requirements of paragraphs (g) (3) through (5) of this section.

(11) *Post-emergency response operations.* Upon completion of the emergency response, if it is determined that it is necessary to remove hazardous substances, health hazards, and materials contaminated with them (such as contaminated soil or other elements of the natural environment) from the site of the incident, the employer conducting the clean-up shall comply with one of the following:

- (i) Meet all of the requirements of paragraphs (b) through (o) of this section; or
- (ii) Where the clean-up is done on plant property using plant or workplace employees, such employees shall have completed the training requirements of the following: 29 CFR 1910.38(a); 1910.134; 1910.1200, and other appropriate safety and health training made necessary by the tasks that they are expected to perform, such as personal protective equipment and decontamination procedures. All equipment to be used in the performance of the clean-up work shall be in serviceable condition and shall have been inspected prior to use.

APPENDICES TO § 1910.120—HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE

Note: The following appendices serve as non-mandatory guidelines to assist employees and employers in complying with the appropriate requirements of this section. However paragraph 1910.120(g) makes mandatory in certain circumstances the use of Level A and Level B PPE protection.

Appendix A—Personal Protective Equipment Test Methods

This appendix sets forth the non-mandatory examples of tests which may be used to evaluate compliance with § 1910.120 (g)(4) (ii) and (iii). Other tests and other challenge agents may be used to evaluate compliance.

A. Totally-encapsulating chemical protective suit pressure test

1.0—Scope

1.1 This practice measures the ability of a gas tight totally-encapsulating chemical protective suit material, seams, and closures to maintain a fixed positive pressure. The results of this practice allow the gas tight integrity of a totally-encapsulating chemical protective suit to be evaluated.

1.2 Resistance of the suit materials to permeation, penetration, and degradation by specific hazardous substances is not determined by this test method.

2.0—Definition of terms

2.1 "Totally-encapsulating chemical protective suit (TECP suit)" means a full body garment which is constructed of protective clothing materials; covers the wearer's torso, head, arms, legs and

respirator; may cover the wearer's hands and feet with tightly attached gloves and boots; completely encloses the wearer and respirator by itself or in combination with the wearer's gloves and boots.

2.2 "Protective clothing material" means any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with a potentially hazardous liquid or gaseous chemicals.

2.3 "Gas tight" means, for the purpose of this test method, the limited flow of a gas under pressure from the inside of a TECP suit to atmosphere at a prescribed pressure and time interval.

3.0—Summary of test method

3.1 The TECP suit is visually inspected and modified for the test. The test apparatus is attached to the suit to permit inflation to the pre-test suit expansion pressure for removal of suit wrinkles and creases. The pressure is lowered to the test pressure and monitored for three minutes. If the pressure drop is excessive, the TECP suit fails the test and is removed from service. The test is repeated after leak location and repair.

4.0—Required Supplies

- 4.1 Source of compressed air.
- 4.2 Test apparatus for suit testing, including a pressure measurement device with a sensitivity of at least 1/4 inch water gauge.
- 4.3 Vent valve closure plugs or sealing tape.
- 4.4 Soapy water solution and soft brush.
- 4.5 Stop watch or appropriate timing device.

5.0—Safety Precautions

5.1 Care shall be taken to provide the correct pressure safety devices required for the source of compressed air used.

6.0—Test Procedure

6.1 Prior to each test, the tester shall perform a visual inspection of the suit. Check the suit for seam integrity by visually examining the seams and gently pulling on the seams. Ensure that all air supply lines, fittings, visor, zippers, and valves are secure and show no signs of deterioration.

6.1.1 Seal off the vent valves along with any other normal inlet or exhaust points (such as umbilical air line fittings or face piece opening) with tape or other appropriate means (caps, plugs, fixture, etc.). Care should be exercised in the sealing process not to damage any of the suit components.

6.1.2 Close all closure assemblies.

6.1.3 Prepare the suit for inflation by providing an improvised connection point on the suit for connecting an airline. Attach the pressure test apparatus to the suit to permit suit inflation from a compressed air source equipped with a pressure indicating regulator. The leak tightness of the pressure test apparatus should be tested before and after each test by closing off the end of the tubing attached to the suit and assuring a pressure of three inches water gauge for three minutes can be maintained. If a component is removed for the test, that component shall be replaced and a second test conducted with another component removed to permit a complete test of the ensemble.

6.1.4 The pre-test expansion pressure (A) and the suit test pressure (B) shall be supplied by the suit manufacturer, but in no

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PREPARATION REQUIRED FOR COMPLETING A JOB TASK ANALYSIS BY THE SMALL GROUP METHOD

1. Select participants (a minimum of three incumbent workers).
2. Obtain verified task lists for each participant.
3. Obtain task analysis forms (one for each task).
4. In advance of the meeting, complete on the task analysis form these task analysis components from your worker-verified task list: 1) occupation, 2) duty area, and 3) task.
5. Arrange for the meeting.
6. Arrange for a recorder to attend and fill out the task analysis form.
7. Prepare orientation activities for the small group participants.
8. Arrange for someone to facilitate the meeting.
9. Prepare name tags.

Completing a Job Task Analysis by the Small Group Method

Orient the Group

1. Welcome the group.
2. Ask members to introduce themselves with name, title, and company where employed.
3. Define job task analysis.
4. Explain the need for job task analysis.
5. Review what is done with job task analysis information.
6. Explain job task analysis steps.
7. Review the occupation or cluster to be analyzed.
8. Hand out and review the worker-verified task list.
9. Hand out and review a sample completed job task analysis.
10. Identify the tasks to be analyzed.

Complete the Job Task Analysis Process Using the Small Group Method

1. Identify the steps in performing the task (include decisions, cues, and errors, if essential, at any step in which they occur).
2. Identify the performance standards.
3. Identify knowledge.
4. Identify attitudes.
5. Identify safety procedures and precautions.
6. Identify equipment, tools, materials, and human resources unique to the performance of the task.
7. List the source for the analysis.
8. Verify the job task analysis with other incumbent workers.
9. Revise the job task analysis with input from incumbent workers.

PREPARATION REQUIRED FOR COMPLETING A JOB TASK ANALYSIS BY THE RESEARCH METHOD

1. Obtain a worker-verified task list.
2. Conduct a search for resource materials to be used in the analysis.
3. Obtain job task analysis forms (one for each task) or generate a form on your computer.
4. From your verified task list, complete these job task analysis components on the job task analysis forms: 1) occupation, 2) duty area, and 3) task.
5. Generate or create a file for each task.
6. As materials start to come in from your search, match or code them to tasks.

Complete Job Task Analysis Process Using the Research Method

1. Identify the steps in performing the task (include decisions, cues, and errors at any step in which they occur).
2. Identify the performance standards.
3. Identify knowledge.
4. Identify attitudes.
5. Identify safety procedures and precautions.
6. Identify equipment, tools, materials, and human resources unique to the performance of the task.
7. List the source for the analysis.
8. Contact incumbent workers to assist you in filling the gaps.
9. Verify the job task analysis with incumbent workers.
10. Revise the job task analysis with input from incumbent workers.

PREPARATION REQUIRED FOR COMPLETING A JOB TASK ANALYSIS BY THE JOB OBSERVATION METHOD

1. Obtain worker-verified task lists.
2. Select incumbent workers to be observed and to verify the completed job task analyses.
3. Obtain job task analysis forms (one for each task).
4. Before the job observation, complete on each job task analysis form these task analysis components from the verified task list: 1) occupation, 2) duty area, and 3) task.
5. Arrange the observation. Plan to observe more than one worker in more than one location. Plan to observe workers until all tasks are analyzed.
6. Prior to the observation, hold a meeting with the workers, supervisors, managers, union representatives, and others who may be concerned to explain the job observation method of task analysis and to explain what you will do with the information.

Complete Job Task Analysis Process Using the Job Observation Method

1. Observe workers performing the tasks until all tasks are analyzed.
2. Record worker steps in performing the tasks (include decisions, cues, and errors at any step in which they occur).
3. After the observation, complete all other sections of the job task analysis form by questioning the workers. Use the key questions from "Procedures For Task Analysis," (Part 4 of the handbook) to assure completeness of information.
 - a. Identify performance standards.
 - b. Identify knowledge.
 - c. Identify attitudes.
 - d. Identify safety components.
 - e. Identify equipment, tools, materials, and human resources unique to the performance of the task.
 - f. List the source of the analysis.
4. Type the job task analysis, or enter the analysis into a word processor or computer.

5. Verify the job task analysis with incumbent workers.
6. Revise the job task analysis with input from incumbent workers.

Suggestions for Completing Job Task Analysis by the Job Observation Method

1. Explain to those workers being observed that they have been chosen for their good work, and their performance is not a test. Also explain that their job will remain unchanged after the observation has been completed.
2. Observe the tasks being performed, not the workers.
3. Distinguish between the human activity and the machine activity. Workers operate controls, push buttons, remove materials from presses, and turn dials, so that machines will drill, saw, lift, move, and form.
4. Ask questions after the observation in order to understand what you have observed. For instance, ask the worker why he/she pulled a certain lever when the green light came on.
5. Take notes on each work activity and element.
6. Observe more than one worker in more than one company.
7. Observe workers until the analysis has been completed.

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UNIT 4: GOALS AND OBJECTIVES

TERMINAL OBJECTIVES

Given a fire service topic and a task analysis for the topic, the students will be able to:

1. *Write a course goal for their training course.*
2. *Write clear, concise, and measurable objectives using the ABCD method.*

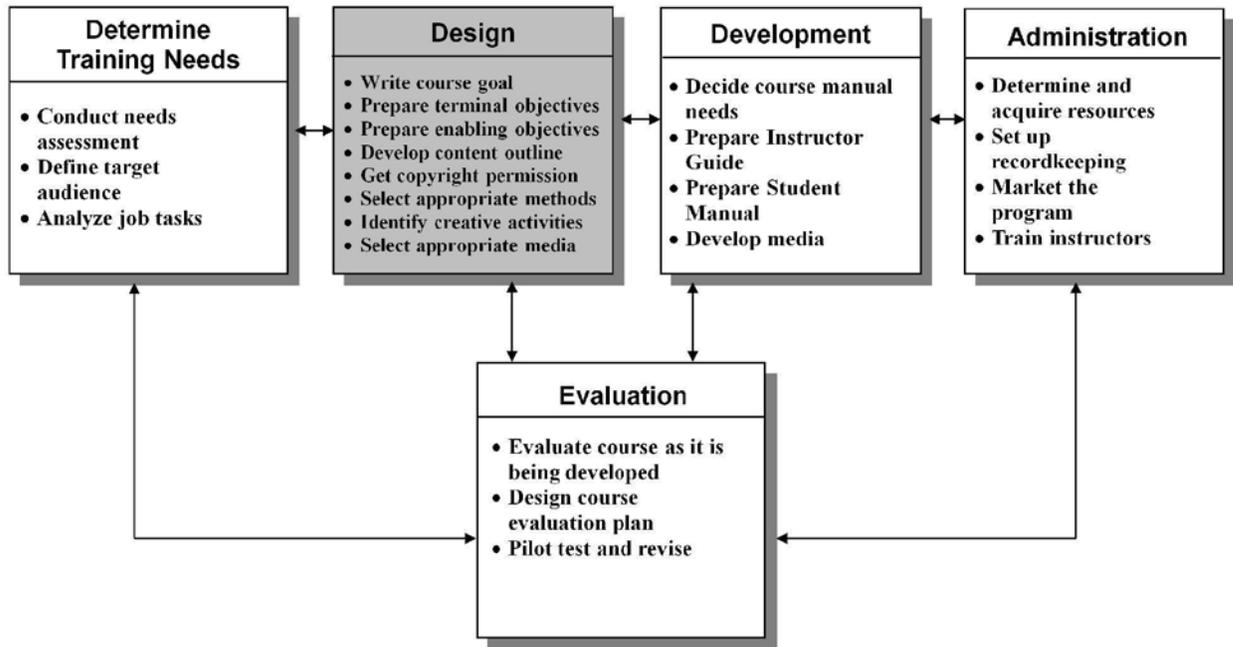
ENABLING OBJECTIVES

The students will:

1. *Given a lecture/discussion, accurately describe the relationship between a task analysis and the course goal to bridge the training gap.*
 2. *Accurately describe the benefit of a course goal according to the material presented.*
 3. *Correctly distinguish between a terminal and enabling objective in the Instructional System Design (ISD) process, according to the material presented.*
 4. *Correctly identify the three domains of learning, given a lecture and activity.*
-

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**INSTRUCTIONAL SYSTEM DESIGN MODEL
FOR COURSE DEVELOPMENT**



INTRODUCTION

Course goals and objectives are the heart of every course: all other course elements support their achievement. Thus, the **best** learning activities are those that aid the student in achieving the stated instructional objectives. Similarly, student evaluation focuses on whether the student reached the instructional objectives successfully.

RELATIONSHIP BETWEEN TASK ANALYSIS, COURSE GOAL, AND COURSE OBJECTIVES

Task analysis establishes what needs to be taught, as determined by the target audience's lack of skills. It provides the bridge to writing objectives. Ideally, the target audience should perform the same tasks, under the same conditions, in the job as in the course.

Therefore, the course objectives should mirror the job. If course objectives cannot be performed in the exact manner and under the same conditions as the job, then they must be simulated as closely as possible. Resources and time are the main reasons for not being able to replicate job performance in a course. Simulated exercises or scenarios should be used when replication is not possible.

Terminal objectives are written from the tasks to provide direct linkage to the target audience's jobs. The behavior is exactly the same. The performance standard also is the same. Objectives that do not reflect the tasks will not relate to the job.

COURSE GOAL

The course goal is a short description of how the outcomes of the course will help the target audience do a better job. The course goal relates to all the tasks and duty areas of the target audience and becomes the bridge between the course and the job.

SAMPLE: The book titled *Transfer of Training*, by Mary L. Broad and John W. Newstrom, has the following course goal:

Transfer of Training is based on three major premises:

1. U.S. organizations spend billions of dollars each year on human resources development (HRD) for their employees.
2. Most of that investment in organizational training and development is wasted because most of the knowledge and skills gained in training (well over 80 percent, by some estimates) is not fully applied by those employees on the job.
3. For these organizations to remain competitive in the global marketplace, and to develop the highly skilled workforce that can contribute to solutions for the world's pressing problems, improving *transfer of training* must become HRD's top priority. Our multibillion-dollar training industry has to show that HRD investments pay off in improved performance on the job.

SAMPLE: For the Michigan State University, Emergency Response Solutions *Rapid Intervention Program* the course goal is

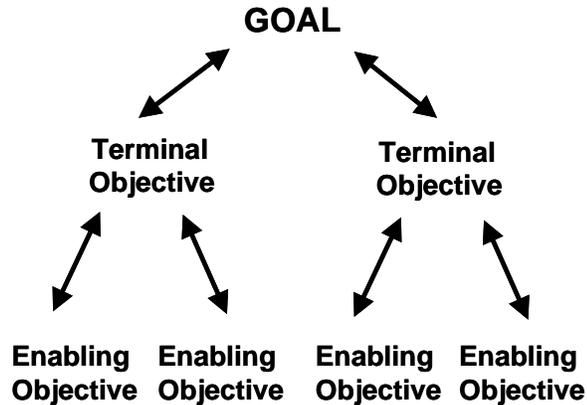
The goal of this course is to provide fire departments with a training program for Rapid Intervention Teams (RIT) as required respiratory standard of Michigan Occupational Safety and Health Act.

The course has been developed as a guideline for fire department Rapid Intervention Teams. Fire departments must evaluate skill levels of their RIT members to determine specific course length.

This course is based on a Four-Phase Standard Operating Guideline that requires the use of Locate, Access, Stabilize, and Transfer procedures for rescue of firefighters.

MEASURABLE OBJECTIVES

In general terms, a **goal** describes the desired outcome of a given course. **Objectives** detail the steps the student must master to reach the goal. There are two kinds of objectives--terminal and enabling. **Terminal Objectives** describe the end results of training in terms of student performance. **Enabling Objectives** are the building blocks needed to achieve the terminal objectives.



Instructional objectives are useful for students, instructors, and course developers. From the student's point of view, objectives act as organizing principles: they provide a focus for study and describe the information on which the student will be tested. For the instructor, objectives define the topics to be covered, identify the training's presentation sequence, help in evaluating student progress, and provide a means for evaluating course effectiveness. Finally, for the course developer, objectives describe the material to be covered in order to meet course goals; they also suggest the skills that must be developed or strengthened through training.

When writing objectives, a useful device to keep in mind is the ABCD format:

1. **Audience**--Who (what learner) will perform the action?
2. **Behavior**--What does the learner have to do?
3. **Condition**--Under what circumstances does the learner have to perform the action?
4. **Degree**--How will we judge if the learner has succeeded?

Include the answers to each of these questions in the objective statement.

Note that, while the National Fire Academy (NFA) uses this ABCD format in writing its objectives, there are different formulations preferred by other entities. These include CBS--**C**ondition, **B**ehavior, **S**tandard--and GPS--**G**iven, **P**erformance, **S**tandard. Use the format preferred by your jurisdiction.

DOMAINS OF LEARNING

In writing your instructional objectives, you also must specify the area, or **domain**, in which the learning is to occur. There are three possible domains: cognitive, affective, and psychomotor. The **cognitive domain** describes thinking processes the learner must master. The **affective domain** describes attitudes and feelings the learner should attain. The **psychomotor domain** describes physical skills and tasks the learner must be able to perform.

Cognitive Domain

Cognitive objectives and associated action verbs:

Class	Associated Action Verbs		
Knowledge	define state list name	write recall recognize label	underline select reproduce measure
Comprehension	identify justify select indicate	illustrate represent name formulate	explain judge contrast classify
Application	predict select assess explain	choose find show demonstrate	construct compute use perform
Analysis	analyze conclude differentiate	select separate compare contrast	justify resolve break down criticize
Synthesis	combine restate summarize	argue discuss organize derive	select relate generalize conclude
Evaluation	judge evaluate determine recognize	support define attack criticize	identify avoid select choose

Source: Ivar K. Davies. *The Management of Learning*. London: McGraw-Hill, 1971.

- Knowledge--the act of remembering previously learned facts, theories, principles, and procedures.
- Comprehension--the ability to grasp the meaning of material. One step beyond memorization; the lowest level of understanding.
- Application--the ability to use learned material in new and specific situations.
- Analysis--the ability to break material into its component parts in order to understand its structure.
- Synthesis--the skill of putting parts together to make a new whole.

- Evaluation--the capability to judge the value of something for a given purpose.

Since they imply changes in attitudes, values, and beliefs, **affective objectives** are difficult to test. Instead, they must be measured indirectly by observation.

Affective Domain

Affective objectives and associated action verbs:

Class	Associated Action Verbs		
Receiving	listen attend prefer	accept receive perceive	beware favor select
Responding	state answer complete	select list write	record develop derive
Valuing	accept recognize participate	increase develop attain	indicate decide influence
Organization	organize judge relate	find determine correlate	associate form select
Characterization	revise change face	accept judge develop	demonstrate identify decide

Source: Davies, *op. cit.*, 1971.

- Receiving--the student's ability to listen and to be aware of stimuli. In teaching it involves getting, holding, and directing the student's attention.
- Responding--participation on the part of the student.
- Value--the worth or value the student places on a particular behavior.
- Organization--emphasizes comparing, relating, and synthesizing values.
- Characterization--objectives that emphasize a person's pattern of adjustment.

It would be unreasonable to expect students to do long division before they have mastered simple subtraction. Yet instructional designers often make this kind of mistake. Objectives, as mentioned earlier, usually specify a complex learning task requiring that several other components (enabling objectives) be mastered before the terminal objective can be attained. Follow this model in writing instructional objectives. Be sure to require a set of subskills as a

prerequisite to learning; prepare students to learn these subskills by including them as enabling objectives.

Psychomotor objectives that require performance of a physical skill always should be tested through performance.

Psychomotor Domain

Refers to movement characteristics and capabilities.

Psychomotor action verbs:

stand	type	bounce
sit	file	write
dance	punt	balance
paint	touch	bend
play	stop	crawl
run	catch	creep
jump	walk	slide
turn	grasp	open
select	throw	close
	catch	differentiate
	comply	follow

Source: Jerrold Kemp. *The Instructional Design Process*. New York: Harper & Row Publishers, 1985.

The levels of the psychomotor domain are not as standardized as are the other two levels. Jerrold Kemp has a list, and E. J. Simpson has another grouping, presented here because of the increasing acceptance of it.

Kemp

- imitation;
- manipulation;
- precision;
- articulation;
- naturalization; and
- nondiscursive communication.

Simpson

- Perception--the use of sense organs to obtain clues that prompt motor activity.

- Set--indicates the readiness to perform a particular action and involves mental, physical, and emotional readiness to act.
- Guided response--the early stage of learning a complex skill. It involves repeating an act demonstrated by the instructor.
- Mechanism--infers that the learned responses have become habitual and can be performed with skill and confidence.
- Complex overt response--the skillful performance of physical actions that involve complex movement patterns.
- Adaptation--involves modifying skills that have been well developed to fit a particular situation or problem.
- Origination--indicates that the person has become so skillful that he/she can create movement patterns to fit a particular situation or problem.

LEVELS OF LEARNING

Your next step in writing concise, measurable instructional objectives is to identify the desired level of learning within the objective's domain. As used here, **level of learning** refers to the type of behavior the student must display to achieve the objective.

Action verbs help pinpoint the desired level of learning. Thus, every objective should, in its performance/behavior component, contain an action verb that describes an **observable behavior** the learner should be able to do.

As you define the desired levels of learning, you must determine simultaneously how you will evaluate the student on his/her mastery. In other words, you must begin to convert your instructional objectives into effective evaluation instruments.

Cognitive objectives often can be measured effectively by a written or oral test. Verbs such as "list" and "state" can be tested with completion, multiple choice, or matching questions; verbs like "judge," "evaluate," or "defend" may call for written essay questions.

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Activity 4.1

Benefits of Goals and Objectives

Purpose

To determine how goals and objectives can serve you, the instructors, and course designers.

Directions

1. In your small groups, brainstorm all the ways in which instructional objectives may be useful to students, instructors, and course designers.
2. Use a separate piece of easel pad paper for each.

For the student:

For the instructor:

For the course designer:

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Activity 4.2

Writing Terminal and Enabling Objectives

Purpose

To write terminal and enabling objectives from a course goal.

Directions

1. In your groups, on an easel pad, write one terminal objective and one enabling objective for the stated goal.
2. Determine if your objectives have all three components (BCD).
3. Your group will have a chance to correct any objectives that do not contain the components.

Goal:

To provide assistance to citizens in emergency life-threatening situations.

Terminal Objective:

Enabling Objective:

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Activity 4.3

Writing Objectives in Specific Domains

Purpose

To write an objective correctly in each of the domains.

Directions

Part 1

1. Choose a course topic from your interest area.
2. With your group, write a terminal instructional objective appropriate to that topic in the cognitive domain. Record your group's objective for future reference. Ensure that the objective contains all the essential elements: **A**udience, **B**ehavior, **C**ondition, and **D**egree.

Cognitive domain objective:

Part 2

3. Now write a terminal objective in the affective domain. (You may want to choose a different topic.) Again, be sure the objective has A, B, C, and D elements.

Affective domain objective:

Part 3

4. Write a terminal objective in the psychomotor domain.

Psychomotor domain objective:

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Activity 4.5

Course Goals and Objectives

Purpose

To become proficient at writing objectives.

Directions

1. Choose one task from your task analysis that was completed and approved last night.
2. As a group, prepare one terminal objective for each of the tasks chosen by each individual group member. The terminal objectives all should contain the following:
 - a. Audience.
 - b. Behavior.
 - c. Condition.
 - d. Degree.
3. Review the task analysis sheets to analyze the steps and develop enabling objectives. Record what domain each enabling objective occupies (cognitive, affective, or psychomotor).
4. Use the following verb charts to write the enabling objectives so that they accurately reflect the level required to accomplish the step in the task analysis.
5. Complete the above tasks for each group member. Be prepared to share the work your group has done with the remainder of the class. Each group then will have one enabling objective for each member of the table group.
6. Place each enabling objective from the group on an easel pad and share with the class.

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Activity 4.5 (cont'd)

Cognitive objectives and associated action verbs

Class	Associated Action Verbs		
Knowledge	define state list name	write recall recognize label	underline select reproduce measure
Comprehension	identify justify select indicate	illustrate represent name formulate	explain judge contrast classify
Application	predict select assess explain	choose find show demonstrate	construct compute use perform
Analysis	analyze conclude differentiate	select separate compare contrast	justify resolve break down criticize
Synthesis	combine restate summarize	argue discuss organize derive	select relate generalize conclude
Evaluation	judge evaluate determine recognize	support define attack criticize	identify avoid select choose

GOALS AND OBJECTIVES

Affective objectives and associated action verbs

Class	Associated Action Verbs		
Receiving	listen attend prefer	accept receive perceive	beware favor select
Responding	state answer complete	select list write	record develop derive
Valuing	accept recognize participate	increase develop attain	indicate decide influence
Organization	organize judge relate	find determine correlate	associate form select
Characterization	revise change face	accept judge develop	demonstrate identify decide

Psychomotor Action Verbs		
stand	type	bounce
sit	file	write
dance	punt	balance
paint	touch	bend
play	stop	crawl
run	catch	creep
jump	walk	slide
turn	grasp	open
select	throw	close
	catch	differentiate
	comply	follow

EVENING ASSIGNMENT

Step 4: Write Course Goal and Objectives

In order to complete Step 4, you will be required to formulate the goals and objectives for your course. The goals and objectives will be derived from your job task analysis.

Objectives should be written in the ABCD format. Be sure to specify who the **A**udience is, what **B**ehavior the audience will be required to exhibit, under what **C**onditions, and to what **D**egree.

Your objectives should be written accurately to reflect the level of learning you expect the audience to achieve.

You should have prepared a draft course goal. Review your course goal and make any changes before writing your course objectives. Then, write two terminal objectives from the tasks and performance standards. Enabling objectives are prepared from the knowledge, skills, and attitudes from each task. You will need to write at least two enabling objectives for each terminal objective.

Use the forms in the Project Manual.

When you return home, the terminal and enabling objectives for your whole course must be written.

Sample Goals and Objectives (Using *Administration and Planning*)

Course Goal

To provide students with the necessary skills and knowledge to accomplish their duties in administration and planning. *Administration and Planning* is a 3-day course for supervisory personnel in the department. Typical students may include Chief Executive Officers (CEO's), Captains and Lieutenants, Fire Marshals, and Training Officers. The purpose of the course is for students to learn how to plan for projects assigned to them, and how to provide administrative support to accomplish program support. Specific administrative functions include documentation procedures, recordkeeping, and confidentiality of reports.

Terminal Objective 1: Given a blank fire alarm response report, students will be able to complete the report with 90-percent accuracy.

Enabling Objective 1: Given a written exam, the students will be able to locate the appropriate blanks on the alarm response form with 100-percent accuracy.

Enabling Objective 2: Given a series of situations and the *National Fire Incident Reporting System* (NFIRS) manual, the students will indicate the correct code number for each as listed in the manual with 100-percent accuracy.

Enabling Objective 3: Given a written exam, the students will state the department policy on fire alarm response reports with 100-percent accuracy.

Enter your objectives on the Summary Form at the end of the Project Manual. After each subsequent step in the design process, return to the Summary Form and add the information developed during that step.

APPROVAL SHEET

I. COMMENTS ON TASK:

II. SUGGESTIONS TO IMPROVE TASK:

_____ Approval granted

_____ Approval, pending correction of suggestions

Student Colleague _____ Date _____

Instructor Approval Signature _____ Date _____

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UNIT 5: COURSE ORGANIZATION AND CONTENT CONSIDERATIONS

TERMINAL OBJECTIVE

Given a course goal and terminal objective for the course design project, the students will be able to select a course organizational strategy or strategies that will maximize learning.

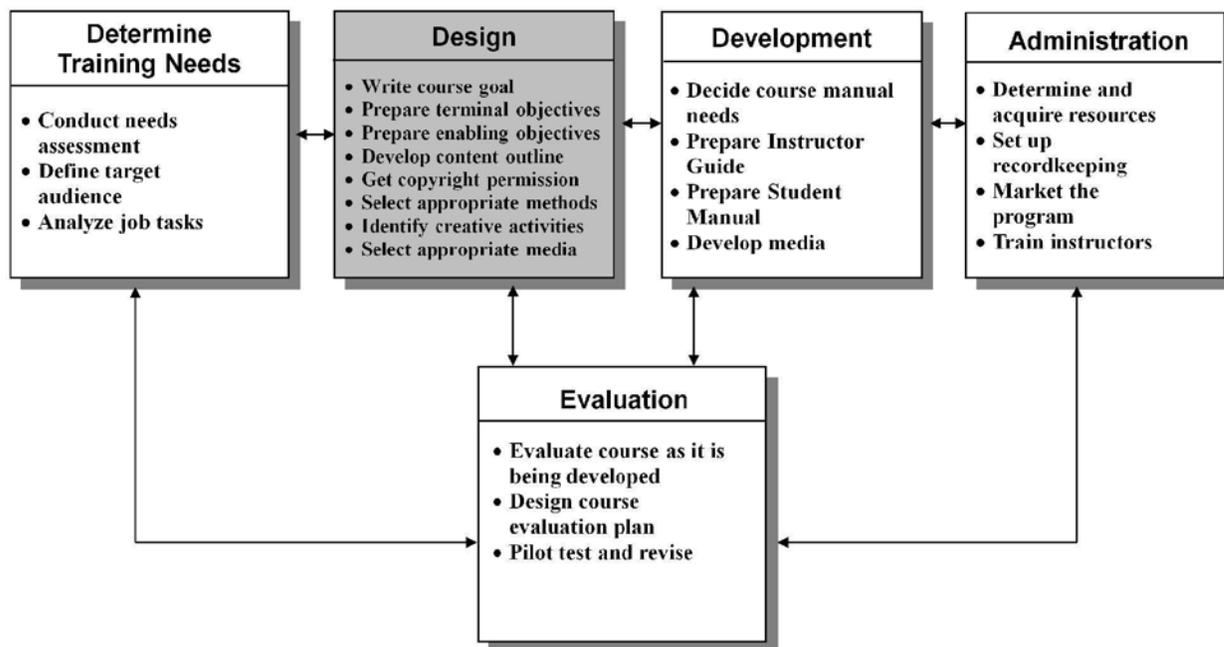
ENABLING OBJECTIVES

Given the course goal, terminal objective, and the course design strategy the students will:

- 1. Sequence the terminal objective according to the prescribed method.*
 - 2. Sequence units of instruction to facilitate the transfer of training, according to a prescribed method.*
 - 3. Prepare a content outline for each enabling objective with the correct outlining procedure.*
-

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INSTRUCTIONAL SYSTEM DESIGN MODEL FOR COURSE DEVELOPMENT



IMPORTANCE OF COURSE ORGANIZATION

All courses must be organized to create the best opportunity for students to learn easily and effectively. People are goal oriented; they want to know what's next and how each part unfolds in relation to the whole. The objectives that you have written have no meaning unless they can be connected into, and flow toward, the attainment of the course goal.

One of the main roles of a course designer is to assure good course structure and organization. The instructor's role is to teach and not to organize. Course designers analyze and organize material for instructors.

THREE LEVELS OF INSTRUCTIONAL SEQUENCES

Course organization/sequence involves sequencing terminal objectives in a course to meet a stated goal, and making units of instruction for the course.

Unit organization/sequence involves sequencing terminal and/or enabling objectives in a unit. Unit flow is guided by the attainment of the terminal objectives in the unit.

Sequencing the content for a specific enabling objective is guided by the end result of the enabling objective. Sequencing content often depends on the sophistication of the learners.

Always begin with sequencing the course objectives, then proceed into sequencing within a unit, followed by sequencing a specific procedure or enabling objective within the units.

STRATEGIES FOR ORGANIZING A COURSE

Identify objectives that relate to or depend on one another. Objectives that must be performed before other objectives must be considered prerequisites. Look for objectives that must be performed in a specific sequence because of the job requirement.

Look for course schemes on which the course can be based and the objectives can be sequenced, such as:

- easy to difficult;
- known to unknown;
- whole-parts-whole;
- historical;
- relational;
- incident-related;
- phases;
- least to most; and
- the "five W's."

Have an open mind about how the course can be organized. Seek opinions of others who may play the Devil's advocate role. People see things differently, so take advantage of it; it will make your course better.

ESTABLISHING UNITS OF INSTRUCTION FOR A COURSE

Always create units after you sequence course objectives. The units of instruction are a group of objectives with a title, and eventually will get assigned times and other requirements.

To determine units of instruction, look for major content groupings and appropriate breaks in the sequence of objectives that were determined earlier. Consider appropriate timeframes for course units. For example, a 4-day course should not contain one unit that is 3-1/2 days long, and a second unit lasting 3 hours. Unless the reason is good, most units should be relatively equal in length.

Consider whether an evaluation can be provided for your selected units. Unit titles should be short and reflect the objectives and content of each unit.

SEQUENCING OBJECTIVES WITHIN A UNIT

Organization within a unit should be completed after the course organization and units have been determined. This involves sequencing terminal objectives, using the strategies discussed earlier, then sequencing enabling objectives under a terminal objective in a unit in order to promote the most effective learning.

PREPARING A CONTENT OUTLINE FOR A SPECIFIC ENABLING OBJECTIVE

Locate resources such as books, manuals, audiovisual materials, notes from task analysis, magazines, Standard Operating Procedures (SOP's), etc. Do not attempt this step without resources. List all major points for each enabling objective in outline form. Always use resources to outline content; never do this from memory. Use your organization's SOP's as the standard.

Prepare an outline in short sentences, listing key points. List behaviors if a skill is involved (i.e., connect, draw, etc.). From the short sentences, text, and activities, other course materials then can be prepared. The outline should have at least two to three indentations (division levels). Roman numerals reflect key points from the enabling objectives. Capital letters and numbers should reflect the key points and/or steps from the task analysis. You cannot have just one bulleted item; there must be two, or drop the item.

Example of Content Outline

Define the objective: The dispatcher will perform calming techniques during an emergency situation that enables the emergency to be processed with 45 seconds. Develop a content outline for the objective. Example could be: Take a deep breath; Calm yourself down; Only you can help your loved one until emergency rescue arrives; I can help you help your loved one; I am going to stay with you through this; Please answer my questions; Explain what you are doing to help.

Ways to Organize the Content for an Enabling Objective

Use the same methods as for course organization, and make your selection based on learning effectiveness. Two or more schemes can be used at the same time. This is the first step in getting ready for a lesson plan, so make sure this information is accurate.

RELATING TASKS AND OBJECTIVE TO CONTENT OUTLINE

As you develop your course content outline, you always should be aware of ways in which you can increase the chances of your students learning what is being taught. This section describes mechanisms for building this awareness into your content outline.

Make the objectives clear. Write objectives carefully and thoroughly. After outlining the content, check to see if the objectives need revisions.

Organize content and procedures into meaningful sequences. Organizational schemes can include historical, relational, cause-and-effect, incident-related (issues), least to most, the "five W's," phases, positional (pros and cons), and structural (hierarchical). Next, divide the content into three categories: must know, important to know, and nice to know.

Fill in the details as bite-sized segments. Because everyone learns at different rates, you should build flexibility into the lesson plan so that the pace and materials can be adjusted to learner needs. Make sure you include an adequate number of breaks throughout the training.

Provide motivation. You can do this in several ways: by making the material relevant to the student, adding variety to the lesson plans, and allowing immediate application of skills learned.

COPYRIGHT CONSIDERATIONS

Instructional designers should be concerned about copyright laws for two reasons:

- They may be using copyrighted material.
- They may need to copyright their own manual.

It is important for instructional designers to obtain permission in writing to copy anything that comes from a copyrighted document, particularly when those materials will be reprinted.

It is also wise to apply for a copyright for any material you are producing. Contact the Library of Congress Copyright Office in Washington, DC, for information.

You can and should copyright the training media and materials you produce. Examples of materials that can be copyrighted:

- manuscripts; scripts and storyboards for videotape production;
- books;
- magazines: using the lift method for overlays, photos of articles, photocopies of articles;
- periodicals;
- phonograph records--background music;
- films;
- tapes; and
- disks.

Items not protected:

- ideas;
- procedures;
- processes;

- systems; and
- methods of operation.

Avoid plagiarism. Acknowledge material by referencing quotations, or paraphrasing with the name of the authority. This practice serves to indicate where the borrowed materials begin. Provide specific, in-text documentation for each borrowed item. For example, Modern Language Association (MLA) style requires name and page for all in-text references.

Enclose all quoted materials within quotation marks. When not a quotation, make certain that referenced material is rewritten into your own style and language. Simply rearranging sentence patterns is unacceptable. Be sure that you do not alter the essential idea of the source.

Provide a bibliographic entry for every source cited in the paper. Omit sources consulted but not used.

Avoid copyright infringement. Copyright law allows for "fair use" of material "...without the need for specific permission as long as your usage is noncommercial for purposes of criticism, scholarship, or research..." (Lester, 141).

This information was adapted from Lester's *Writing Research Papers*.

Copyright Topics for Discussion--These are Just Ideas

1. Do you know someone who was caught using copyrighted materials in training without permission? What was the penalty?
2. Is your organization willing to spend more money to purchase something that has copyright protection?
3. Are there any rules that your department follows on this subject?
4. What has been your experience in getting copyright permission for a training program in which participants did not pay? Easy to get? Takes a long time?
5. Have you ever changed the ideas of a product and reused it claiming there is no copyright?
6. Are you less likely to take something for granted today because of stricter laws?
7. Does the fact that a lot of people use copyrighted materials without permission today make you feel like it is not a big thing?

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Activity 5.1

Organizing a Course Through its Objectives

Purpose

Given a course goal and the terminal objectives, to determine the best course organization strategy; then to sequence the objectives by numbering them in an order that best promotes learning. Finally, to determine what unit titles are appropriate for the sequenced objectives.

Directions

1. Your instructor will divide the class into groups of four to six people and assign you to one of the courses described on the following Student Activity Worksheets (SAWs). Select a group spokesperson to provide a 2-minute summary of your conclusions. You will also be given an envelope containing objectives on strips of paper.

Please use the strips in the envelope to rearrange the objectives on a table in your work group. Kindly do not write on the strips and place all strips back into the envelope following the activity.

2. Take a couple of minutes and read the course goal and terminal objectives assigned to your group.
3. Decide as a group which strategy or strategies can best be used to organize this course. Record these strategies. You may refer to the list of organizational strategies in your Student Manual (SM).
4. Using the strategy or strategies you have decided on in Step 3, sequence all the terminal objectives that fit the strategy. Objectives are not listed in any sort of order.
5. Divide the terminal objectives into units and create unit titles. Refer to your lecture notes for assistance.
6. The spokesperson will summarize the group's results.

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Activity 5.1 (cont'd)

Course 1: *Volunteer Fire Service Management*

Course Goal

To provide volunteer fire officers with a practical management training program that will allow them to apply management concepts and principles to the real-world management of a volunteer fire department.

The *Volunteer Fire Service Management* course provides introductory information to assist managers in their professional development in the following areas from National Fire Protection Association (NFPA) 1021, *Standard for Fire Officer Professional Qualifications*: leadership, human relations, management, administration, public relations, organization, and problem-solving skills.

Terminal Objectives

The students will be able to:

1. When given a situation, compare the pressures for and against change by applying the problem analysis method.
2. When given a list of tasks, apply the principles of organization that define authority, responsibility, and accountability.
3. When given specific information, develop a list of tasks needed to accomplish an objective.
4. When given a list of tasks, apply the principles of controlling to develop policies, procedures, and timelines.
5. Analyze the effects of authoritative versus persuasive behavior in a manager-subordinate relationship in a given situation.
6. When given necessary information, write a management objective that is specific, measurable, and achievable.
7. Prioritize a given list of tasks and develop a schedule for completion, meeting a given timeframe.

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Activity 5.1 (cont'd)

Course 2: *Fire Inspection Principles*

Course Goal

Fire Inspection Principles has been designed to provide the student with the fundamental knowledge, skills, and attitudes to conduct basic fire safety inspections effectively and confidently. This course is appropriate for the fire prevention or code enforcement official and other allied professionals, with limited fire inspection and code enforcement experience, who have the responsibility for conducting fire safety inspections. Students will be introduced to various codes and standards to develop a working knowledge of their application in the inspection process.

Due to the variety of regional and local codes and ordinances with which each student must deal on a daily basis, the National Fire Academy (NFA) must, for the purpose of this course, assume that each of you is familiar with the codes and standards in effect in your jurisdiction. All of the activities have been designed to allow you to accomplish them from the perspective of the code **being enforced in your local jurisdiction.**

Terminal Objectives

The students will be able to:

1. Explain the code enforcement system and the fire inspector's role in that system.
2. Evaluate the general fire safety of a structure by researching the concepts within their code.
3. When given simulated situations, identify construction types and building systems and analyze the strengths and concerns related to fire, smoke, and heat travel.
4. Describe categories of human behavior in fire situations and analyze what variables affect this behavior.
5. Recognize the presence of hazardous materials or processes.
6. Recognize hazards associated with electrical, heating, and cooking systems and equipment.
7. When given specific building materials, recognize the potential hazards of fire spread.
8. Handle in a professional manner situations that are typical of the fire inspector's role.

9. Using their codes, verify that an acceptable level of life safety is provided for the occupants of a structure.
10. Given a scenario, identify the key characteristics of each occupancy class.
11. Identify methods of mitigating the recognized hazards.
12. Verify that manual fire suppression equipment is operational.
13. Develop an inspection procedure for special hazard fire suppression systems.
14. Verify that automatic sprinkler systems and fire alarm/detection systems are operational.
15. Educate others about hazards associated with electrical, heating, and cooking systems.
16. Identify types of special hazard suppression systems.
17. Explain the development, application, and interrelationship of codes and standards.

Activity 5.1 (cont'd)

Course 3: *Public Fire Education Planning*

Course Goal

The *Public Fire Education Planning* course is a specialized course relating to the local development and implementation of public fire education programs and is based on selected standards included in NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plan Examiner*.

The course seeks, within the 12-hour format, to provide the student with a working knowledge of the principles of public fire education planning procedures to be used on a local level.

Terminal Objectives

The students will be able to:

1. When given the necessary information, prepare scenarios for a real or potential fire or burn problem in their own communities.
2. For a given problem area within their communities, design their fire education program.
3. For a given problem area, determine methods of evaluating the effectiveness of their fire education programs.
4. Given the history, purpose, and role of public fire education, identify potential problems in the implementation of their public fire education programs for their own communities.
5. Given the necessary information, identify persons and/or groups from the community necessary for a successful planning process.
6. For a given a problem area within their communities, select objectives for their fire education programs.
7. Prepare a list of five actions to be taken in their communities to begin or improve their public fire education programs.
8. When given the necessary information, determine the means of implementing their public fire education programs for the problems they identified.

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Activity 5.1 (cont'd)

Course 4: *Commanding the Initial Response*

Course Goal

Commanding the Initial Response is a 12-hour course designed to give the student the information and skills necessary to establish command, perform sizeup, develop and implement an action plan, transfer command, and organize an incident using an effective command system.

This course follows *Preparing for Incident Command*. It is intended for those who may assume command of the initial response resources. Typically, these are persons of the rank of lieutenant (or equivalent) or higher. Persons attending this course should have a knowledge of leadership, fire hazards and causes, firefighting strategy and tactics, fire chemistry, and safety practices as described in NFPA 1021.

Terminal Objectives

The students will be able to:

1. Identify sources of information available at an incident and describe the methods used to reevaluate situation status.
2. Given a scenario, demonstrate the ability to develop an action plan that will include
 - a. Appropriate goals and objectives.
 - b. Necessary tactical operations to accomplish goals and objectives.
3. List the three incident priorities and explain why they remain constant for all incidents.
4. Define authority and responsibility as they relate to command.
5. Use the command sequence as a guide to action planning.
6. Identify and define the four parts of the command sequence.
7. Demonstrate modular expansion of the Incident Command System (ICS).
8. Identify reasons and methods for establishing command at all incidents.
9. Explain the advantages of ICS common terminology and all-risk design.
10. Given a scenario, apply incident priorities to determine order of implementation.

11. List the critical elements of sizeup.
12. Identify and describe procedures for transferring command.
13. Identify factors influencing the capabilities of initial response resources on a given incident.
14. List and describe the five major ICS functional areas and the three ICS Command Staff functions.
15. Identify factors that allow the Incident Commander (IC) to evaluate and modify the action plan.
16. Demonstrate the ability to deliver a complete, concise report of conditions as they exist upon arrival at an incident.
17. Identify reasons why a formal Command Post (CP) may be established on initial response incidents.
18. Explain how ICS provides for unity of command.
19. Identify who is responsible for sizeup on an incident.

Activity 5.2

Course Organization and Content

Purpose

Given an enabling objective, to identify a strategy for organizing the content of the objective and prepare a brief content outline that supports the enabling objective.

Directions

1. Your instructor will divide you into pairs. As a course designer, you have just finished writing your course goal and sequencing your terminal and enabling objectives, and have decided on unit titles. Now you are working on a specific enabling objective.
2. Below is a list of some enabling objectives for a program. Select one enabling objective from the list. Identify what strategies are most appropriate to organize the content to support the objective. Make a note of the strategy or strategies.
3. Next, using an easel pad or sheet of paper, begin to outline the content using the strategy you have selected. At least four key points must be identified; at least two of those points must contain subpoints. Finally, try to break at least one of the subpoints into yet another division.
4. Be prepared to discuss the strategy you selected to organize your content as well as your outline. Remember, if your content is a psychomotor skill or an attitude, you must indicate the behavior by starting with an action verb. Please refer to your notes or text on rules for outlining.

Select one of the following enabling objectives:

- The student will list four important fires in the community and tell what changes have been made as a result of each fire.
- Given the necessary materials, the student will wash a car.
- Given the necessary equipment, the student will plant a tomato plant correctly.
- Given a ladder, the student will demonstrate the correct techniques for raising a ladder.
- Given an overhead projector, the student will demonstrate correctly four techniques for using the projector.
- Given a smoke detector, the student will demonstrate correctly an inspection test of a home smoke detector.

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EVENING ASSIGNMENT

Step 5: Determining Course Organization and Content Considerations

The four requirements for this step are summarized below.

1. First determine the best course organization strategy. You should review the course goal and terminal objectives. It is necessary to have all of the terminal objectives prepared so that an intelligent course strategy can be decided. If the instructors have required that you prepare a few of your objectives for the class, you have two choices: You can write all of the course terminal objectives or, for the sake of time, you may opt to use your completed list of tasks. First list the terminal objectives. Review this list and refer to the list of the schemes in your SM. Select one or more of these strategies that represent the primary organization of your course. Place these schemes at the top of the page.
2. Next, sequence your objectives by placing a number next to each objective, to represent the order that the terminal objectives will flow in the course. Remember, your decision to order the terminal objectives must be based on the sequence described above. Also, try to select the sequencing that best promotes learning.
3. Finally, determine which objectives will be taught in which course units. This is accomplished by grouping certain objectives together, creating a unit number and unit title. You may have one or more objectives or tasks per unit of instruction. After you have grouped them, create unit titles.
4. Your final requirement for Step 5 is to prepare a content outline for each enabling objective. For the purpose of the class requirement, your instructor may require only a content outline for a specified number of objectives. Follow the rules for content outlining as presented in class. Do not skip any key points. Your outline should be broken down into two or three levels. A minimum of two points always support one point.

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APPROVAL SHEET

I. COMMENTS ON TASK:

II. SUGGESTIONS TO IMPROVE TASK:

_____ Approval granted

_____ Approval, pending correction of suggestions

Student Colleague _____ Date _____

Instructor Approval Signature _____ Date _____

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APPENDIX A

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Sample Letter

Requesting Permission to Duplicate Material for a Course

30000 Anywhere Lane
Anyplace, USA
Any date

Superior Publishing Company
50000 Anyplace Lane
Any City, USA

To Whom It May Concern:

I am developing a program for educational use in our fire station.

The program will be given on _____ and _____.

I would like to obtain your permission to reproduce 100 copies of the article, "xxxxxxxxx" published in _____ journal on yyyy date.

The article will be used for educational purposes only. Full credit will be given to the author and publisher and the source will be displayed clearly on each handout.

Please sign a release form and send it to me at xxxxxxxx.

The _____ Fire Department thanks you for your prompt and generous assistance in aiding our (in-house or outreach) education efforts.

Sincerely,

Your Name
Job Title

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APPENDIX B

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UNIT 4: BUILDING CONSTRUCTION AND FIRE BEHAVIOR FACTORS

TERMINAL OBJECTIVE

At the conclusion of this unit the firefighters and officers will understand the five classifications of building construction as described in the 2008 edition of the NFPA 220 standard and identify the positive characteristics and/or areas of concern for each classification. When given a picture of a structure the participants will be able to identify the classification of the structure and describe how the structure is built, the structural elements utilized, and how this structure may behave under fire conditions.

ENABLING OBJECTIVES

At the conclusion of this unit the participants will be able to:

- 1. List the five classifications of buildings and explain the characteristics of each classification.*
 - 2. Identify the strengths and concerns for each building construction classification.*
 - 3. List and explain the critical fire behavior factors that relate to tactical operations for an assigned fire scenario.*
 - 4. Given a simulated incident where building construction is a critical issue, develop a sizeup report of fireground conditions, complete the Primary Factors Size-Up Chart, and document progress using the Command Sequence Tactical Chart.*
-

POINTS FOR THE INSTRUCTOR

The first portion of this unit is designed as a refresher in building construction principles, the strengths of each classification, and those areas that may be of concern under fire conditions. The building construction section is intended as a brief overview of the classifications. The students will have the opportunity to list several areas of strengths and concerns.

The second section is a review of basic fire behavior factors that are critical for the fire officer to understand in order to ensure the safety of firefighting personnel and to develop strategy based on a fire behavior prediction.

The third section ties construction and fire behavior factors together in an effort to predict fire travel due to certain construction features and fire protection considerations.

The material is not intended to provide an indepth course about building construction or fire behavior, but as a review that will foster accurate decisionmaking in other portions of this course. While the fire behavior factor section may seem basic to fire officers, they should be thinking proactively in order to provide for the safety of their personnel. The need to understand the basics completely cannot be overstated.

The National Fire Academy (NFA) course, *Principles of Building Construction: Noncombustible* (PBC:NC), provides a more indepth examination of the behavior of buildings under fire conditions.

ATTITUDES TO FOSTER

1. The students will demonstrate an awareness of the severity of the threat of structural collapse, flashover, and backdraft to the safety of firefighting personnel involved in structural firefighting.
2. The students will assume responsibility for the assessment of fire development and structural conditions as a Company Officer (CO).

METHODOLOGY

This unit uses lecture, discussion, and small group and simulation activities.

(Total Time: 3 hr., 30 min.)

115 min.	Lecture/Discussion	
	Objectives and Overview	IG 4-5
	Building Construction Classifications	IG 4-6
	Fire Behavior Factors	IG 4-22
	Fire Travel Predictions	IG 4-26
30 min.	Small Group Activity 4.1	
	Predicting Fire Travel	IG 4-29
60 min.	Simulation Activity 4.2	
	Command Sequence #2: McDonald's	IG 4-33
5 min.	Lecture	
	Summary	IG 4-69

AUDIOVISUAL

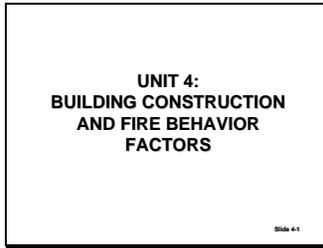
Slides 4-1 to 4-85

HANDOUT

Handout 4-1: Simulation Messages

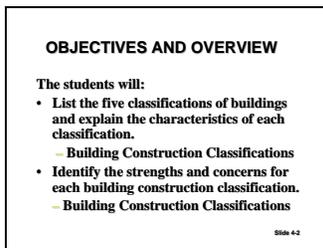
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Slide 4-1



115 min.
Lecture/Discussion

Slide 4-2



I. OBJECTIVES AND OVERVIEW (5 min.)

The students will:

- A. List the five classifications of buildings and explain the characteristics of each classification.

Topic covered: Building Construction Classifications.

- B. Identify the strengths and concerns for each building construction classification.

Topic covered: Building Construction Classifications.

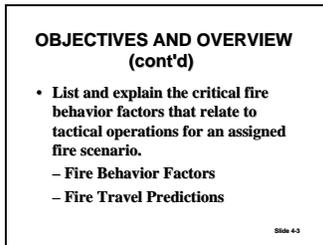
- C. List and explain the critical fire behavior factors that relate to tactical operations for an assigned fire scenario.

Topics covered:

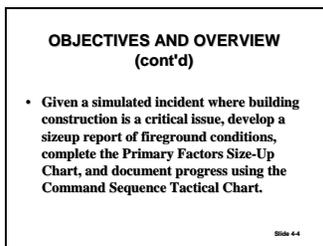
1. Fire Behavior Factors.
2. Fire Travel Predictions.

- D. Given a simulated incident where building construction is a critical issue, develop a sizeup report of fireground conditions, complete the Primary Factors Size-Up Chart, and document progress using the Command Sequence Tactical Chart.

Slide 4-3



Slide 4-4



II. BUILDING CONSTRUCTION CLASSIFICATIONS (60 min.)

This course is not intended to teach building construction in depth, but rather to provide a refresher on the strengths and weaknesses of buildings so that the Company Officer (CO) will be able to make safe and accurate predictions about the structure's stability and fire/smoke travel within the structure.

Emphasize that understanding building construction characteristics regarding strengths and weaknesses for each type is a critical component for developing an Incident Action Plan (IAP) that strongly considers the safety of firefighters within a structure involved in fire.

Slide 4-5

BUILDING CONSTRUCTION CLASSIFICATIONS

- Understanding the strengths, concerns, and specific characteristics of construction types is critical.
- As structural elements become weakened, gravity will take over and pull the building down.

Slide 4-5

- A. Understanding elements of the varied construction types is critical to safe and effective operations:
1. Strengths.
 2. Concerns.
 3. Specific characteristics of each.
 4. As structural elements become weakened, gravity will take over and pull the building down.

- B. Buildings may be grouped into one of five common classifications, or a combination of two or more.

Slide 4-6

BUILDING CONSTRUCTION CLASSIFICATIONS (cont'd)

- Fire resistive
- Noncombustible
- Heavy timber
- Ordinary
- Wood frame

Slide 4-6

1. Fire resistive.
2. Noncombustible.
3. Heavy timber.
4. Ordinary.

Slide 4-7



Slide 4-8



Slide 4-9



Slide 4-10



Slide 4-11



5. Wood frame.
- C. Fire-resistive construction.
1. A building in which no structural steel is exposed, and all vertical openings are protected with approved doors.
 2. Bearing walls may be made of steel with a fire-resistive covering applied.

Structural steel often is protected by encasing, sprayed-on protection, or membrane ceilings (3-hour rating).
 3. Exterior walls generally will be curtain walls that do not support the structure.
 - a. They may be precast, lightweight concrete, aluminum, glass, or other construction material.
 - b. Exterior wall supports also may be made of reinforced concrete.
 4. Exterior or interior nonbearing walls will have a varying degree of fire resistance.
 5. Stairwells are enclosed in fire-resistive materials.
 6. Floors may be poured-in-place concrete, prefabricated slabs, or other material providing fire resistance.

Slide 4-12



7. Roof construction may be similar to that used for floors.
8. Fire spread via the exterior of a building is a prime concern.
 - a. From a window to the window above.
 - b. Through the gap between floor and exterior curtain wall.

Slide 4-13



The following is good background information on the perils of fires in highrise structures. This is an example of a building that was contaminated by polychlorinated biphenyl (PCB) as the result of a fire.

This multi-story fire-resistive building was constructed in the late 1960's and opened as a State office building. It is a typical center-core design with elevators, two stairwells, and plumbing (restrooms) in the center of the building.

On February 5, 1981, one electrical transformer in the sub-basement shorted and burned the PCB-based transformer oil. The resulting fire was extinguished easily after the electricity was shut down, but the environmental damage would continue for years.

The toxin-laden smoke traveled through all floors via an open ventilation shaft that started in the subbasement over the transformer. It served as the ventilation (air removal) for the men's room on every floor. Each of the men's room doors was louvered to allow for makeup air to enter.

The building was contaminated with the products of combustion from the PCB-based transformer oil. It was closed on February 5, 1981, and remained closed for 10 years. The cleanup costs were estimated in excess of \$75 million, and no date to reoccupy the structure has been established.

9. Typically "fire-resistive" (highrise) buildings are constructed with center-core design. This allows the outside walls to be used for offices, apartments, or other revenue-producing areas. In office buildings there generally is little compartmentation, and open floor plans are common.

- D. Strengths of fire-resistive construction and concerns related to firefighting operations.

Easel Pad

Ask the following question and capture student responses on an easel pad.

ASK: What are the strengths of fire-resistive construction and the concerns related to firefighting operations?

Strengths of fire-resistive construction.

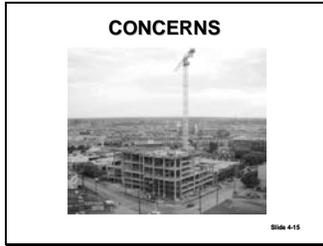
Suggested responses:

- Structural elements will have a minimum 3-hour rating.
- Means of egress will be enclosed in fire-resistive material.
- Floors will provide 2-hour fire resistance.
- Buildings normally will have built-in fire protection features such as sprinklers, standpipes, and detection systems.

Slide 4-14



Slide 4-15



Concerns related to firefighting in fire-resistive buildings.

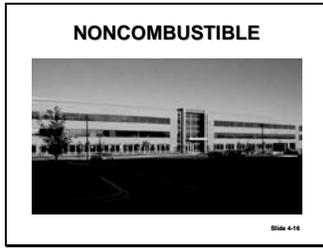
Suggested responses:

- Vertical fire spread via windows or openings between floor and exterior wall.
- Vertical utility shafts within the building.
- Large open spaces make it difficult to get water to the seat of the fire.
- Auto exposure.

Maintain completed easel pad chart for easy reference during the course.

1. To stop a fire between the curtain wall and the building structure (i.e., the steel skeleton and the exterior wall of the building), firefighters must open walls on the floor or floors above the fire floor over the area where the fire is located.
2. Vertical shafts in the building are more difficult due to their probable concealment in the interior walls.
3. Again, good prefire planning and building blueprints will assist in locating these shafts so they may be opened.
4. Fires in large open areas must be attacked with master stream devices to get maximum reach and cooling.

Slide 4-16



E. Noncombustible construction.

1. A totally noncombustible building in which structural steel is exposed to the effects of fire.

Totally noncombustible refers only to structural materials, not to interior finish and contents.

Slide 4-17



2. Structural framework is made of steel bolted, riveted, or welded together.
3. Susceptible to expansion, distortion, or relaxation of steel members from heat resulting in early distortion.
4. Wall enclosures may be masonry, steel, aluminum, glass, or other material.

Once wall coverings are in place, it may be difficult to determine if structural elements are exposed or protected.

Slide 4-18



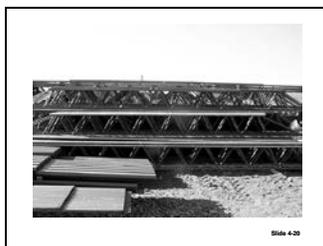
5. The floor and roof support system often will be lightweight bar joists, trusses, or other lightweight steel.

F. Strengths of noncombustible construction and concerns related to firefighting operations.

Slide 4-19



Slide 4-20

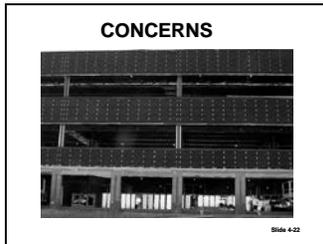


Easel Pad

Slide 4-21



Slide 4-22



Ask the following question and capture student responses on an easel pad.

ASK: What are the strengths of noncombustible construction and the concerns related to firefighting operations?

Strengths of noncombustible construction.

Suggested responses:

- Structural elements will not add to fire load.
- Means of egress may be enclosed within fire-resistive material.
- Profile of building may be recognizable easily as being in the noncombustible classification (sheet steel walls or unprotected steel columns).

Concerns related to firefighting in noncombustible buildings.

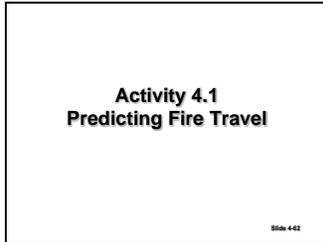
Suggested responses:

- Steel exposed to heat and fire will expand approximately 1 inch for every 10 feet at 1,100°F (593.3°C).
- Steel at 1,500°F (815.6°C) will not even support its own weight.
- Steel structural members are subject to early distortion and relaxation.
- Steel structure will retain heat and become a good conductor of heat.

Maintain completed easel pad chart for easy reference during the course.

30 min.
Small Group
Activity 4.1

Slide 4-62



Activity 4.1 Predicting Fire Travel

Purpose

To review construction features, fire and smoke development, and to predict fire travel patterns.

Prior to facilitating the activity, the instructor(s) must complete the descriptions of all construction types:

- fire resistive;
- noncombustible;
- heavy timber;
- ordinary; and
- wood frame.

Slide 4-63



Slide 4-64



Slide 4-65



Slide 4-66



Slide 4-67



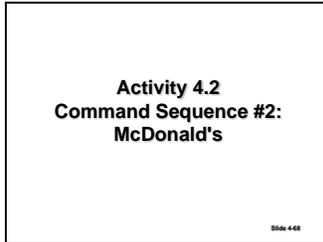
Directions to Students

SM p. 4-15

1. Depending on class size, assign students to groups of not less than two and not more than four students. Ensure that there is one group for each type of construction. The groups should be diverse, based on size of community.
2. Read the directions to the students. Assign each group one construction type. If there are more than five groups, a construction type may be assigned to multiple groups.
3. Show each group the PowerPoint® slide of its building. Ask students to review the features of the building and to make predictions of how fire will travel within this structure. Allow the groups 10 minutes to determine how fire will travel in the construction type. At the end of 10 minutes, allow each group to explain to the class how fire would travel in this building.
4. Allow 15 minutes for students to complete the activity.

60 min.
Simulation
Activity 4.2

Slide 4-68



Activity 4.2

Command Sequence #2: McDonald's

Purpose

To develop a sizeup report of fireground conditions, complete the Primary Factors Size-Up Chart, and document progress using the Command Sequence Tactical Chart.

Directions to Students

1. Assign three students to a team for this exercise.
2. A Command Sequence Tactical Chart is provided in the SM and on the following Student Activity Worksheet (SAW).
3. Designate two students per team jointly to assume the role as the first-due engine CO.
4. Designate one student per team as the team recorder.
5. Team recorder position will rotate among team members during the large simulations.
6. Team recorder will record all actions taken by the first-due CO onto the Command Sequence Tactical Chart.
7. Review the Command Sequence Tactical Chart preparation process with the class.
8. Emphasize that the chief will not arrive on scene for 30 minutes, and the first CO will manage the incident until the arrival of the chief.
9. Deliver the simulation messages at 3-minute intervals.

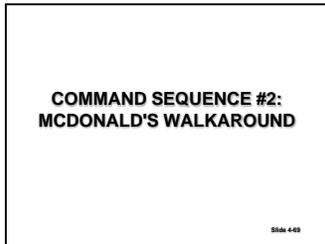
SM p. 4-17

IG p. 4-39

Part 1

1. Walk students through the primary sizeup factors and visible cues on slides.
2. Allow time to complete the Primary Factors Size-Up Chart and develop the sizeup report.
 - a. Primary factors.
 - b. Initial objectives.
 - c. Initial strategy.

Slide 4-69



Slide 4-70



Slide 4-71



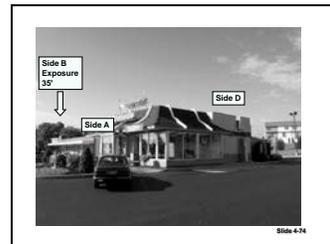
Slide 4-72



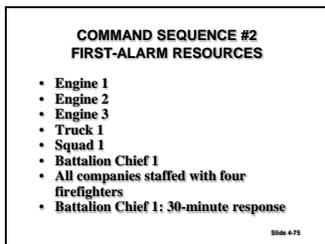
Slide 4-73



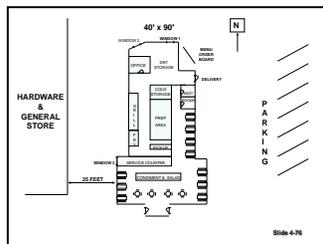
Slide 4-74



Slide 4-75



Slide 4-76



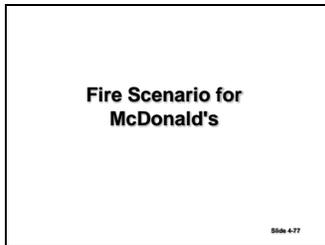
Part 2

Allow 45 minutes for simulation.

Handout 4-1

1. Show fire slides.
2. Distribute messages.
3. Have students complete the Command Sequence Tactical Chart.

Slide 4-77



Slide 4-78



Slide 4-79



Slide 4-80



Slide 4-81



Slide 4-82



Slide 4-83



Slide 4-84

Slide 4-84: A Command Sequence Tactical Chart table with columns for "Command Sequence", "Action", "Priority", "Status", and "Remarks". The table contains a list of tasks and their corresponding actions and priorities.

Command Sequence	Action	Priority	Status	Remarks
1. Establish Command	Establish Command	1		
2. Perform Size-Up	Perform Size-Up	2		
3. Establish Incident Objectives	Establish Incident Objectives	3		
4. Assign Tasks	Assign Tasks	4		
5. Monitor Progress	Monitor Progress	5		
6. Communicate	Communicate	6		
7. Evaluate	Evaluate	7		
8. Terminate	Terminate	8		
9. Debrief	Debrief	9		
10. Report	Report	10		

Part 3

1. Debrief.
2. Each group will present its sizeup report and review its primary Factors Size-Up Chart and Command Sequence Tactical Chart.

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STUDENT ACTIVITY WORKSHEET

Activity 4.2

Command Sequence #2: McDonald's

Purpose

To develop a sizeup report of fireground conditions, complete the Primary Factors Size-Up Chart, and document progress using the Command Sequence Tactical Chart.

Directions

1. You will be working in teams of three for this simulation exercise.
2. A Command Sequence Tactical Chart for each team position is included here.
3. The instructor will designate two students per team jointly to assume the role as the first-due engine CO.
4. The instructor will designate one student per team as a team recorder; this position will rotate among team members when doing the large simulations.
5. Team recorder will record all actions taken by the first-due CO onto the Command Sequence Tactical Chart and the Primary Factors Size-Up Chart.
6. The instructor will review the Command Sequence Tactical Chart preparation process with the class.

Part 1

1. View the slides to assess primary sizeup factors and visible cues.
2. Complete the Primary Factors Size-Up Chart and develop the sizeup report.
 - a. Primary factors.
 - b. Initial objectives.
 - c. Initial strategy.

Part 2

1. View the McDonald's fire slides and read the simulation messages.
2. Complete the Command Sequence Tactical Chart.
3. Be prepared to present your sizeup report and charts to the rest of the class.

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STUDENT ACTIVITY WORKSHEET

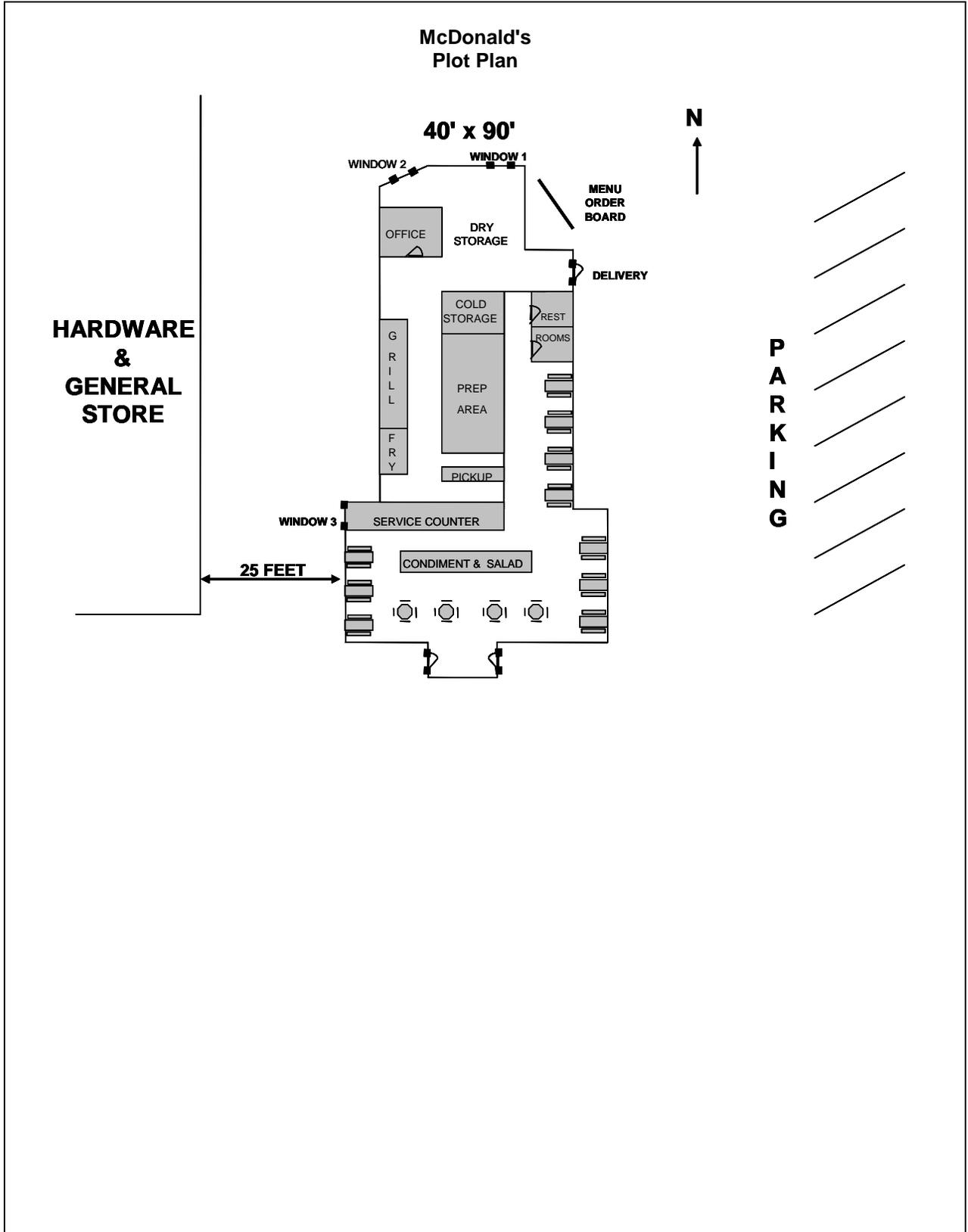
Activity 4.2 (cont'd)

Transfer of Command Chart

To be completed upon transferring command:

<p>Location and Extent of Fire:</p>	
<p>Control Efforts:</p>	
<p>Deployment of Resources:</p>	
<p>Need for Additional Resources:</p>	

STUDENT ACTIVITY WORKSHEET



UNIT 6: DETERMINING A COURSE EVALUATION PLAN

TERMINAL OBJECTIVE

The students will be able to develop an evaluation plan, including evaluation tools, for their course design project.

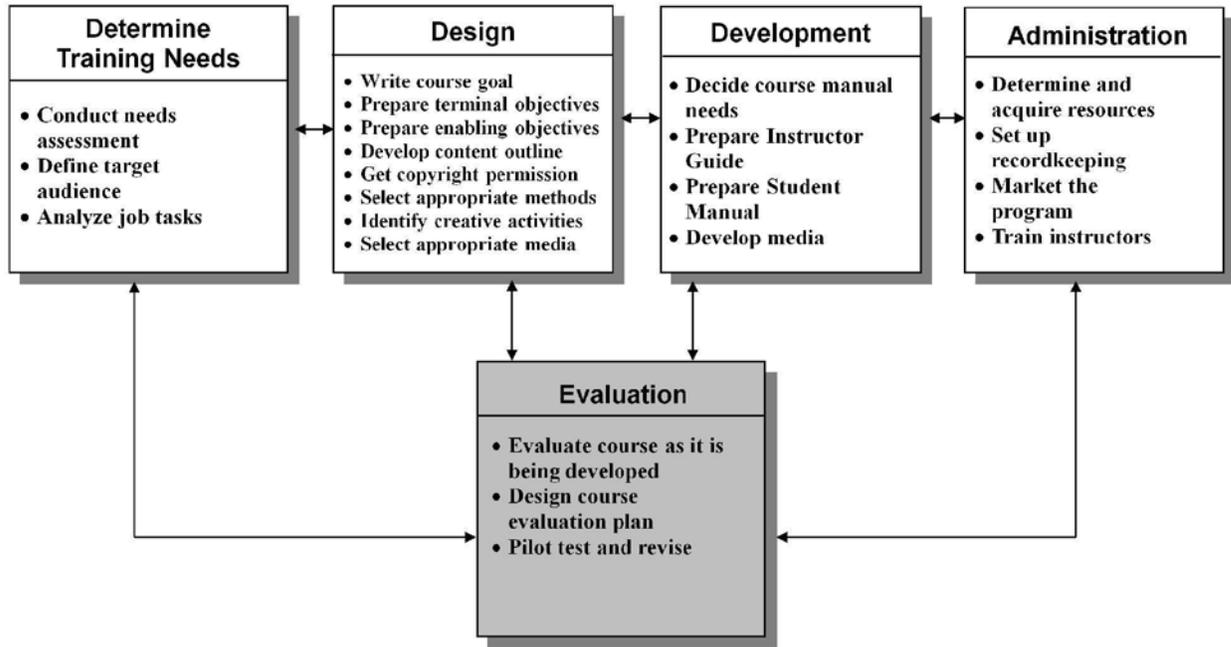
ENABLING OBJECTIVES

Given the information from this unit, the students will:

- 1. Correctly evaluate the course designer's responsibility concerning test reliability, validity, and recordkeeping.*
 - 2. Define the characteristics of a formative evaluation instrument with 100-percent accuracy.*
 - 3. Define the characteristics of a summative evaluation instrument with 100-percent accuracy.*
 - 4. Given a set of instructive objectives, identify the domain and type of test accurately.*
 - 5. Identify the types of evaluation for the course, the student, and the instructor, according to before, during, and after class criteria.*
-

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**INSTRUCTIONAL SYSTEM DESIGN MODEL
FOR COURSE DEVELOPMENT**



INTRODUCTION

This unit covers evaluation and testing. Compare developing a course to developing a new product, such as a car or rocket ship. Throughout the design and development phases, one continually evaluates the effectiveness of the design. Have someone evaluate your work.

FORMATIVE EVALUATION

Evaluation is an ongoing activity throughout the course design and development phases. There are two major types of evaluation: formative and summative.

Formative evaluation is used to detect deficiencies and weaknesses in an instructional design document that is still being developed and tested. It is often an informal process conducted through pilot program (field trial), observation, and general, ongoing questioning as to whether course activities and content meet the objectives. Feedback sessions and practical evaluations also can be used as formative evaluation methods. Personnel involved in formative evaluation include the course designer, content expert, and students.

Questions that should be asked during formative evaluation:

- Is the intended purpose of the instruction being met?

- Is the instruction appropriate for the target audience?
- Does the instruction aid the student in reaching the objectives?
- Does the content match the instructional objectives?
- Do the activities match the instructional objectives?
- Do the testing procedures provide a valid and reliable measure of whether or not the instructional objectives have been met?
- Are the students' reactions to the instruction positive?
- Has the scope of instruction changed? Is this desirable?
- Is the course on budget, on time?

In conducting a formative evaluation during a pilot, be sure the environment closely approximates the evaluation environment. Involve students, instructors, evaluators, content experts, and the course designer. Do not "lock in" a course until it has been field tested several times.

SUMMATIVE EVALUATION

A **summative evaluation** measures the degree to which objectives have been met by the end of instruction. Summative evaluation also can include follow ups with students after instruction has ended; this helps ensure transfer of training.

Many course designers design the course test after they have decided on the course objectives. They then design the course itself to ensure that students will achieve mastery of the skills needed to pass the test.

Summative evaluation of a course enables you to determine whether it has achieved its instructional objectives successfully within the allotted resources. It allows you to determine how to revise a course and provides you with a mechanism for documenting the effectiveness and cost-effectiveness of the training. Specifically, summative evaluation allows you to evaluate a course's effectiveness, efficiency, cost, and long-term benefits.

Effectiveness is evaluated through a comparison of pretest and posttest scores, rating of projects, evaluator's observations, and student and instructor feedback.

Efficiency is evaluated through several quantifiable mechanisms. These include an assessment of the time required for learners to achieve objectives, the number of instructors and staff required and the time they spend with the program, the use of facilities, comparison with other types of instruction, and postincident analysis (e.g., safety records).

Training **cost** is evaluated by determining the cost to develop the program, the cost to implement the program, and the cost per student.

Finally, **long-term benefits** can be evaluated by determining if the training resulted in a reduced number of accidents, increased efficiency of work accomplished, increased quality of work, and a decreased number of fire and life safety problems.

TEST VALIDITY AND RELIABILITY

A test is considered **valid** if it measures what it is supposed to measure and thus matches the instructional objectives. A test is considered **reliable** when test scores are consistent. For a test to be reliable, it must be used in a pilot test. Maintain records of these test scores to determine if they are consistent with results obtained by different instructors and different groups of students.

ETHICS AND TEST DESIGN

Frequently promotions, certifications, and raises are based, at least in part, upon satisfactory completion of training. Consequently, accurate and confidential records of test scores must be maintained during a student's career. Students should know in advance who will be allowed to see these records; policies should be set up and followed concerning access.

As a course designer, you should design tests to guarantee that students are trained adequately. When a student successfully completes a course and passes its test, this should mean that he/she is able to perform in accordance with National Fire Protection Association (NFPA) standards, State laws, and standard operating procedures (SOP's). Design tests to be valid measures of whether the student has met the instructional objectives. Tests should be evaluated to ensure they meet the standards for reliability.

MATCHING TEST TYPE TO LEVEL OF LEARNING

Each of the various learning levels calls for a different type of test. For example, **true/false tests** are best used to measure cognitive domain objectives at the knowledge, analysis, and synthesis levels. **Completion** and **multiple choice tests** work best in measuring cognitive domain objectives at the knowledge and comprehension levels. **Assessment checklists** and **simulations** are useful in measuring cognitive domain objectives--application level and skill-specific psychomotor domain objectives. Use **essay tests** to measure cognitive domain objectives--evaluation level; use **questionnaires, interviews, observation, and rating scales** to measure changes in attitude (affective domain objectives).

The chart below indicates the most commonly used testing formats.

		Format	Most Useful for Evaluating
* K N O W L E D G E	(R E C O G N I T I O N)	Multiple choice	Recognition of specific facts, concepts, principles, or processes; machine scorable.
		True/False	Recognition of specific facts, concepts, principles, or processes; machine scorable.
		Matching	Recognition of simple relationships and classification skills.
* C O M P R E H E N S I O N	(R E C A L L)	Short answer (completion)	Recall specific facts, concepts, and principles.
		Written format, Timed essay, Timed problem-solving, Term paper	Comprehension or understanding of facts, concepts, and principles combined; ability to organize information; and to communicate original ideas in written language.
		Interview/Oral quiz, speech, or report	Oral communication skills, including ability to organize information; fluency and intonation; and presentation of original ideas.
		Simulation	Skills or application of principles that would be too expensive or dangerous to perform in real world.
		On-the-job or motor performance Demonstration	Vocational skills, or other motor performance areas such as emergency rescue, fire suppression activities.
A P P L I C A T I O N			

*Overlap Areas

**Figure 6-1
Identification of Tests that Support your Objectives**

Table 6-1
Mechanics of Constructing Effective Tests

Objective	Method	Domain	Level	How to Test
The students will discuss types of questions to include on a pretest.	Activity	Cognitive	Application	Essay
The students will weigh the advantages and disadvantages of using a pretest.	Lecture	Cognitive	Synthesis	Essay
The students will develop a feeling of confidence about test construction.	Lecture	Affective	--	Interview
The students will discuss the relationship between instructional objectives and tests used to evaluate their achievement.	Matrix	Cognitive	Synthesis and evaluation	Matching
The students will give cardiopulmonary resuscitation (CPR) to a victim.	Practice	Psychomotor	--	Observation

Source: Jerrold Kemp. *The Instructional Design Process*, New York: Harper & Row Publishers, 1985.

YOUR EVALUATION PLAN

Evaluate, evaluate, test, test, and then evaluate some more!! All through the design and delivery of your course, you will be evaluating. You will evaluate the entry level of students; you will evaluate the effectiveness of your course; you might choose to evaluate the applicability of the content. You may evaluate the instructors. You may test your tests to see that they consistently test what they claim to test. Evaluations give you an opportunity to improve your course and see that it delivers what you think it does.

Some evaluations are performed before the course is delivered. These are called **formative evaluation** methods. Formative evaluation is used to assess entry level of the target audience and to discover ways of improving the design and delivery of the course before it is distributed.

Examples of formative evaluation include

- pretests to determine entry level of students;
- evaluation of precourse assignments; and
- pilot testing of materials, delivery methods, and instructional design.

Some evaluations are performed after the course has been delivered. These evaluations are known as **summative evaluations**. The purposes of summative evaluation are to determine whether transfer of training has occurred, and to receive student and instructor feedback about the strengths and weaknesses of the course the next time it is up for revision.

Examples of summative evaluation instruments include

- performance observations;
- written criterion-referenced tests;
- exit interviews or rating sheets that allow both students and instructors to rate the class; and
- followup questionnaires and interviews several months after a class has concluded.

A DESIGN EVALUATION PLAN

Before you design any test questions, surveys, or performance evaluations, you need to decide what types of evaluations your course will require and when you are going to design and pilot test them.

You might choose to develop a timeline as part of your evaluation plan.

Major Components of a Course Evaluation Plan

- identify appropriate tests for objectives (ongoing and post);
- construct tests for objectives (ongoing and post);

- assess prerequisite skills of the student (pretest, posttest);
- provide students feedback on their learning progress;
- identify media to provide students feedback of tests;
- provide the instructor with feedback on performance (ongoing and post);
- conduct pilot tests; and
- revise all components as necessary.

Formative Evaluation Instruments

Before the class begins:

- design and pilot a pretest of entry level of students;
- arrange to have reviewers check content for applicability to target audience;
- set date for pilot; and
- arrange to have reviewers attend pilot.

Summative Evaluation

- design posttest;
- do reliability test of posttest during the pilot;
- design course evaluation form;
- pilot course evaluation form during pilot;
- find good boilerplate for instructor evaluation form; and
- analyze data from pilot and make recommendations for revising course before final delivery.

Table 6-2
Example of a Complete Evaluation Plan

	Students	Instructors	Course
Before	Analysis Qualifications Cost	Qualifications T-t-T Background	Needs Funding Task analysis (Everything under students and instructors.)
During (delivery)	Tests-written, oral, psychomotor Learning activities Projects	Student evaluations at course midpoint Self-evaluation In-class observation and evaluation	Pilot cycle Surveys Drafts of revisions
After (on-the-job)	Performance Questionnaire Performance evaluation Observation Survey	Report Students Student performance	Analysis of above Possible revision

TEST DESIGN POINTERS

- Match the question to the instructional objective.
- Be sure that true/false test questions are not ambiguous.
- Use matching test questions to test recall, comprehension, or application.
- Strive to eliminate the chance of guesswork.
- Use completion questions to test recall, comprehension, and application.
- Use essay questions to test higher level cognitive skills.

- Be certain to construct essay questions with well-thought-out criteria for evaluation.
- In designing performance analysis, list the criteria you will use to rate performance. Design a checklist for rating and standardize location, task, and equipment to be used during evaluation.
- Use questionnaires, observations, and interviews to evaluate transfer of training in the affective domain. It is useful to do a pretraining measurement to establish a baseline for subsequent evaluation of changes in the affective domain.

HOW TO CONSTRUCT A GOOD TEST

A good test should be **reliable** and **valid**. A test is valid if it measures what you say it is going to measure. A test is reliable if the scores are consistent across time.

How can you tell whether you have constructed a reliable and valid test?

- You can purchase a commercial test that matches the learning objectives of your course.
- You can construct a test and pilot it and then analyze the items for reliability and validity.
 - To analyze for reliability, give the test. Pilot the course a second time. Give the test again and correlate the scores on each question for each of the two groups.
 - To analyze the difficulty or ease of a test question, compute the percent of the class that gets each item right. If everyone gets an item correct, it is too easy. If everyone misses an item, it is too difficult.
- When constructing tests, remember
 - Tests should contain a mixture of items, not all true/false.
 - Tests should not contain double negatives.
 - Multiple choice tests should not have "all of the above," "none of the above," "all but x," "- and -" as choices.

DESIGNING A GOOD OPINION SURVEY

Many courses are evaluated by having students rate the class using a scale. If you design a scale, here are several pointers to keep in mind.

- A scale is used to give a rating to someone or some program. The points along the scale are assumed to have equal value. Any words you choose to represent numbers must reflect this.

- A scale using "Strongly Agree," "Agree," "Neither Agree nor Disagree," "Disagree," "Strongly Disagree" is a better scale than one that says: "Violently Disagree," "Strongly Disagree," "Moderately Disagree," "Disagree," "Agree." The second example is weighted on the side of disagreement. The language is not neutral.

Leaving space for students to write comments will provide you with information you might not get from a numerical scale.

Activity 6.1

Matching Test Type to Level of Learning

Purpose

To apply information and determine the proper test type for level of learning.

Directions

1. Individually answer the questions on the following Worksheet.
2. Be prepared to discuss your answers with the whole class.

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Activity 6.1 (cont'd)

Worksheet

How would you test for the following instructional objectives?

1. Given equipment, the students will **attach** a firehose to a fire hydrant in 2 minutes.

Domain: _____

How would you test? _____

2. After a discussion, the children will **correct** five hazards in their homes according to the criteria discussed in class.

Domain: _____

How would you test? _____

3. Given a slide of a fire at a shopping mall, the students will **list three** conditions under which it is necessary to call in more engines, based on a checklist provided in class.

Domain: _____

How would you test? _____

4. Given a list of topics, the students will **deliver** an oral presentation to a large group, using one example for each criteria in the speech.

Domain: _____

How would you test? _____

DETERMINING A COURSE EVALUATION PLAN

5. Given a course manual, the students will **determine** the domain (affective, cognitive, and psychomotor) for each objective with 90-percent accuracy.

Domain: _____

How would you test? _____

6. Given a lecture on the importance of using the Learning Resource Center (LRC), the students will **use** the resources in the LRC, at least three evenings during the course.

Domain: _____

How would you test? _____

Activity 6.2

Evaluation Plan for Student Project

Purpose

Given a blank matrix, to identify types of evaluations used in this class.

Directions

1. Draw the chart on an easel pad. Using this class as an example, identify the types of evaluation measures used.
2. If you are not aware of how instructors at NFA are evaluated, you may ask your instructor during the debriefing sessions.

	Students	Instructors	Course
Before (in the design process or before starting class)			
During (delivery)			
After (on-the-job)			

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EVENING ASSIGNMENT

Step 6: Determining Course Evaluation Plans

Determining Course Evaluation Plans

Many different types of evaluations take place during the design, development, delivery, and postdelivery of a program. These all are important to the course designer. This evaluation unit attempts to highlight some of these evaluation measures. For your course design project, you will be expected to identify measures that will be useful to you.

Part 1: Course Evaluation Plan

Complete the "Course Evaluation Plan." This chart provides ideas for a variety of evaluation strategies at each phase of design and delivery of your program. Answer the following questions **as a guide** to assist you in completing this chart.

Before class:

- How are you going to evaluate the students and instructors prior to class?
- Do students have to apply and, if so, are the applications reviewed?
- Must they be selected and notified?
- Are there precourse assignments that must be completed?
- Are your instructors selected using certain criteria or qualifications?
- Will you have a Train-the-Trainer program for your instructors?
- What other requirements must instructors meet prior to instruction?
- What type of reviews will you use, and who will conduct them prior to the course?
- Will you be conducting any pilot offerings? How many?

During class:

- Through what means will students be evaluated in your class? Usually, a variety of evaluation instruments determine pass or fail.
- What about instructors? How will they be evaluated?
- Will the instructors be observed and evaluated during instruction?

- Is there a debriefing session with instructors during or after the course?
- How will the course be evaluated?

After class:

- Will the students have a postcourse project or assignment?
- Is there any followup with the employee after he/she returns to the job?
- Is the instructor evaluated after class? Is the instructor required to write an evaluation report of the class?
- Is there an evaluation form for the course? What is done to ensure that revisions are made?

Part 2: Formative and Summative Evaluation

Please answer the following questions about how you are going to treat formative and summative evaluation for your program. You may not know the answers to some of these questions now. All of them should be answered when your final project is submitted.

Formative evaluation:

During the design/development of program:

Describe the types of review you would like to have during the design and development of your program and who will be involved.

For pilot program:

1. How many pilot programs or trial courses will you conduct?
2. What types of questions will you consider for your pilot program?
3. What will be your role in the pilot program?
4. What other people will you use to obtain feedback during the pilot offering?

Summative evaluation:

1. When the course is offered after the pilot programs, what type of ongoing evaluations will be administered?
2. What type of resources will be available to make changes?

Part 3: Evaluation Measures for Each Objective

Return to your objective matrix that contains the content, methods, media, and evaluations. Complete the information in the column marked "evaluations" for each terminal and enabling objective. If you have several enabling objectives under one terminal objective, you will have to complete the information for the terminal objective only once (on the first sheet). Additional sheets will be needed for each enabling objective.

Remember, you will be required to complete Part 3 for a portion of your enabling objectives, as your instructor has assigned, to meet the in-class requirements.

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APPROVAL SHEET

I. COMMENTS ON TASK:

II. SUGGESTIONS TO IMPROVE TASK:

_____ Approval granted

_____ Approval, pending correction of suggestions

Student Colleague _____ Date _____

Instructor Approval Signature _____ Date _____

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UNIT 7: SELECTING INSTRUCTIONAL METHODS AND CREATING LEARNING ACTIVITIES

TERMINAL OBJECTIVE

Using the information in this unit, the task analysis, and sequenced course objectives, the students will be able to determine a minimum of two appropriate instructional methods and one learning activity to use for each enabling objective.

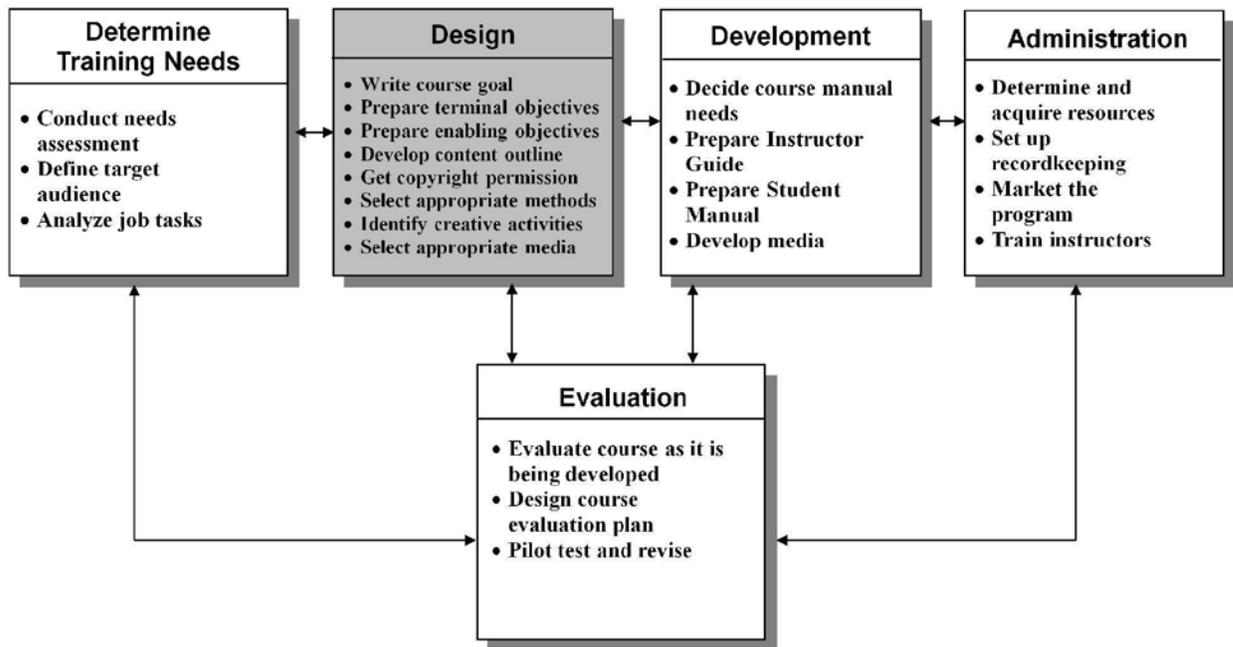
ENABLING OBJECTIVES

The students will:

- 1. Given instructional objectives, identify at least two appropriate alternative instructional methods with the Instructional System Design (ISD) process.*
 - 2. Given an instructional objective, create a learning activity for their instructional task in accordance with the methods and feedback.*
-

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INSTRUCTIONAL SYSTEM DESIGN MODEL FOR COURSE DEVELOPMENT



INSTRUCTIONAL METHODS

A brief review of the methods of instruction follows. They have been divided into traditional and alternative methods. The traditional methods are those we're most familiar with and probably we have used in classes we've conducted. Alternative methods are those the fire service is "discovering." These methods are not necessarily new, but they are new to the fire service.

TRADITIONAL INSTRUCTIONAL METHODS

There are several common methods of instruction you may wish to use in your course:

Lecture is an informative talk given before an audience. It usually is prepared in advance and may include audiovisual aids, demonstrations, questions to and from the audience, brief discussions, activities, and testing. The two basic types of lectures are **traditional and interactive**.

Guided interaction includes discussion, brainstorming, activities, demonstration, and case studies.

In a **discussion**, students talk about the pros and cons of various aspects of a subject. Discussion may be **instructor-directed** or **group-centered**. The first enables the instructor to encourage class participation and provides opportunities for interaction. The instructor's role is to recognize contributions, define terms, and clarify content. Group-centered discussion, on the other hand,

builds on students' experiences and strengthens relationships within the class. The group's tasks are to raise questions, explore hypotheses, formulate ideas, and examine assumptions.

Brainstorming is a group method for generating ideas. In brainstorming, the instructor writes down the ideas generated by the group and edits and summarizes them.

Demonstration is a practical showing of how something works or is used. It is especially helpful for acquiring psychomotor skills. There are several types of demonstrations, including **onsite visits**, in which students observe the behavior on the job; **practical exercise**, in which students practice the behavior with minimal instructor guidance; and **instructor-led exercise**, in which students are led step-by-step through a procedure by the instructor.

Active learning is more likely to result in longer and greater retention than is passive learning. Demonstrations, because they allow for this active performance, are a very useful instructional tool in activities. They help students build confidence and achieve mastery of psychomotor skills through practice. You should include a skills checklist to guide the instructor and students through demonstration activities.

In **case studies**, students are given written material describing a problem; numerous variables are included for consideration. Students must analyze these variables and come up with a solution to the problem posed. Case studies of fire service problems provide one of the most directly applicable training activities and typically foster cognitive and affective learning.

Role plays are incidents and situations brought to life. Students act out a situation while other students observe and analyze it.

A **simulation** used in an activity provides hands-on experience not offered by any other method, as students use apparatus simulators for both independent and directed practice. Simulations have an attendant disadvantage, however, as sophisticated job-related equipment or materials can be expensive and complicated to set up.

Learning Checklist

Traditional Methods of Instruction

Determine whether each statement is true or false.

- _____ 1. A course designer should strive to find at least two methods of instruction to support each objective.
- _____ 2. The most underused method in training is the lecture.
- _____ 3. A group-centered discussion should be designed so that no one in the group can solve the problem.
- _____ 4. A good feature of brainstorming is that all the students' ideas are worthy. No value judgment is made on an idea.
- _____ 5. Case studies are an effective method for teaching the Incident Command System (ICS).
- _____ 6. In a role play, the course designer should not provide a specific script for each actor or actress.
- _____ 7. As an instructional method, panel discussions usually represent a very narrow view on a subject.
- _____ 8. Traditional methods of instruction are more effective when they are used in connection with another method.
- _____ 9. An onsite visit to watch how inspection reports are completed is not to be considered a form of demonstration.
- _____ 10. The method that involves the least number of senses is the role play.

ALTERNATE INSTRUCTIONAL METHODS

Besides the traditional methods outlined above, there are several alternative instructional methods that you should consider in developing your course.

Self-instructional methods are also called individualized learning, self-instruction, or self-directed learning. In these methods, learning is self-paced: students study at the rate that is most comfortable and productive for them. Self-instructional methods are based on the premise that maximum learning takes place when a student works at his/her own pace. Moreover, true individualized instruction requires that each student have a set of objectives based on his/her own needs.

Quality individualized instruction contains carefully constructed and detailed learning activities. The content is organized and sequenced into small, discrete steps within these activities. Students can continue to the next step only after they have mastered the preceding step. These methods also provide for instructor feedback regarding student progress as well as needed instructor assistance.

Self-instructional methods include learner contracts, textbooks/worksheets, self-instructional booklets, computer-based instruction, audiotapes with worksheets, visuals and guide sheets, and multimedia packages.

The **laboratory** method involves manipulating materials and engaging in procedures that are characteristic of the subject matter or discipline.

In **simulation**, students are immersed in a situation that portrays a real-life phenomenon so as to learn from this experience. Simulations should be as realistic as possible; consequently, they take some time to set up.

A **panel discussion** consists of from three to six people presenting information to the class as to their views on a given topic. These panelists usually represent different viewpoints. Class members can ask questions of the panelists and learn from the ensuing discussion.

Tutorial (peer-assisted) teaching involves two or more students studying together, with the most knowledgeable student acting as the instructor. This method requires an instructor who can identify closely with students' needs.

On-the-job training provides training in a real-life situation. Usually one or more persons act as a mentor for students; the instructor sets the assignments and provides help sheets.

Training in context uses as its basis the premise "under stress you will perform as you learned." This methodology involves four key steps or principles: The first is to clearly define operations that describe the services your organization provides. Second, the learning environment consists primarily of coaching learners. Third, a coaching methodology is designed to support the learner. Fourth, you identify learner behaviors that contribute to an effective learning experience.

This approach focuses the student from start to finish on the task at hand. It stresses proper completion of the task to an acceptable standard of performance, and it uses the instructor as a coach rather than just as the provider of information. This entire approach puts the emphasis on the student, where it belongs, instead of on the instructor, where it currently is in many training situations.

Note: More information can be obtained from the Montana Fire Training School, 2100 16th Ave. South, Great Falls, MT 59405-4997, (406) 761-7885, or from your instructor.

Learning activities differ from the other instructional methods in that they are usually group- or student-led rather than instructor-led. Also, since activities are often a lesson's practice and

application step, they generally take place at a set point and for a set period within the lesson, while other instructional methods typically are sprinkled throughout the presentation step.

As has been mentioned, other methods of instruction sometimes are used within an activity. Further, while an activity is always a method of instruction, a method of instruction is not always an activity. Note, too, that an activity can combine two methods of instruction.

STRATEGIES FOR SELECTING METHODS

Select Instructional Method

Key points to keep in mind when selecting instructional methods:

- Methods must support and be based on the course objectives.
- Students have different learning styles; try to vary the techniques you use.
- Consider the best method to encourage transfer of learning.
- Consider the variables present in the learning environment so as to select the most appropriate method.
- Students are adults, and your methods should address principles of adult learning.

Audience Variables

Student characteristics. These characteristics could include familiarity with the field of study (how quickly students can learn); the level of skills in studying, test-taking, reading, math, and writing (What is the educational level?); the level of relevant entry skills, prerequisite knowledge, and abilities; the need for affiliation and role models; preferences; and heterogeneity among students in terms of background experiences, aspirations, knowledge, and skills.

Domain and level of learning. These include the cognitive domain (concepts, facts, principles, processes), the psychomotor domain, and the affective domain.

Bloom's Taxonomy, cognitive level of learning:

- knowledge (recognition);
- comprehension (recall); and
- application.

Administrative and logistical factors. Take into consideration the degree of developer control over design of the course, the amount of time available to design and teach the course, and the budget.

Constraints. Constraints might be instructor familiarity, skills, and preference for using various instructional methods; the availability of instructional materials (e.g., computers); the number of students; and the teaching environment (e.g., firehouse).

Subject matter characteristics. How is it organized? (E.g., this course is organized around a model of instructional design.) How fast does information become dated? Are there a number of different and/or concurrent schools of thought or theories? Is the knowledge base in the field established or agreed upon?

There are three basic **learning styles** students seem to prefer. One is the **kinesthetic-tactile**, another is **visual**, and a third is **auditory**. Each of these learning styles contains observations that the instructor can use to assist him/her in identifying the learning style a student may prefer. Some methods work better with specific learning styles. By understanding and using this information in the selection of methods the designer can attempt to vary the methods to appeal to all types of learners.

Kinesthetic-tactile learners often are "movers." They may be considered hyperactive, they may want to feel and touch everything, and they usually are well coordinated. They also may enjoy or insist on writing everything down. In general, these individuals learn best by doing. Methods that may assist the instructor in appealing to these individuals are those in which the student can take an active part in the process, such as demonstration, role playing, and simulation.

Visual learners generally want **you** to show them rather than tell them. They notice details and may watch the instructor intently as things are explained. They use minimal words when responding to questions and may be able to reference pages and/or places in a book where these answers can be found. In dealing with visual learners, give visual directions, demonstrations, and when possible use color coding in visual aids. The illustrated lecture and demonstration methods seem to work best.

Auditory learners are often "talkers" and may be considered a disruptive force in the classroom. They are often physically awkward and may have rather poor handwriting. Sometimes they memorize easily and therefore may appear brighter than the rest of the students. The instructor should let them talk through the tasks they must perform and encourage them to think out loud. Lecture and discussion seem to work best for them.

In addition to the individual's learning style the designer must remember that the major goal of any learning situation is transfer of learning. Simply put, this means that students can take what they learn during the learning situation and use it on the job. This appears as if it would be easy to do; however, many times we forget to think about how and when the student will use the information. In some cases if we took the time to understand this, we may find that the student doesn't use the information, and therefore maybe it shouldn't be taught.

Instructional variables are those areas that interact to form the learning environment the student must learn in. These include the student characteristics, the level and domain of the objective, and administrative and logistical factors. The table in the Appendix has been developed to assist you in matching the variables with the recommended method. This table should assist you in selecting the appropriate method for each of your objectives.

Finally, keep in mind how adults view learning and select the method(s) that support that view. Most adults view learning as a continuous growth opportunity. They want it to be purposeful and to involve them. At the same time it should challenge them, and the results should be satisfying.

INDEPTH LOOK AT LEARNING ACTIVITIES

Activities, like the other instructional methods, are chosen to engage and hold student interest; they are designed with a particular audience in mind. Activities complement and support the cognitive and/or procedural skills presented and are chosen carefully to support an instructional purpose.

Characteristics of Learning Activities

Learning activities are methods of instruction that involve the learner. Usually activities are created by the course designer and take place at a set point for a set period in the lesson, generally after the presentation step. (Other methods typically are sprinkled throughout the presentation step, e.g., discussion, lecture.)

Other methods of instruction sometimes are used within an activity. The instructor could ask students in small groups to discuss the topic of sprinkler systems or he/she could divide students into small groups and give each group a case study to analyze.

Activities are similar to other instructional methods: They are chosen to engage and hold the interest of the students, are designed with a particular audience in mind, complement and support cognitive and/or procedural skills presented and taught by other methods, and are chosen carefully to support an instructional purpose for unit objectives.

Types of Learning Activities

- **Icebreaker activities** usually are placed at the beginning of a lesson. Because they involve the whole class, they provide motivation and build group cohesiveness.
- **Out-of-class experiences** apply learning to a more realistic environment. They usually are done as a culminating experience.
- **Exercises** generally are created to meet a specific objective. They may involve physical movement, discussion, or writing, and can be oriented to small group, large group, or individual formats.
- **Instructional games** often are derivatives of games familiar to students. Consequently, they must be chosen or modified carefully to support training objectives. Instructional games are more often used in teaching affective, rather than cognitive or psychomotor, skills.

- **Mentoring** is a one-on-one interaction between the student and an experienced mentor to reach specified objectives. Mentors should be chosen carefully; different mentors should be used for different activities, depending on their subject matter expertise.
- **Seminars** can involve a group of supervised students doing research or advanced study, as at a university; they sometimes can entail sending trainees to a conference or special speaker's night.
- **Newsletters and bulletin boards** can carry the message you began in the course by providing reinforcement and information transfer to the workplace. These activities can engender active participation and networking.

CREATING COURSE ACTIVITIES

Activities can be a valuable and efficient part of the training process. Some will foster cognitive aspects of training, others are suitable for developing psychomotor skills, and still others promote affective objectives. Several promote more than one domain of knowledge. In all cases, the course developer must select activities carefully, tailor them to meet unit objectives, and explain them clearly and completely in the course manual.

In developing course activities, you should bear in mind these six considerations:

1. **Determine why the activity is needed.** Do not include activities simply for the sake of having them or to fill time. Activities **must** be related to course goals and objectives and must meet objective learning levels. Also ensure that activities match the audience, behavior, condition, and degree prescribed in the objectives.
2. **Consider the audience.** Always remember the attributes and composition of the audience for whom the activity is planned. Refer back to the audience targeted for course attendance to ensure that activities are tailored accurately.

Activities can be structured for individuals, pairs, small groups, or large groups. Choose the configuration that best suits the needs of the activity and that audience.

3. **Determine what behavior should be demonstrated.** Identify the objective's domain and consider all activities suited for that domain. Then, construct the activity to ensure it supports achievement of the objective. For example, if the objective requires demonstration of a psychomotor skill, do not limit activities to those in the cognitive domain.
4. **Make sure the conditions reflect those in the objective.** If you cannot acquire or reproduce the necessary environment, apparatus, equipment, supplies, etc., that accurately reflect the conditions in the objectives, the resultant activities may be ineffective. This point is critical: don't plan activities for which instructors will not have the appropriate equipment or resources.

5. **Consider how feedback will occur concerning successful completion of the activity.** Employ formative and summative feedback mechanisms when designing an activity. This will ensure that the student is performing according to the criteria outlined in the objectives.
6. **Identify when activities should be used.** Activities may be included during any of the seven functions of the learning process: it is up to you to determine when they will best fit. General guidance is never to design a lesson that requires lecture for more than 30 minutes without conducting an activity that involves all students.

In general, you will want to get students involved as early as possible in the lesson and keep them involved as often and as much as you can. Clearly state the directions for the activities to be conducted and list any essential materials needed. Include these instructions in both the Instructor Guide (IG) and Student Manual (SM).

A consideration related to activity placement is determining how long, in terms of clock time, should be devoted to an activity. This is difficult to judge prior to the first pilot of a course; pilot testing offers a good opportunity for looking closely at activities' clock times.

In developing activities, note that they can be created for any training topic and can be focused on just about anything. Many activities can be generated from a single device, objective, or process.

Table 7-1
Applying Adult Learning to Curriculum Design

Adults see learning as:	Education Strategy
Continuous growth opportunity	<ul style="list-style-type: none"> - Begin where the learners are; try to gear your presentation to address a common element of the learners' needs. - "New" must be related to "old." - Pace must be adjusted to the learners' capacities and abilities.
Purposeful	<ul style="list-style-type: none"> - Must make sense to the learner. - Progress must be appraised and lack of progress redirected immediately to avoid negative learning. - Purpose of learning must be kept in sharp focus.
Involving them	<ul style="list-style-type: none"> - Learning results from self-activity--involve as often as possible, but only as involvement relates to the learners' purpose, and only if their chances for success are high.
Challenging and satisfying	<ul style="list-style-type: none"> - It is critical that you develop self-motivated learners. - Recognition for achievement should be appropriate and timely. - Standards, grades, and criteria for success should be perceived as suitable by the learners.
Obtaining functional results	<ul style="list-style-type: none"> - Learning activities should culminate with practical application. - Material should be organized to indicate progress toward learners' goals and objectives.
Considerate of their emotions	<ul style="list-style-type: none"> - Increase pleasant emotions and decrease unpleasant situations. - Recognize that individuals differ in their emotional intensity, and that this affects learning. - Expression of emotions is highly trainable.

After considering all these variables, remember the decision as to which method or approach to use still remains with you as the course developer. You might decide that an approach different from that indicated should be used. This is fine as long as you remember that the success of the learning experience is influenced greatly by the method used to present the information. Success is the word to remember as you decide on the method for each objective.

Student characteristics to be considered include familiarity with the field of study; studying, test-taking, reading, math, and writing skill levels; level of relevant entry skills, prerequisite knowledge, and abilities; need for affiliation; need for role models; and preferences. You also should determine the level of heterogeneity among students in terms of background experiences, aspirations, knowledge, and skills.

Regarding **domain and level of learning**, consider whether objectives are in the cognitive domain (concepts, facts, principles, processes), psychomotor domain, or affective domain.

Consider **Bloom's Taxonomy, Cognitive Level of Learning**. Recognize that the bottom three levels of this taxonomy--knowledge (recognition), comprehension (recall), and application--are the ones used most frequently in fire service training.

Be aware of **administrative and logistical factors**, including the degree of control you as developer will have over the course design, the amount of time available to design and teach the course, and the budget.

Consider any **constraints** related to the instructor, e.g., his/her familiarity with skills in, and/or preference for, using various instructional methods. Also consider the availability of instructional materials, the number of students, and the teaching environment.

Note **subject matter characteristics**, such as the subject matter's organization, how quickly the information will become dated, the number of different and/or concurrent schools of thought or theories regarding the subject matter, and whether the knowledge base in the field is established or agreed upon.

SUMMARY

Traditional methods of instruction are lecture and guided interaction; this latter category of instruction includes discussion, brainstorming, demonstration, and case studies. Next, you should identify the instructional variable, e.g., student characteristics, domain and level of learning, cognitive level of learning (Bloom's Taxonomy), administrative and logistical factors, constraints, and subject matter characteristics. Based on this identification, analyze instructional methods to determine which ones would be most appropriate for your course.

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Activity 7.1

Selecting Alternative Instructional Methods

Purpose

Given four instructional objectives from various training programs, to identify at least two appropriate alternative instructional methods.

Directions

1. On the following Worksheet are objectives that were taken from various training programs.
2. For each objective, determine at least two alternative instructional methods that could support the objective **and list why**.
3. Choose your methods from the following list.
 - a. Self-instruction (including worksheets, computer-based instruction, slide/tape programs, reading, etc.).
 - b. Laboratory.
 - c. Simulation.
 - d. Panel discussion.
 - e. Tutorial (peer-assisted) training.
 - f. On-the-job training.
 - g. Training in context.
 - h. Learning activities.

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Activity 7.1 (cont'd)

Worksheet

1. The students will explain the correct procedures and select the appropriate size hoselines for attaching to a fire department connection in a simulation activity with 100-percent accuracy.

Two appropriate alternative methods of instruction. Why did you select each?

2. Given a list of ventilation principles, the students will select appropriate ventilation tactics with 100-percent accuracy.

Two appropriate alternative methods of instruction. Why did you select each?

3. Given a model dummy, the students will perform cardiopulmonary resuscitation (CPR) according to the six steps on the checklist with 100-percent accuracy.

Two appropriate alternative methods of instruction. Why did you select each?

4. Given an article on fire origin, the students will be able to list five causes of common fires with 100-percent accuracy.

Two appropriate alternative methods of instruction. Why did you select each?

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Activity 7.2

Selecting and Justifying Learning Activities and Instructional Methods

Purpose

Given an objective, to select the most appropriate learning activities, indicate how the activity will be accomplished, and what types of feedback mechanisms are necessary.

Directions

1. Working in pairs, describe three different learning activities that the course designer could use to accomplish the objectives, using the brief scenario below.

Learning Activity 1: _____

Learning Activity 2: _____

Learning Activity 3: _____

2. The fire department is able to supply a smoke detector for each person. Select one of the activities and indicate whether it is best suited for individuals, groups, pairs, or a combination, etc.

3. List the steps to be used in conducting this activity.

4. What types of feedback are most appropriate for this type of activity?

Scenario

Creating learning activities can be fun for a course designer. Activities can be created for any topic. Recently, a public fire educator was assigned to teach 20 citizens how to install a smoke detector, change the battery, and test the smoke detector. Before going out to present this lesson, the course designer wanted to accomplish the objectives through involvement of the citizens and make them enjoy the tasks.

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APPENDIX

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INSTRUCTIONAL VARIABLES WITH METHODS

Research concludes that if the instructional variables in column one are present as described then the methods in column two are appropriate.

INSTRUCTIONAL VARIABLES

METHODS

STUDENT CHARACTERISTICS:

- | | | | |
|----|--|----|--|
| A. | If students are very familiar with the content (subject): | A. | then texts may be used. |
| B. | If the level of ability (student-used study skills) is low :

If the level is high : | B. | then discussion may be used.

then texts and independent study may be used. |
| C. | If the level of entry skills is low : | C. | then self-instructional work materials and laboratory work should not be used. Tutorial is good for remediation. |
| D. | If the student possesses a need for affiliation (must identify material): | D. | then self-instructional materials and independent study should not be used. Tutorial may be used. |
| E. | If the student has a need for a role model (instructor): | E. | then lecture, discussion, and tutorial may be used.

then self-instructional materials and independent study should not be used. |
| F. | If students of the target audience are heterogeneous or dissimilar in nature: | F. | then lecture should not be used, especially if high heterogeneity exists.

then independent study and field work may be used.

then self-instructional materials and tutorial may be used if there is a high degree of heterogeneity. |

DOMAIN AND LEVEL OF LEARNING:

- | | | | |
|----|--|----|---|
| A. | If the course deals with the instruction/ learning of facts: | A. | then lecture may be used.

then discussion may be used only when knowledge is difficult to acquire.

then texts may be used if studying is guided to promote active reading. |
|----|--|----|---|

SELECTING INSTRUCTIONAL METHODS AND CREATING LEARNING ACTIVITIES

- | | |
|---|--|
| B. If the course deals with the instruction/
learning of concepts: | B. then lecture may be used.

then discussion may be used if students are
allowed to practice and if relevant feedback is
provided.

then texts may be used.

then laboratory may be used if students are
allowed to practice and relevant feedback is
provided, and if students are properly guided
and procedures demonstrated or modeled. |
| C. If the course deals with the instruction/
learning of principles: | C. then discussion, simulation, and demonstration
may be used if students are allowed to practice
and relevant feedback is provided.

then laboratory may be used if students are
allowed to practice and relevant feedback is
provided, and if students are guided and
procedures demonstrated or modeled. |
| D. If the course deals with the instruction/
learning of strategy learning: | D. then discussion may be used if students are
allowed to practice and relevant feedback is
provided.

then simulation may be used if students are
allowed to practice and relevant feedback is
provided. It also must be guided with
procedures demonstrated or modeled. Concepts
and principles must be learned beforehand.

then guided independent study may be used
with procedures demonstrated or modeled.

then field work may be used. |
| E. If the course deals with the instruction/
learning of psychomotor skills: | E. then lecture/demonstration may be used.

then simulation may be used if students are
allowed to practice and relevant feedback is
provided. It must be guided with procedures
demonstrated or modeled.

then concepts and principles should be learned
beforehand. |

- | | |
|---|--|
| F. If the course deals with the development of an attitude change (affective domain): | F. then lecture, modeling, and demonstration may be used.

then discussion may be used if students are allowed to practice and relevant feedback is provided.

then simulation, role playing, and field work may be used.

then laboratory may be used if students are allowed to practice and relevant feedback is provided. It should be guided with procedures demonstrated or modeled. |
|---|--|

**COGNITIVE LEVELS OF LEARNING
(BLOOM'S TAXONOMY):**

- | | |
|--|--|
| A. If the objectives are based on knowledge (recognition): | A. then lecture, texts, and self-instructional materials may be used.

then independent study may be used if studying is guided to promote active responding. |
| B. If the objectives are based on comprehension (recall): | B. then laboratory, simulation, demonstration, and tutorial may be used.

then lecture may be used if students are allowed to practice and relevant feedback is provided.

then discussion may be used if concepts and principles are learned beforehand.

then texts and self-instructional materials may be used if studying is guided to promote active responding. |
| C. If the objectives are based on application: | C. then lecture should not be used.

then texts and self-instructional materials should not be used.

then laboratory and simulation may be used.

then discussion may be used if studying is guided to promote active responding. |

ADMINISTRATIVE AND LOGISTICAL FACTORS:

- | | |
|--|--|
| A. If the instructor has a high degree of control over the course design: | A. then lecture may be used if the classroom is fixed.

then discussion may be used if the instructor is leader.

then texts may be used if the instructor has control over the selection.

then laboratory and tutorial may be used.

then simulation, field work, and independent study should not be used. |
| If the instructor has a low degree of control over course design: | |
| B. If there is a limited amount of time available for the actual teaching of the course: | B. then lecture, texts, self-instructional materials, demonstration, independent study, tutorial, and field work may be used. |
| C. If cost is a problem: | C. then lecture, discussion, independent study, tutorial, or field work have little, if any, cost factor.

then self-instructional materials have a high initial cost, but efficient use of student and instructor time thereafter.

then laboratory and simulation involve a cost factor. |

CONSTRAINTS:

- | | |
|---|---|
| A. If number of students is a factor in course delivery: | A. then lecture may be used for class of more than 20 students.

then discussion and demonstration may be used for class of under 15 students.

then self-instructional materials may be used--high initial cost, but efficient use of student and instructor time thereafter.

then laboratory and simulation may be used. |
| B. If the size or design of the room might be a constraint: | B. then lecture, discussion, laboratory, and simulation should not be used. |
| C. If instructional aids are not available: | C. then lecture should not be used.

then discussion may be used. |

SELECTING INSTRUCTIONAL METHODS AND CREATING LEARNING ACTIVITIES

- | | |
|--|---|
| D. If there is a low degree of instructor familiarity with the methodology: | D. then discussion may be used. |
| E. If there is a degree of tradition, that is, if there are policies and procedures used that have been used previously: | E. then lecture may be used if control is desired.

then discussion, texts, laboratory, independent study, or field work may be used.

then self-instructional materials, simulation, and tutorial should not be used. |

SUBJECT MATTER CHARACTERISTICS:

- | | |
|---|--|
| A. If there is a hierarchical order of course content, that is, a logical subject sequence: | A. then lecture, texts, self-instructional materials, laboratory, independent study, or tutorial may be used.

then discussion, simulation, and field work should not be used. |
| B. If the subject matter is changing continuously: | B. then lecture, discussion, independent study, or tutorial may be used.

then texts, self-instructional methods, laboratory, and simulation should not be used. |
| C. If there are a number of different schools of thought presented in the subject matter: | C. then lecture, discussion, some texts , independent study, and tutorial may be used.

then self-instructional materials, laboratory, and simulation should not be used. |

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UNIT 8: SELECTING INSTRUCTIONAL MEDIA

TERMINAL OBJECTIVE

Given the enabling objectives in their course project, the students will be able to identify media according to the criteria presented in this unit.

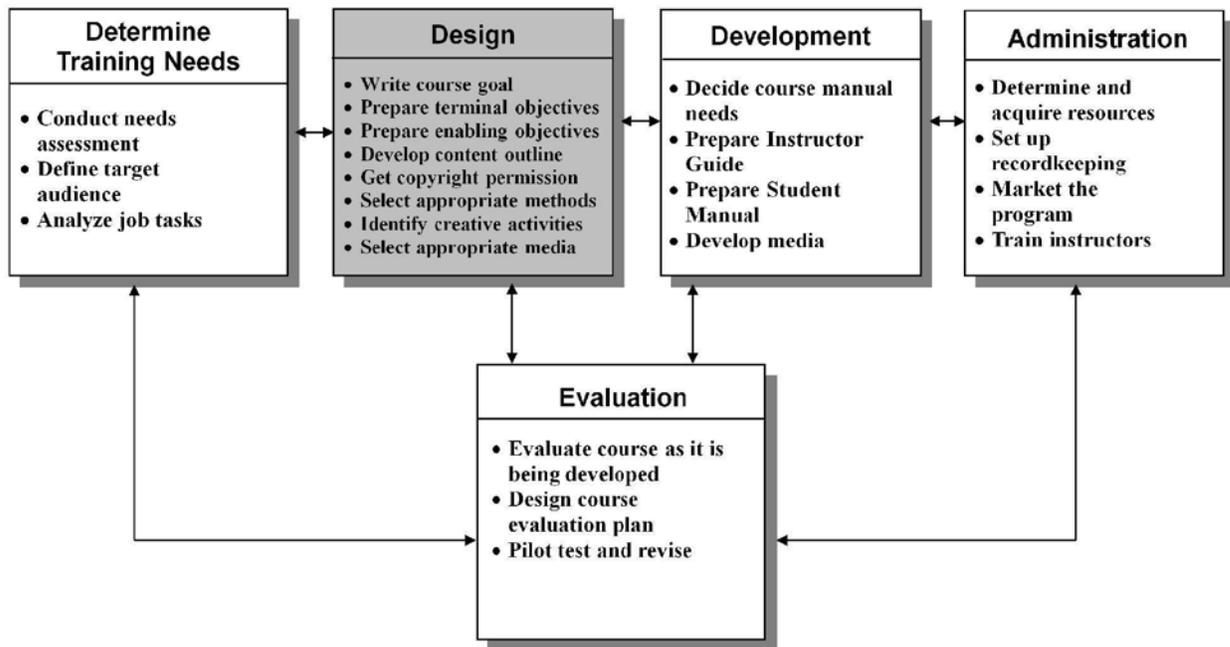
ENABLING OBJECTIVES

Given a list of objectives, the students will:

- 1. State the correct types of learning they represent.*
 - 2. Select the appropriate types of media for each objective.*
-

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INSTRUCTIONAL SYSTEM DESIGN MODEL FOR COURSE DEVELOPMENT



IMPORTANCE OF MEDIA IN INSTRUCTION

Media are materials or objects used to assist the instructor in the teaching/learning process. Media should motivate; they add variety and create interest, thereby involving students successfully in the learning process. And, because "a picture is worth a thousand words," media can shorten the time needed for instruction.

These attributes enable media to be used to help students meet objectives in any domain. Using media, the instructor can explain concepts, demonstrate performance skills, and stimulate the senses. Media are particularly helpful in the affective domain, where they contribute to attitude formation.

In designing and implementing your courses, you should use media to **refocus attention**, **increase retention**, and **improve learning transfer**. Have a specific reason for using media; overusing media makes them less effective. Always remember: media **assist**, but never **replace** the instructor.

Reasons for using media:

- Media refocus attention--They add variety and interest and create a motivating learning environment.
- Media increase retention--Since students use more senses, there is a better chance of having the information stored in long-term memory.

- Media improve learning transfer--"Real-world" equipment, e.g., video footage, can be used to show exactly how it is done "on the street."

TYPES OF MEDIA

Many types of media are available for your use, ranging from real-life things, such as guest speakers, props, models, and mock-ups, to written, audio, and video representations of learning concepts. Basic categories of media include the following:

- **real things:** guest speakers, props, models, mock-ups;
- **nonprojected materials:** chalkboard, easel pad, diagrams, charts, graphs, photographs;
- **audio recordings:** CD's, audiocassette recordings, records;
- **projected still pictures:** slides, overhead transparencies, computer-based instruction, PowerPoint[®];
- **projected motion pictures:** films, videos; and
- **print-based instructional materials:** Instructor Guide (IG), Student Manual (SM), job aids, and handouts.

Certain characteristics are associated with all effective media, regardless of type. First, effective media are always simple, realistic, and accurate. They are streamlined and manageable; this helps to avoid possible embarrassing malfunctions or losing focus by creating a "dog-and-pony show." Effective media adhere to the "K-I-L-L" formula: **Keep It Large and Legible**. Remember the Rules of 7: No more than 7 lines per media device and no more than 7 words per line.

MEDIA SELECTION CRITERIA

Media Considerations

There are many factors to consider when selecting media for course use. Selection can be based on what media are available and what you feel comfortable using. You also should examine your training situation. How many participants will you have? Will they be in one large group, several small groups, or self-paced? What are the subject matter requirements, i.e., visual, verbal, or symbolic?

You also need to understand the choices the various media offer you. For instance, a pictorial representation can be photographic or graphic, black and white or color. Nonprojected images must be larger than those you will project. Slides can't show movement. Language can be conveyed through sounds or printed words. Some media allow you to choose between a silent picture or a picture with sound.

Know your requirements and evaluate your options carefully. Above all, don't develop or include media just for the sake of using them--have a definite purpose in mind for all media you use.

Other important considerations to address in selecting, developing, and purchasing appropriate media are described below.

Availability--Do the needed media already exist? If they do, how can you obtain them?

Cost--What will the media cost to purchase or prepare? If your media require any expensive equipment, you probably will need to develop a budget and get approval for the items. A critical point in attempting to "sell" your proposed purchase is its potential for future use. Items that can be used for a variety of programs have a better chance of receiving funding approval.

Reproduction and Duplicating Costs

Other cost considerations to keep in mind are reproduction and duplication. Photocopying, printing, or otherwise reproducing your media can add up; be aware of these costs when making your selections.

Time--Locating and preparing media can require a large time commitment and long lead time. Often, developers pressed for time settle for a "quick and dirty" method. Recognize this time requirement and the fact that your other course development duties also will require your time and energy. Plan for and around these commitments.

Logistics--Careful planning can help you avoid logistical problems of media equipment and facilities, use, maintenance, and storage requirements. Develop plans--and backup plans--for using the equipment; address supervision and scheduling concerns. You may find that it is considerably cheaper to purchase a maintenance contract than to try to maintain equipment yourself. Take steps to minimize the risk of theft. An inexpensive but effective technique is to permanently engrave items with an agency identification mark.

Learner Preferences--Keep in mind the attributes and preferences of your target audience when selecting and developing media. For example, firefighters tend to be active people, so try to avoid media that keeps them sedentary for long periods of time.

Remember that media must have meaning for the developer and maintain or create interest in the students. While appealing to the senses is important, do not overwhelm students. As a course developer you need to answer two questions: what type of media to use in the course, and whether you should use ready-made media or develop them yourself.

CRITERIA FOR BUYING/EVALUATING MEDIA

Sometimes it is more efficient and cost-effective to purchase ready-made media than to develop something from scratch. When buying ready-made media, ask yourself:

- Are they appropriate for the target audience?
- Do they mesh with the course objectives, subject matter?

- Are they affordable?
- Are they timely?
- Do they have good technical quality?
- Are they useful to the course?
- Can other instructors use them successfully?
- Are they easy to implement?

In evaluating ready-made media, look for--and avoid--"noise." Noise is anything that distracts from or interferes with the media; e.g., a low background hum in an old film's soundtrack or fingerprints or smudges on slides. High-quality, noise-free media has a better chance of grabbing and keeping a learner's attention.

After your media are produced, it is time to see how your intended audience will react to them. There is never a guarantee that your media will be accepted by the target audience. If they aren't, you as the course developer must be prepared to alter the media. After all, the real reason media are developed is to enhance the learning environment.

DEVELOPING YOUR OWN MEDIA

If, after reviewing available ready-made media, you decide there's nothing that fits your needs, it is time to consider developing your own media. This decision involves considering the types of media to be developed, time to develop the materials, and development costs and quality. If these factors are not considered, the resulting media may detract from, rather than enhance, the learning process. This is a decision that has to be made based on your unique situation.

Media type will have a great bearing on whether or not to develop them yourself. Some types of media, e.g., slides, overhead transparencies, and charts, lend themselves well to in-house development. However, if your media include films, videotape, or computer-assisted training, the decision to develop them in-house may not be a good one unless your department has an expert in this area or unless you can obtain outside assistance.

Time is a critical factor in the decision to develop media in-house. When will the media be needed, and do your personnel have the time to develop them? Is there enough time to redo parts if they do not turn out right? Can you afford equipment malfunctions? You need to make a time commitment before you decide to develop the media in-house.

Cost is another consideration. There are direct costs for materials and supplies, and indirect costs paying the people who do the work. You must balance time and money. Again, make the commitment before the decision.

The last issue is quality. You have decided that you have the time and money commitment, and you have people able to accomplish the task. What will the finished product look like? Consider your obligation to those doing the work. What if the media do not turn out as expected? With outside sources satisfaction is usually guaranteed. With in-house people you have very little to assure quality other than their own commitment.

**Table 8-1
Instructional Media Stimulus Relationships
to Learning Objectives**

	Learning Factual Information	Learning Visual Identification	Learning Principles, Concepts, and Rules	Learning Procedures	Performing Skilled Perceptual Motor Acts	Developing Desirable Attitudes, Opinions, & Motivations
MEDIA TYPE:						
Still Pictures	Medium	High	Medium	Medium	Low	Low
Motion Pictures	Medium	High	High	High	Medium	Medium
Television	Medium	Medium	High	Medium	Low	Medium
3-D Objects	Low	High	Low	Low	Low	Low
Audio Recordings	Medium	Low	Low	Medium	Low	Medium
Programmed Instruction	Medium	Medium	Medium	High	Low	Medium
Demonstrations	Low	Medium	Low	High	Medium	Medium
Printed Textbooks	Medium	Low	Medium	Medium	Low	Medium
Oral Presentation	Medium	Low	Medium	Medium	Low	Medium

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Activity 8.1

Selecting and Justifying Instructional Media

Purpose

Given a list of objectives, to state which types of learning each one represents and to select the most appropriate types of media for each objective.

Directions

1. Read the following three objectives.
2. In your small groups, discuss which type(s) of learning each represents and select the most appropriate media for each objective.
3. Be prepared to discuss your answers with the class.

Objective One

You will understand the need to design a community fire prevention program. An acceptable response requires you to describe in your own words the community's attitudes and level of awareness toward the need for effective fire prevention.

- A. Using the table on SM p. 8-7, identify the correct category or categories in which the objective can be placed.

- B. Select the most appropriate media to match the objective.

1. _____
2. _____
3. _____
4. _____

Objective Two

You will construct a rationale for labeling a given fire as accidental or incendiary. You will determine the probable cause of four out of five fires and will list three or more reasons for each fire.

A. Using the table on SM p. 8-7, identify the correct category of objective.

B. Select the most appropriate media to match the objective.

1. _____
2. _____
3. _____
4. _____

Objective Three

You will identify proper fire scene operational procedures as related to recent court rulings. An acceptable response requires a review of a given fire scene and a determination of whether procedures were used properly.

A. Using the table on SM p. 8-7, identify the correct category of objective.

B. Select the most appropriate media to match the objective.

1. _____
2. _____
3. _____
4. _____

EVENING ASSIGNMENT

Step 7: Selecting Methods of Instruction and Designing Learning Activities

This step has three parts:

1. For each enabling objective, identify a **minimum of two different methods of instruction** and indicate the reason why you selected each method. Your instructor will encourage you to select a variety of methods of instruction throughout your course.
 - a. As you review each enabling objective and the content supporting it, select the method that best supports the attainment of the objectives.
 - b. Go back to your objective matrices and locate the column marked Methods/Activities. For each enabling objective place **at least two different methods** and a short (few words) description of the reason you selected that method in the Methods/Activities column.
2. **For each enabling objective, briefly describe at least one learning activity that you will be designing.** A few words will suffice. Place this information in the Methods/Activities column on the objective matrix column. The learning activity you identify does not have to be an extensive, involved activity. It can be as simple as a class exercise or as complex as a simulated scenario.
3. After you have decided on a learning activity for each **enabling** objective, identify some additional features of the activity. **Complete the Learning Activity Assessment sheet for each learning activity.** These sheets are found in the Course Design Project Manual. Remember this set must be completed for every activity, and one activity must be identified for each objective.

Step 8: Selecting Media

1. The first entry should consist of materials or media that you (or your organization) will create to support the objectives. Indicate the type of media that will be developed.
2. The other entry in the media column should consist of prepared materials or media that you must locate, evaluate, and recommend for purchase.
 - a. You will be expected to locate a minimum of two external sources (not necessarily costing anything).
 - b. For the two external media or materials requirement, you should place the title and other pertinent information being sought.

SELECTING INSTRUCTIONAL MEDIA

3. If a media piece is available, you should evaluate it by using the evaluation form. You should submit the completed evaluation form with your project.
4. You are encouraged to use the text in the SM and any notes you may have taken on this unit to form a basis of sound judgment in selecting media.

APPROVAL SHEET

I. COMMENTS ON TASK:

II. SUGGESTIONS TO IMPROVE TASK:

_____ Approval granted

_____ Approval, pending correction of suggestions

Student Colleague _____ Date _____

Instructor Approval Signature _____ Date _____

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UNIT 9: COURSE MANUALS

TERMINAL OBJECTIVE

Given the completion of the course design, the students will be able to determine Instructor Guide (IG) and Student Manual (SM) formats suitable for use in the course they are designing.

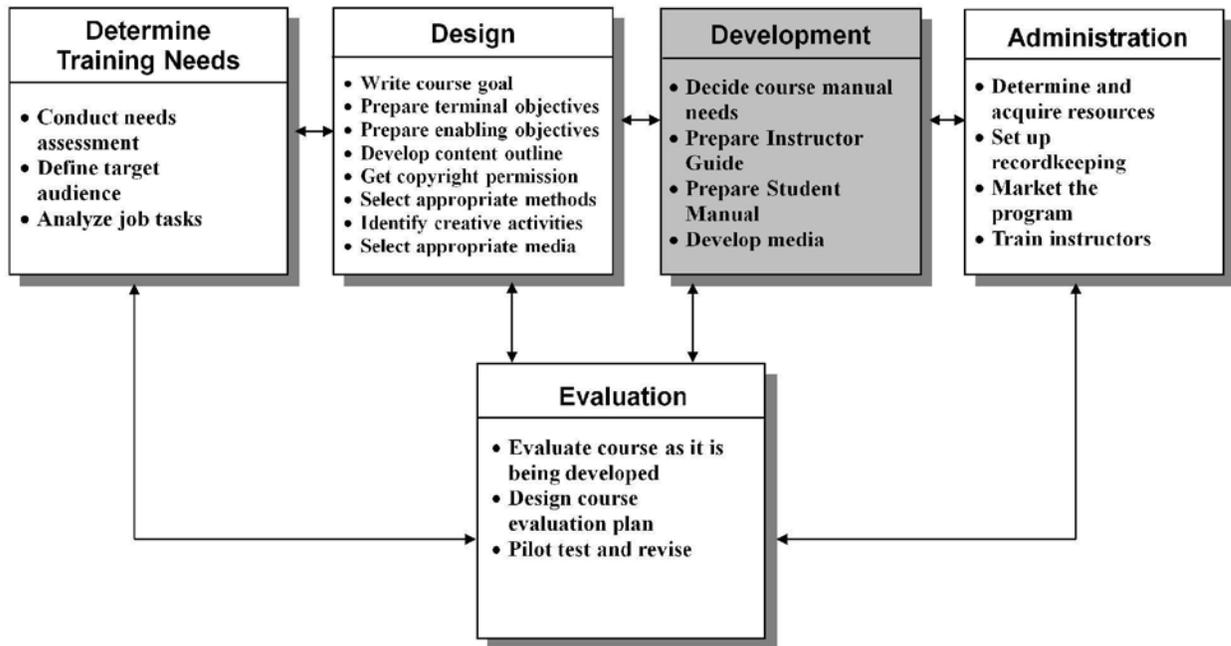
ENABLING OBJECTIVES

The students will:

- 1. Given a lecture/discussion, list the six items to consider when developing a course manual.*
 - 2. Given an example IG and SM, evaluate the completeness and accuracy of each according to the suggested components in the SM.*
-

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INSTRUCTIONAL SYSTEM DESIGN MODEL FOR COURSE DEVELOPMENT



SIX CONSIDERATIONS FOR DEVELOPING A COURSE MANUAL

There are six considerations when developing a course manual:

- the approach to writing;
- components of the Instructor Guide (IG);
- components of the Student Manual (SM);
- the course description;
- the mechanics of manual design; and
- the need for revisions.

WRITING THE COURSE MANUAL

The following are basic ground rules for writing both the IG and the SM.

Ensure Consistency

The information in the IG and the SM must be in the same sequence; this consistency makes the manuals easy to follow. Students will retain more of the information if they do not have to search for it. When their attention is focused on inconsistencies in the material, students are not paying attention to the instruction.

Use a Technical Writing Style

Write simply and concisely, avoiding local colloquialisms, jargon, or long and unfamiliar terms. A corollary consideration is that of format: select a suitable format and stay with it throughout the manuals.

THE INSTRUCTOR GUIDE

The IG should provide all the tools and directions needed by the instructor to teach the course successfully. Remember that **you** are not necessarily going to be that instructor. Consequently, there are certain considerations you need to be aware of when developing an IG for others to use.

Developing an Instructor Guide

When you develop your own lesson plans, you personalize them to suit your own style and requirements. Lesson plans developed for others, however, need to be generic and flexible enough for those instructors to add their personal touches. Embed a "train-the-trainer" philosophy into the lesson plan. Provide enough information so that another instructor can teach from the IG. Similarly, avoid designing instruction that can be used only in a classroom setting. Instead, plan for varying logistics, resources, etc.

When developing lesson plans for others, ask yourself: When is interaction needed? Should an activity be here? What options might the instructor need? Am I meeting the objectives?

Instructor Guide Components

The IG contains other components besides the lesson plan. Depending on the particular course, you also may want to include some or all of the following elements in the IG:

- **SM**--This provides the instructor with the same information the student receives. In some cases there will be no SM, simply reading assignments or references for the student to read. In any case, as part of preparation, most instructors will want to review this material. Therefore, it makes it easier for them if it is provided as part of the IG.
- **Methodology**--This is probably more important for a new course than for revised courses. If it is included it should contain not only the methods, but also the background or philosophy around which the course is developed. This is more important for some courses than others, but it does give the instructor some insight into what the developer was thinking and how he/she saw the pieces fitting together.
- **Media**--Whether media are included will depend on the types of media and the number of instructors. It is common practice with "still" media to include either masters, in the case of overheads, or small copies, in the case of slides. Because of the expense involved with videos, movies, and actual objects, these usually are referenced and, where they can be obtained, identified. Also included many times are debriefing questions to assist in focusing the students on the important items they just reviewed.

- Equipment--This listing should be comprehensive, but flexible. In most cases it is obvious what equipment will be necessary to conduct the instruction. However, it may be beneficial to the instructor to have information on possible scheduling problems, how to obtain the equipment and/or whom to contact for the equipment. This gives instructors some latitude in the selection of what they feel will be best for their students and, at the same time, a starting point.
- References--These should be included, especially if the information used to develop the lesson plan is not in the SM. Occasionally material presented during instruction is not so extensive as to require that the student purchase additional reference sources or to be included in the SM. In any case, references should include not only the source, but also the edition and page numbers to make it easier for the instructor.
- Directions for activities--These should be included to ensure that the instructor conducts the activity as it was intended. It should include any suggestions to the instructor that the developer feels would be helpful.
- Answers--These should be provided for all activities, pretests, and quizzes. This again makes it easier for the instructor to spend more time preparing for the instruction and not taking tests and completing exercises.
- Evaluation instruments--These include tests, quizzes, and student checklists, and the masters should be included. Again it provides the instructor with everything he/she needs rather than just parts of it. By providing these, the developer also provides a degree of quality control.
- Forms--These may be included if they are not readily available to the instructor.

STUDENT MANUAL/STUDY GUIDE COMPONENTS

If material is not available to students in the form of manuals or textbooks, a student guide or SM should be provided. As the name implies the student guide contains information that guides or assists the student through a course. With the exception of the actual material the components are the same for both. In place of the student material in the SM, the student guide provides the student with a reading or reference list.

- Cover/Title page--This provides a check to make sure that you match course materials with the correct course. It does not have to be very involved.
- Edition/Date--This ensures that you are using the most current edition of the course material. Secondly, it gives the students a sense of how old the course is. Although it doesn't really have an effect, it may reassure the students that the material is the most current and meets their needs.

- Developers/Authors--This provides not only recognition to the individuals responsible for the "behind the scenes work," but also a reference source should questions arise.
- Acknowledgments--Any course that is developed should involve more than just one person. This section gives recognition to **all** those who assisted in the development of the course. In some cases the developer may wish to thank organizations or groups of individuals that assisted. One of the pitfalls is that no matter how hard the developer tries he/she may forget someone. To try to prevent this you might consider keeping a list along with your development materials of **all** individuals who assisted with the course, no matter how small the contribution. Remember this section is for recognition of **all** individuals who contributed.
- Table of contents--This is necessary in any SM or student guide. It provides the student with an easy means of locating the various components of the remainder of the manual or guide.
- Schedule or outline--This provides the student with direction, and an idea of how the course will progress. This also will permit students to make decisions on accomplishment of assignments to meet their schedules.
- Goals and objectives--These are included to let the students know what is expected of them. This can be used by the student not only in preparation for classes, but also in preparation for evaluations. Some students may use them to determine if the course is exactly what they want or need.
- Note-Taking Guide--This provides the student with an organized means of taking notes. Most students like it, but it can create some problems. Be aware that it **must** be updated as material is updated. If material is presented in addition to the material contained in the lesson plan, it could confuse the students.
- Activities--These are necessary to support the instruction and to provide the instructor with an opportunity to evaluate students' comprehension of material. However, the instructor might consider providing these as handouts. Consider the student who may wish to work ahead and complete activities either incorrectly, or as an individual rather than as part of a group.
- Assignments--These should be provided to tell the students exactly what **they** must do as part of the course. A mistake many developers make is to think that all the information should be provided in the class and place no responsibility on the student for learning.

Several other things can be provided to the students: pretest, bibliographies, a glossary, and summaries. The decision to include these should be based on the use of those materials and the complexity of the material being presented.

TRAIN THE TRAINER

If the course is to be delivered by someone other than the developer, that person needs to be trained to deliver it.

The prospective trainer should be given practice in the following areas:

- purpose and objectives of the specific course;
- methodologies used;
- use of media equipment necessary for the course; and
- needs of the target audience.

Participants should try to meet the highest possible standards in selecting and training trainers (e.g., National Fire Protection Association (NFPA) standards).

One useful procedure is to gather a group of potential trainers and have them practice delivering the course to each other. If possible, videotape this procedure and allow potential trainers to review the tapes of their performance.

At times, it is not possible to have a formal program to train the trainer. In these cases, potential trainers rely heavily on the IG to see them through. Keep this in mind as you write your course.

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Activity 9.1

Course Design Project, Step 9

Purpose

To complete in class the forms for formatting course manuals.

Directions

1. Using the questions in your Course Design Project Manual as a guide, individually fill out the form for Step 9 of the Course Design Project.
2. Be prepared to share your work with the class.

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APPROVAL SHEET

I. COMMENTS ON TASK:

II. SUGGESTIONS TO IMPROVE TASK:

_____ Approval granted

_____ Approval, pending correction of suggestions

Student Colleague _____ Date _____

Instructor Approval Signature _____ Date _____

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UNIT 10: COURSE CONCLUSION

TERMINAL OBJECTIVE

The students will be able to evaluate the process used to create their Course Design Project.

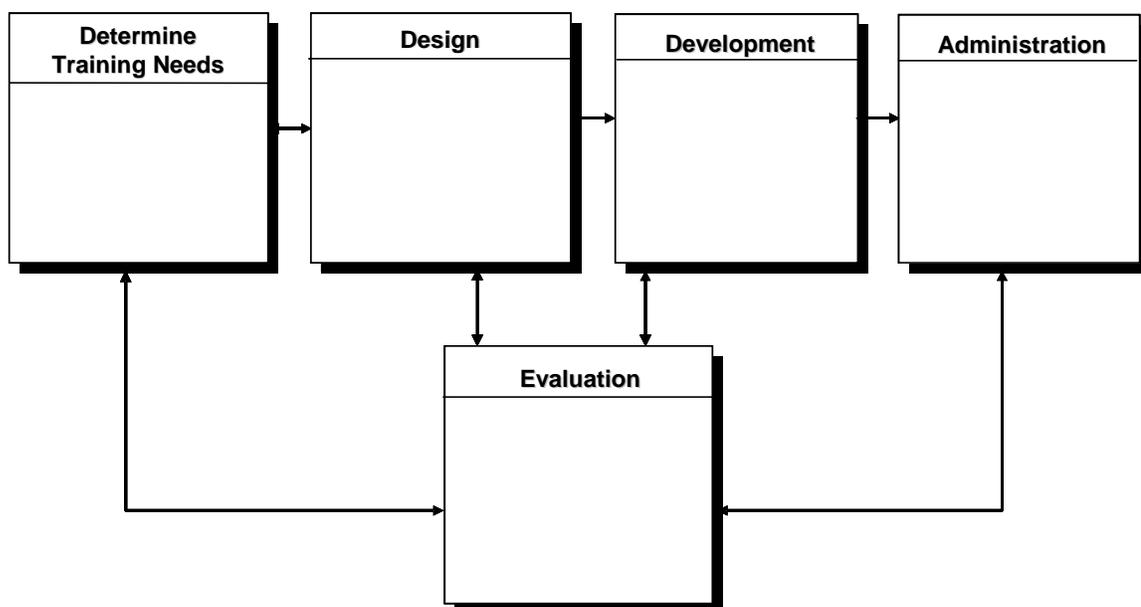
ENABLING OBJECTIVES

The students will:

- 1. Identify the steps that are needed to complete the Course Design Project.*
 - 2. Describe the purpose of a train-the-trainer program for new programs.*
-

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INSTRUCTIONAL SYSTEM DESIGN MODEL FOR COURSE DEVELOPMENT



A needs assessment should be carried out to determine if there is a training problem or another identified problem.

- define the target audience by age, education, and/or by experience;
- conduct a job task analysis and write course goals and objectives that address the task to be completed or learned;
- determine the course organization and content considerations;
- determine the course evaluation plan for the students and for the pilot programs; and
- select methods of instruction and design learning activities, select media for the support of the learning objectives, and develop the format of the course manuals.

STEPS COMPLETED

The needs assessment was a precourse assignment to determine if the problem was a training problem. In class, a further refinement of the target audience was developed, and an analysis of the job task was completed. During the course, a course goal, two terminal objectives, and two supporting enabling objectives were written. Discussions centered around the need for permission for copyright material and how to create activities that support the learning environment. Activities were completed to enable the course designer to be able to use the proper methods of instruction for the most effective means to effect a transfer of training.

Media selection to support the objectives was evaluated, and the cost of commercial media versus the development of in-house media was weighed.

Course manuals, Instructor Guides (IG's) and Student Manual (SM) layouts were discussed, and the style was left up to the individual organization.

Evaluation plans were created for the students, and for the overall evaluation of the course material to evaluate the presentation and completeness of the learning experience.

NEED TO BE COMPLETED

Steps that need to be completed or refined begin with the evaluation methods. Pilot testing of the program will identify areas that need to be revisited and/or improved. Completing the evaluation plan will ensure that the students have learned the material and that the gap has been closed and a behavioral change has taken place. Further refinement of the SM and IG will ensure that spelling and grammar have been checked. The IG should correspond with the SM, and all boilerplate material, graphs, charts, and activities should be in place.

Administration includes ensuring that recordkeeping has been set up and that internal and external marketing continues, pilot programs are set up, and instructors are trained to deliver the newly created material.

Activity 10.1

Individual Presentations

Purpose

To make a presentation on the course you have begun to design.

Directions

1. You will make a presentation describing your Course Design Project.
2. You should describe the Instructional System Design (ISD) model and how the nine steps have assisted you in designing the first two terminal objectives and supporting enabling objectives, selecting methodologies, writing an evaluation plan, selecting marketing plans all through the design process, and the value of peer evaluation of material to make a more effective course.

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Fire Service Course Design Final Project Guidelines

The purpose of these guidelines is to provide both the student and instructor with the necessary information that will ensure the successful completion of the final project requirements.

The following items are required in the final project:

1. A copy of the needs assessment precourse material.
2. Audience Identification.
3. Two completed Task Analysis Forms.
4. Course Goal Sheet and Two Terminal Objective Sheets with at least two enabling objectives per terminal objective.
5. Schemes Worksheet. The Summary Form for steps 4 to 8 should be introduced at this time. There will be four of these forms.
6. Course Evaluation Worksheets.
7. Four completed Activity Forms (one for each enabling objective).
8. One Media Evaluation Form.
9. Course Student Manual and Instructor Guide Design Sheets.

The instructor is responsible to ensure that the projects are complete and that students have understanding of the Instructional System Design (ISD) process.

There is a Checkoff Sheet and dividers on the following pages that will make it easier for the student to complete the project.

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**Fire Service Course Design
Final Project Checkoff Sheet**

1. Precourse material (Needs Assessment)
2. Audience Identification
3. Task Analysis (Two complete sheets)
4. Course Goal Sheet, Terminal and Enabling Objective Sheets
(Two sheets with at least two enabling objectives for each)
5. Schemes Worksheet
(Identifies schemes, sequencing of objectives, and unit names)
6. Evaluation Plan
7. Activity Sheets (One for each enabling objective)
8. Media Review Sheet (one only)
9. Steps 4 to 8 Summary Forms (4 completed forms)
10. IG and SM Design Sheets

Signed:

Date: _____

Approved:

Date: _____

Instructor

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APPENDIX

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NATIONAL FIRE ACADEMY

FIRE SERVICE COURSE DESIGN--

ONE WEEK

Final Project

Name: _____

Date: _____

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Step 1

Precourse Assignment

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Step 2

Audience Identification

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Step 3

Task Analysis
(Two Sheets)

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Step 4

Goal Statement

Two Terminal Objective Sheets

(Complete with at least two enabling objectives)

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Step 5

Scheme Worksheet

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Step 6

Evaluation Plan Sheet

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Step 7

Four Activity Sheets

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Step 8

Media Review Sheet

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Steps 4 to 8 Forms

Four Completed Forms

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Step 9

IG and SM Design Sheet

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GLOSSARY

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GLOSSARY

Action Verbs	Help pinpoint the desired level of learning.
Affective	Feeling (attitude).
Andragogy	The art and science of helping adults to learn.
Audience Analysis	The process of gathering relevant information about the target audience.
Classroom Environment	The physical (desks, chairs, etc.) and psychological (relaxed, friendly, etc.) surroundings in a classroom.
Cognitive	Knowing (knowledge).
Competency-Based Instruction	Providing and evaluating training against specific standards, such as learning objectives.
Computer-Assisted Instruction (CAI)	The interaction of a student with a computer for instructional purposes.
Copyright	The exclusive legal right to reproduce, publish, and sell the matter and form of a literary, musical, or artistic work.
Course Goal	Describes the desired outcome of the instruction.
Criterion-Referenced Tests	Test performance is evaluated based on mastery of specific skills and instructional objectives.
Design Plan	Plan of action for course development.
Domain of Learning	Describes the type of learning (cognitive, affective, psychomotor) to take place.
Enabling Objectives	The building blocks needed to achieve the terminal objectives.
Ethics	Principles of moral conduct.
Fair Use	A portion of the copyright law which allows for your "fair use" of a copyrighted work "without the need for specific permission as long as your usage is noncommercial for purposes of criticism, scholarship, or research..." (Lester, 141).
Feedback	A process of providing specific information (such as constructive criticism) to students relative to their learning progress.

Flowchart	A representation, using symbols, of tasks.
Formative Evaluation	The process used to detect deficiencies and weaknesses in an instructional design that is still being developed and tested.
Four-Step Process	Used to determine training needs: (1) Find a focus, (2) Identify the gap, (3) Assess the gap, (4) Make recommendations.
Goals	Describe the desired outcome.
Instructional System Design (ISD)	The process of systematic and planned course development.
Instructor Guide	The device that gives the instructor all the tools and directions necessary to teach a course successfully.
Law of Association	New facts and concepts are learned best if they are related to our existing knowledge base.
Law of Effect	Students learn best in a pleasant classroom environment.
Law of Exercise	More student involvement and practice equals better retention of learning.
Law of Readiness	Adults learn best when the reason for learning (the need to know) is clear to them.
Learning	An observable change in behavior that occurs as a result of acquiring new knowledge or skills.
Level of Domain	Refers to the type of behavior the student has to display to achieve the objective.
LRC	Learning Resource Center.
Manual	A book capable of being handled conveniently.
Media	Materials or objects used to assist the instructor in the teaching/learning process.
Methods	Systematic plans or procedures.
Motivation	A source of potential energy that can be converted to positive or negative behavior.

Needs Assessment	Determining the gap between what is being done and what should be done.
Negligence	A lack of ordinary care; legal concept dealing with omissions and/or commissions.
NFA	National Fire Academy.
Norm-Referenced Tests	Test performance is evaluated using a standard norm.
Objectives	Detail the steps the student must master to reach the instructional goal. May be either terminal or enabling.
Occupational Analysis	An analysis of a particular occupation to determine the knowledge, skills, and abilities it requires.
Pedagogy	The art and science of teaching children.
Plagiarism	Using material as one's own without crediting the source.
Posttest	A final examination given at the conclusion of a training program.
Pretest	An examination given prior to the start of instruction to determine the level of pre-existing knowledge.
Psychomotor	Doing (skill).
Skill	Ability developed or acquired through training.
Summative Evaluation	The process used to measure the degree to which objectives were met at the end of instruction.
Task Analysis	The process of dividing a task into smaller parts. The elements of the task analysis become the basis for instruction.
Terminal Objectives	Describe the end results of training in terms of student performance.
Test Reliability	The degree to which test scores are consistent.
Test Validity	The degree to which a test measures what it is supposed to measure.

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