

Project Design and Evaluation

National Oceanic and Atmospheric Administration
Coastal Services Center

Acknowledgments

The Project Design and Evaluation course was developed to meet a growing need among National Oceanic and Atmospheric Administration (NOAA) education and extension professionals for more methodical understanding of how to evaluate the impact of their work. This course was developed for education and extension professionals by the NOAA Coastal Services Center, with input and assistance from many others. The working team included the following:

Kate Barba, NOAA Estuarine Reserves Division
Sarah Mitchell, NOAA NOS Communication and Education Division
Chris Parsons, Word Craft
Brian Miller, Indiana-Illinois Sea Grant Extension
Mike Spranger, Florida Sea Grant Extension
Ginger Hinchcliff, NOAA Coastal Services Center
Lynne Hinke, NOAA Coastal Services Center
Corey Riley, NOAA Estuarine Reserves Division

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Coastal Learning Services
NOAA Coastal Services Center
2234 South Hobson Avenue
Charleston, SC 29405
(843) 740-1200

Ginger Hinchcliff, Branch Chief, (843) 740-1184
Steve Gilbert, Program Manager, (843) 740-1309
Pam Kylstra, Trainer, (843) 740-1259
Sacheen Tavares-Leighton, Trainer, (843) 740-1167
Ann Weaver, Trainer, (843) 740-1176

Instructors

Steve Gilbert (*Steve.Gilbert@noaa.gov*) is currently the program manager for the Coastal Learning Services program of the NOAA Coastal Services Center in Charleston, South Carolina. This program develops and delivers training for coastal zone management agencies, Sea Grant, extension services, and local coastal governments and nonprofits across the country.

The majority of his federal career was spent with the Ecological Services (ES) branch of the U.S. Fish and Wildlife Service. His last assignment was as a senior biologist, leading efforts on the Everglades Restoration Project. Prior to this, he spent 25 years with the Charleston, South Carolina, Ecological Services office, working primarily on wetland, stream, and hydropower issues. Concurrent with his field biologist responsibilities, Mr. Gilbert has helped develop and teach several courses at the Fish and Wildlife Service's National Conservation Training Center.

Mr. Gilbert holds master and bachelor of science degrees from the Florida Institute of Technology (currently Florida Tech).

Ginger Hinchcliff (*Ginger.Hinchcliff@noaa.gov*) has been working in coastal interpretation, education, and management for the past 25 years. She joined NOAA's Coastal Services Center in Charleston, South Carolina, in 1999 and serves as its branch chief for Coastal Management Services. She also serves as a training consultant with the National Estuarine Research Reserves and is working with them to develop a coastal training initiative. In addition, Ms. Hinchcliff led the effort to implement a Marine Protected Area Institute for Training and Technical Assistance.

Before coming to the Center, Ms. Hinchcliff worked for the Rookery Bay National Estuarine Research Reserve in Southwest Florida for 11 years as the education coordinator. Other experience includes working seasonally for the National Park Service at six coastal parks, and teaching marine biology and coastal ecology at environmental education facilities in Florida and South Carolina.

In 1980, Ms. Hinchcliff earned a bachelor of science degree from Penn State University in outdoor recreation and environmental education with a minor in marine sciences. In 1999, she completed a master of education degree at Florida Gulf Coast University in instructional technology.

Pam Kylstra (*Pam.Kylstra@noaa.gov*) is a program development specialist with the NOAA Coastal Services Center where she also serves as the Center's Sea Grant Liaison. As a trainer for the Center, she assists with the educational design of Center products, and develops training programs for the coastal resource management community, including Sea Grant, National Estuarine Research Reserves (NERR), and other federal, state, and local agencies and organizations. Her responsibilities include conducting trainings about managing visitor use and project design and evaluation.

Before joining the Center in January 2006, Pam worked on the Oregon coast with the South Slough NERR to coordinate a public involvement program. As a faculty member with the School for Field Studies' Center for Coastal Studies in Baja California Sur, Mexico, she collaborated with local educators to create a bioregional environmental education program. Other experience includes training volunteers to be field research assistants for seasonal behavioral ornithology projects in Central America.

Pam holds a master of science in marine resource management from Oregon State University's College of Atmospheric and Oceanic Sciences and a bachelor of science in zoology from North Carolina State University.

Sacheen Tavares-Leighton (*Sacheen.Tavares@noaa.gov*) joined NOAA's Coastal Services as a coastal training specialist. Her responsibilities include conducting trainings on project design and evaluation and public issues and conflict management.

Ms. Tavares-Leighton has been working in the field of marine science education and program development since 1999. She has extensive experience in formal and informal education, serving as the outreach coordinator for the University of Miami's Rosenstiel School of Marine and Atmospheric Science and as an extension agent with the University of Florida's Sea Grant Extension Program, where she designed, implemented, and evaluated educational outreach programs on marine resources management and coastal issues. Other experience includes working in the nonprofit arena to develop environmental education programs for diverse groups about the Cape Florida Project—a 432-acre habitat restoration of a barrier island park in South Florida.

Ms. Tavares-Leighton holds a master of arts in marine affairs from the University of Miami's Rosenstiel School of Marine and Atmospheric Science and a bachelor of science in zoology and botany from the University of the West Indies.

Ann Weaver (*Ann.Weaver@noaa.gov*) joined NOAA's Coastal Services Center in July 2004 as a contract program and training specialist. Her responsibilities include conducting trainings on public issues and conflict management and project design and evaluation. Before coming to the Center, Ms. Weaver worked as the Coastal Training Program coordinator at the Guana Tolomato Matanzas National Estuarine Research Reserve, where she coordinated the completion of a market analysis and needs assessment for the program.

Ms. Weaver obtained her bachelor's degree in industrial engineering from the University of Washington, and her master's degree in biology at Florida Atlantic University.

Ms. Weaver has extensive experience as a trainer in the public and private sector. After a brief career as an industrial engineer in a manufacturing venue, she refocused her career efforts and left engineering. She became a corporate-certified learning specialist and instructional designer, where she conducted needs assessments, designed and facilitated workshops, and coached multifunctional project groups through a teaming process.

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WHY ARE WE HERE?

There is an increasing awareness within federal, state, and local government agencies, including NOAA, that in order to more efficiently allocate limited resources, agency products and projects must be evaluated to determine their impacts on the target audience. Extension and education programs frequently rely on anecdotal evidence to support their effectiveness. This is no longer adequate, and efforts to more accurately and meaningfully measure project impacts on their target audiences and, ultimately, on marine resources are increasing. Within NOAA partner and client agencies, extension and education professionals have recognized this trend and have requested help to better understand and conduct project evaluations.

Evaluation is an integral component of the project design process and is linked to a thorough audience needs assessment, the establishment of well-written, measurable objectives, and a methodical evaluation methodology. Without all these components in place before delivery or implementation of a project, its success can only be measured by anecdote, or by “luck.”

Through the application of valid instructional design theory to project development, this course will improve the ability of coastal resource education and extension professionals to design targeted education and extension projects that measure impacts and outcomes.

Benefits to You:

- Make your job easier (streamline the project development process)
- Show project and program impacts
- Projects (and you) get evaluated on what YOU determine is important

Workshop Goal:

The goal of this course is to improve the ability of participants to design projects and measure the impacts or outcomes of extension and education projects and products. This course aims to increase the application of valid instructional design theory, including measurable objectives, outcome-focused project evaluation, and appropriate design strategies, to extension and education projects to achieve this goal.

Objectives:

After the workshop, 90 percent of the participants will be able to

- Describe the context of project design and evaluation within the scope of agency and organizational missions, strategic plans, and established program niches
- Apply appropriate instructional design theory and practices to project development
- Explain the role of logic models in project design and evaluation, and create logic models for their projects
- Describe different evaluation models and levels of evaluation, and select the appropriate model and level for given objectives
- Apply performance measurement to project evaluation

The Big Picture

"Perhaps the most valuable result of all education is the ability to make yourself do the thing you have to do, when it ought to be done, whether you like it or not."

– Thomas Huxley

Legislation

- GPRA (1993): Government Performance and Results Act
- FAIR (1996): Federal Agricultural Improvement and Reform Act
- AREERA (1998): Agricultural Research, Extension, and Education Reform Act

Accountability Legislation

The decade of the 1990s can be considered the era of government program accountability. During that time, three pieces of performance-based accountability legislation were enacted that now impact many extension and outreach activities at the state and national levels. These mandate that agencies demonstrate the impacts of their programs on the audience or resource that is targeted. Most government agencies or publicly funded organizations have, or will have, similar accountability requirements in the future. For example, during the last decade, 47 of 50 states passed mandates for performance-based budgeting. Arkansas, Massachusetts, and New York are the only states that do not have performance-based budgeting legislation or mandates (Melkers and Willoughby, 1998). The general purpose of these laws is to provide stakeholders with a clear understanding of what is being achieved with the funds being spent.

Accountability legislation increased competition for public funding and produced a deficit-induced imperative to limit government, particularly during the Reagan Administration. A second impetus was the Clinton Administration's growing interest in budget reforms that could enhance the performance of government agencies and programs. The goal of such legislation was to restrain budgets while improving organizational performance management. Today, accountability, evaluation, and performance assessment of outreach programs is a necessary part of the business of all extension and education professionals.

Overview of the Legislation

Performance-based budgeting is the current focus of the federal government. Performance-based budgeting requires strategic planning regarding agency mission, goals, and objectives, and a process to gather meaningful data to measure program outcomes (Melkers and Willoughby, 1998). During the decade of the 1990s, the Congress of the United States and 47 state legislatures passed performance-based legislation or mandates.

At the federal level, the first legislation of the decade, the Government Performance and Results Act of 1993 (GPRA) called for agencies of the federal government to submit performance plans that link resource information to projected and actual program accomplishments. A second legislative act, the Federal Agricultural Improvement and Reform Act of 1996 (FAIR), included a requirement that a state-of-the-art information technology system be developed and used by the

secretary of agriculture to evaluate agricultural research and extension activities. Cooperative State Research, Education, and Extension Service (CSREES), an agency of USDA's Research, Education, and Economics (REE) and state and private partners, was designated to organize and coordinate efforts in planning, designing, developing, and implementing a comprehensive Research, Education, and Economics Information System (REEIS).

The third legislative action, the Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA) called for a new reporting system for state extension partners and greater collaboration among stakeholders, researchers, and extension staff members. Specifically, AREERA provided instructions for plans of work to address critical research and extension issues. The act also required the secretary of agriculture to develop protocols to be used to evaluate the success of multistate, multi-institutional, and multidisciplinary extension activities and joint research and extension activities in addressing critical agricultural issues identified in the state plans of work.

Although FAIR and AREERA are two independent legislative acts, they have a common purpose—to provide the means by which the secretary of agriculture will evaluate research and extension activities. For FAIR, the purpose relates to the development and implementation of an information technology system that enables the secretary to monitor and evaluate agricultural research and extension activities conducted or supported by the U.S. Department of Agriculture (USDA).

At the present time, the Bush Administration feels that the existing accountability mandates of GPRA may not go far enough, particularly in future funding decisions for federal science research agencies. Both the Office of Management and Budget (OMB) and the Office of Science and Technology Programs (OSTP) have asked the National Academy of Sciences for assistance in the development of performance measures for future science budgets. Federal science agencies will be asked to develop ways to document the impact of the research they support (performance measures). In turn, their budgets may be influenced by their success in doing so (Harpel, 2002). For example, new reauthorization language for Sea Grant indicates that future funding levels will be based on "merit" (i.e., performance measures).

Summary

In today's era of performance-based budgeting and information technology, the challenge for an evaluation and accountability system is to provide focused information in a timely fashion that is as accurate as possible. Documentation of impacts and benefits needs to come from carefully designed evaluation assessment instruments. Specific economic, environmental, and scholarly indicators need to be identified and used to show the full impact of extension and education activities. To continue relying on narrative reports of outcomes and impacts without significant documentation could lead to the type of results feared by the 1980 Citizen's Review Panel of (Cooperative) Extension. It was the panel's conclusion that "Due to insufficient and sometimes misleading data, Congress could draw the wrong conclusion about the usefulness of Extension programs (1980)."

The above was adapted from Spranger, M.S. 2000. "Accountability, Evaluation and Performance Assessment in Sea Grant Extension Programs". For the University of Florida Sea Grant Program.



Programs vs. Projects

This workshop has been designed to focus on extension, education, and outreach projects. In the context presented here, a project is a particular set of actions designed to address an issue.

Projects exist within a program, which is a coordinated approach to exploring and addressing a range of related issues (figure 1).

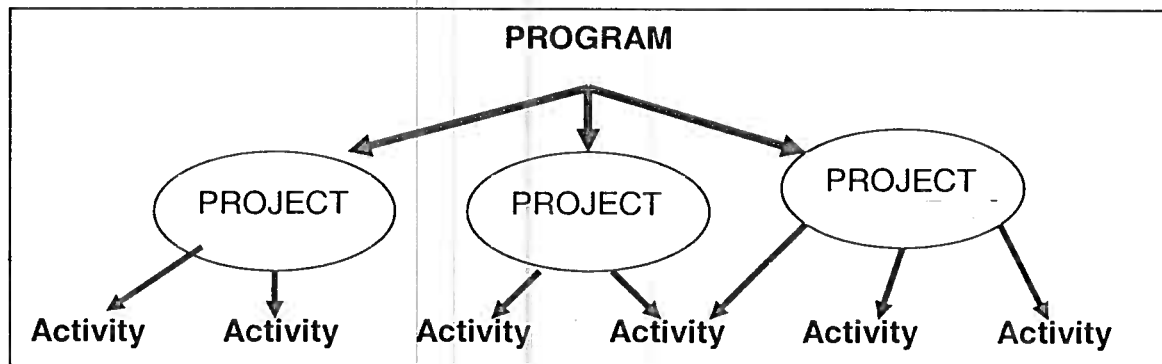


Figure 1. Programs, projects, and activities (NSF, 2002)

While the workshop will focus on the planning, design, and evaluation of individual projects, many of the same concepts, tools, and strategies are also used at the program design and evaluation level. There will also be a discussion of which components of instructional design are similar and which differ at the program level, and how.

The Workshop at a Glance

Application of Instructional Design Theory to Projects

The ADDIE Model

Assessment

- Employ a 12-step process for conducting needs assessments
- Characterize the audience
- Determine needs and wants
- Identify what knowledge, skills, attitudes, or behaviors need to be taught

Design

- Determine what and how much content you need in your instruction
- Write SMART objectives
- Make evaluation part of project design
- Use project logic models

Development

- Identify and include appropriate materials, information, and activities
- Group the related objectives and activities to aid in sequencing, presentation, and reinforcement of the content
- Identify the appropriate delivery methods (lecture, group discussion, case study, activities, etc.) for each portion of the content delivery

Implementation

- Tips for ensuring successful implementation through process evaluation

Evaluation

- Evaluate and revise the project design process, activities, and outcomes, and make changes to improve projects
- Determine: Does the project work? Do we need it?

Moving from Projects to Programs

INSTRUCTIONAL SYSTEMS DESIGN

- **Instructional design** aims for a learner-centered rather than the traditional teacher-centered approach to instruction, so that effective learning can take place. This means that every component of the instruction is governed by the learning outcomes, which have been determined after a thorough analysis of the learners' needs. – *San Jose State University*
- **Instructional design** is a systematic approach to course development that ensures that specific learning goals are accomplished. It is an iterative process that requires ongoing evaluation and feedback. – *University of Michigan*
- **Instructional design** is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities; and tryout and evaluation of all instruction and learner activities. – *Penn State University*
- **Instructional development** is the process of implementing the design plans. – *Penn State University*
- **Instructional technology** is the systemic and systematic application of strategies and techniques derived from behavioral, cognitive, and constructivist theories to the solution of instructional problems. – *Penn State University*
- **Instructional technology** is the systematic application of theory and other organized knowledge to the task of instructional design and development. – *Penn State University*
- **Instructional technology** is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning.
– *Seels and Richey, 1994*

Instructional Technology = Instructional Design + Instructional Development



Instructional Design Theory

- learner-centered
- systematic (follows a step-by-step process)
- systemic (comprehensively addresses change or learning)
- governed by the *learning outcomes*
- based on a thorough analysis of the audience's needs and the context of the issue

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The ADDIE Model

Instructional design is the systematic approach to **Assess**, **Design**, **Develop**, **Implement**, and **Evaluate** learning materials and activities. Although these steps overlap and interrelate, they provide a dynamic and flexible guideline for developing effective programs efficiently.

ADDIE is an iterative process where the results of one phase become the starting products for the next phase, and results of the formative evaluation of each step may lead the instructional designer back to any previous phase.

Step-By-Step ADDIE

Assessment and Analysis*

Design

Development

Implementation

Evaluation

* This step, also referred to as needs assessment, is a form of evaluation. It is often referred to as "front-end" evaluation.

Assessment and Analysis*

Conduct a needs assessment to determine the following:

Who are your learners?

Who is your audience; what do they already know; what are their learning characteristics; what do they need or want to learn; why; and in what environment will they apply the project information, skills, or behaviors?

What about the issue are you trying to impact, or change, with your project?

Define the need for, and the general aim or purpose of, the project or activity. This is the overall goal for the project (should tie into program or organizational goals).

What knowledge, skills, attitudes, or behaviors need to change?

Determine what must be taught to satisfy the learners' needs.

How can you best accomplish this?

What are the strategies, tools, and delivery methods that are best suited for use with this audience?

Design**What does the broad project outline look like?**

Determine how you will move the audience from the current situation to the desired one (what is the appropriate information and method(s)). Draft a project outline that clearly shows what materials, information, skills, and activities will be included to achieve each objective.

Define the goals and objectives.

From the needs assessment—the general learning areas of the project or activity (must be defined in terms that are specific and measurable, i.e., as learning or behavior outcomes). The objectives tell you the desired situation after the project.

What and how much content do you need in your instruction?

Set the scope of the content to be covered in terms of time required, number of lessons, and topic areas.

Develop an evaluation plan.

Evaluation methods must be selected and matched to the learning objectives so that there is agreement between the intended outcomes and what is being measured by the assessment.

Development

Select the specific content.

Identify and include appropriate materials, information, and activities.

How will you structure the content?

Sequencing, presentation, and reinforcement of the content will rely on grouping of related objectives and activities.

Select the appropriate delivery methods.

Identify the appropriate delivery methods (lecture, group discussion, case study, activities, etc.) for each portion of the content delivery.

Sequence the use of the various delivery methods to ensure even flow and varied levels of participation.

Implementation

Pilot the project.

Identify appropriate audience and venue for a pilot of the project or activity that includes opportunities to receive participant feedback.

Implement the project.

Use the results of the needs assessment, and the instructional design process to implement the project.

Evaluation

Conduct the appropriate type(s) of evaluation.

Identify when front-end, formative, and summative evaluations are appropriate and what will be accomplished with each of these.

Evaluate at the correct level(s) of impact.

Select evaluation methods and tools that are appropriate for the intended level of project impact(s).

Evaluate to determine the following.

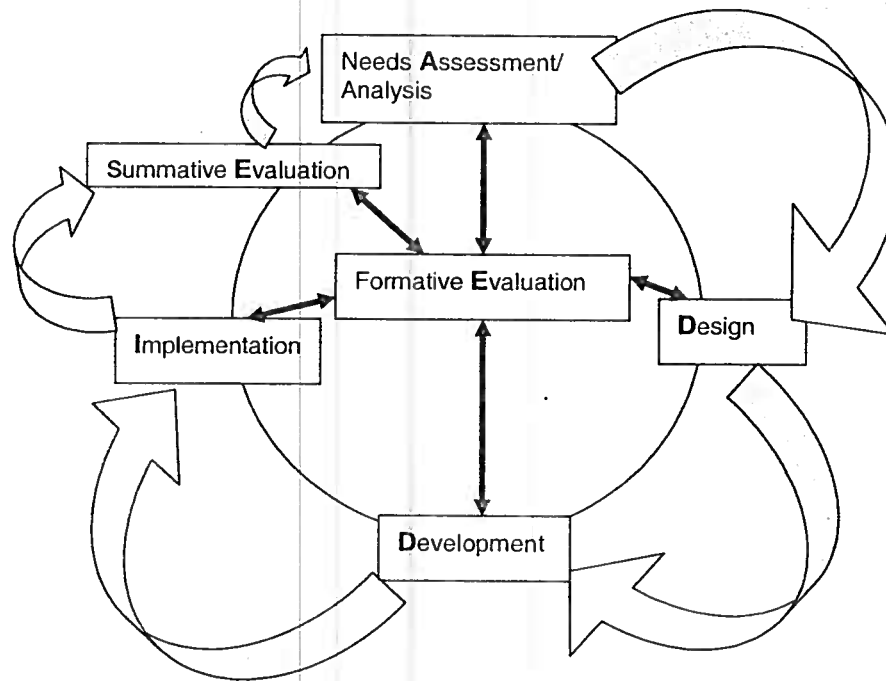
Evaluate participant reaction, learning, application of skills and information, results, **merit** (does it work?), and **worth** (do we need it?).

Make project decisions based on the evaluation results.

The following table shows what tasks and outputs may occur during each phase of the ADDIE process.

Step	Sample Activities	Sample Output
Assessment/Analysis The process of defining what is to be learned	<ul style="list-style-type: none"> • Problem identification • Design a needs assessment • Conduct an audience characterization • Quantify data gathered from the needs assessment (front-end evaluation) instrument 	<ul style="list-style-type: none"> • Needs, problem statement • Description of constraints • Learner profile • Detailed description of knowledge, skills, attitudes, and behaviors that the project is aimed at changing
Design The process of specifying how it is to be learned	<ul style="list-style-type: none"> • Write project objectives • Identify milestones (activities) • Identify resources • Develop logic model • Consider evaluation (of the design process, project outputs, and overall project or summative evaluation) • Consider marketing ("What's In It for Me (WIIFM)?") 	<ul style="list-style-type: none"> • Measurable objectives • Contracts or agreements for collaboration • Logic model • Formative evaluation tools • Summative evaluation tools • List of potential performance measures • Marketing plan
Development The process of authoring and producing the materials	<ul style="list-style-type: none"> • Work with project team and content experts • Identify materials • Develop materials and products • Sequence information 	<ul style="list-style-type: none"> • Instructional strategy • Draft materials • Exercises and activity descriptions • Process agendas
Implementation The process of installing the project in the real world context	<ul style="list-style-type: none"> • Training or workshops • Distribution of publication • Reaction surveys and other formative evaluation tools 	<ul style="list-style-type: none"> • Participant response and comments • Feedback • Summary of evaluation results
Evaluation The process of determining the adequacy of the instruction	<ul style="list-style-type: none"> • Develop evaluation plan • Implement evaluation plan • Observe • Survey • Interviews • Gather and record data • Interpret results • Make decisions based on results 	<ul style="list-style-type: none"> • Recommendations • Project report • Project modifications

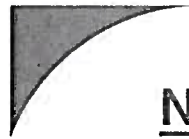
The ADDIE Model



NOTES

Needs Assessment

The **Assessment and Analysis** part of the ADDIE process is also referred to as needs assessment, or front-end evaluation.



Needs Assessment

- **Who** are your learners?
- **What** about the issue are you trying to impact with your project?
- **What knowledge, skills, attitudes, or behaviors** need to change?
- **How** can you best accomplish this?

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A **Training or Project Needs Assessment** is carried out after an organization has completed an analysis of its “market” for conducting education or training projects, and has clearly identified its “niche,” that is, the environmental issues and audiences it expects to target for SPECIFIC outreach and possible training delivery. **Needs assessments will focus on an inventory, literature search, and analysis of those specific audiences with respect to their interests, needs and wants, learning styles, backgrounds, and ability to participate in programs relative to the issues you seek to address.**

Needs assessments are a form of **evaluation** that is conducted **before expending resources on project actions**. Too often, service providers in environmental fields rely on their own instincts and passions to conclude what their clients or customers need and whether the products or services are providing what is needed. Over time, this can result in a lot of guessing about what would be a good product or service, trial and error about how new products and services could be delivered, and much effort to explain or justify programs with little or no measurable impact. (Adapted from C. McNamara, 1998)

Application of needs assessment results to project design can help project leaders understand, verify, or increase the impact of their products or services on customers.

Some Definitions of Needs Assessments

- Needs Assessment is a systematic investigation of an audience(s) to identify aspects of individual knowledge, skill, interest, attitude, or abilities relevant to a particular issue, organizational goal, or objective. – *NOAA Coastal Services Center, 2000.*
- All effective training begins with needs assessment. The training needs survey measures what skills employees have, what they need, and how to deliver the right training at the right time. – *American Society of Training and Development*
- A Needs Assessment is a systematic exploration of the way things are and the way they should be. These "things" are usually associated with organizational and/or individual performance. – *D. Stout, Performance Analysis for Training, 1995.*
- Needs analysis is an examination of the existing need for training within an organization. It is a gathering of data that enables you to make an informed estimate of the changes desired or demanded by those organizations. – *Stuart Dalziel, Planning and Managing Training and Development*
- The word "assess" comes from the Latin term "assidere" which means to "sit beside." Process-minded and participatory-oriented adult educators "sit beside" learners to learn about their proficiencies and backgrounds, educational goals, and expected outcomes, immersing themselves in the lives and views of their students. – *Auerbach, 1994*
- Needs assessment is performed to determine what training will successfully address any skill deficits. – *Cornell, Technology Training Services*
- Needs Assessment is a process used anytime someone carefully asks the question "How can I find out what is really happening (or needed; at the root of the problem; missing; etc.)?" – *Cornell, Needs Assessment Tips and Techniques*
- Data gathering methods by themselves are not a needs assessment. The needs assessment process has to result in decision-making for the process to be complete. – *University of Virginia*
- Needs assessments and needs analysis are interchangeable and have the same purpose and meaning: to assess and analyze. The purpose is to ensure that there is a need for training and to identify the nature of the content of the training program. – *AMX, Training Needs Assessment*



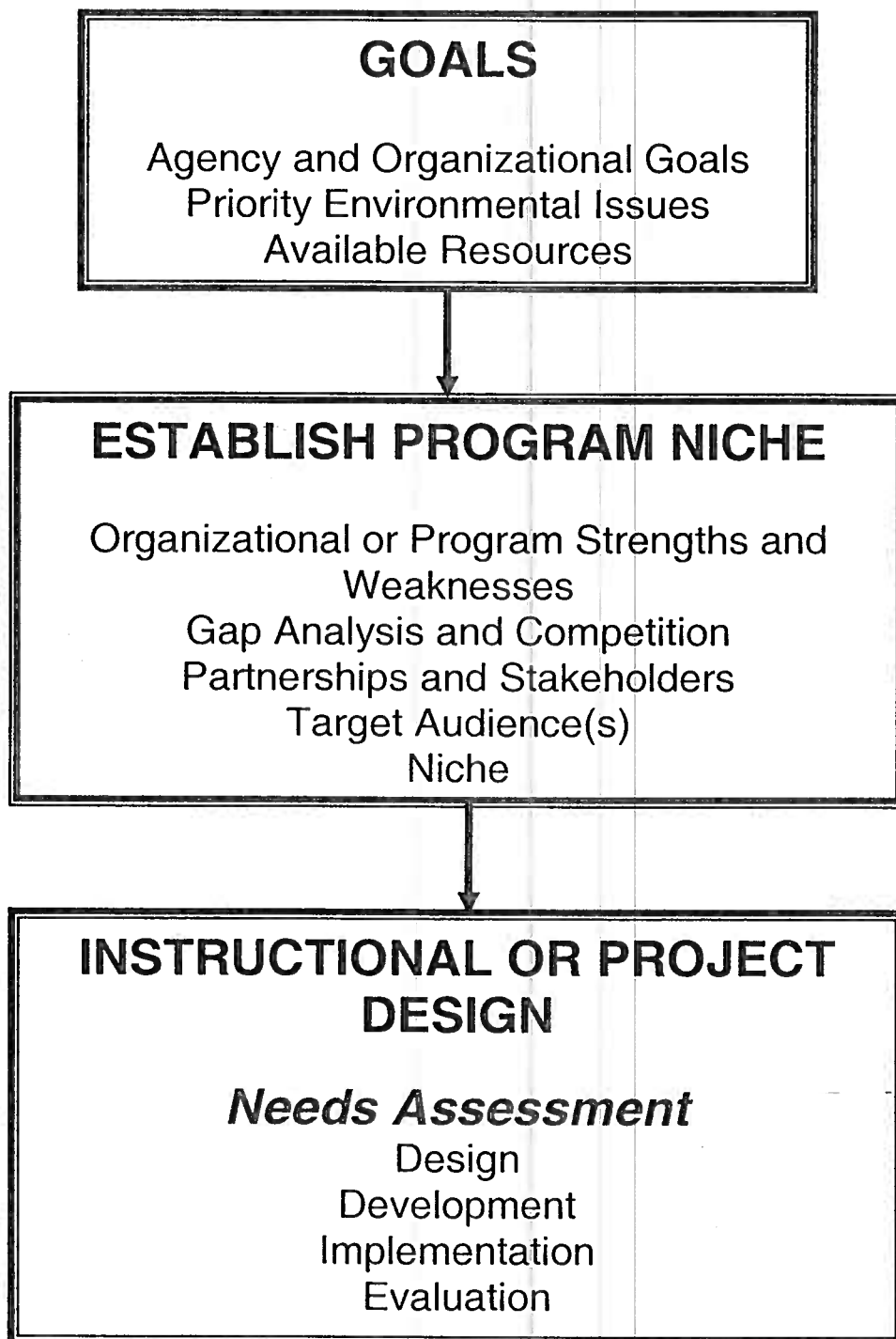
Needs Assessment

- **systematic** investigation of audience and issue
- identifies the appropriate **nature and content** of future programs and projects
- **informs decisions** on how to affect a desired or demanded change
- **audience and issue** focused

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A Context for Needs Assessments



WHY design and conduct a needs assessment?

To help determine the following:

- What learning needs to be accomplished (what are the current knowledge, skills, and attitudes of the audience and to what level does the project expect to change that?)
- What changes in behavior and performance are expected?
- How will we get them interested? What are the audience needs and wants?
- What are the expected economic costs and benefits of any proposed solutions (training)? Is there a more economical way to achieve this?
- Is it a training or learning issue?
- Are our assumptions about the audience correct?

We are often in too much of a hurry—we are rewarded for being busy and active. This can lead to implementing a “solution” that might not be the correct or best action.

Opportunity or Contextual Assessment

As you develop and conduct a project needs assessment, it is also a good idea to conduct an “opportunity assessment” to determine if the problem really is a training or learning issue. In some cases, training may not be the answer. An opportunity assessment should be conducted early on in the instructional design process to gauge the appropriateness of a training or educational program. The following four steps are a good and fast “check” to ensure the opportunity is right for training.

1. Develop alternative solutions that will reduce the identified needs
2. Evaluate the alternatives
3. Choose a course of action that best addresses the need
4. Determine if it is appropriate for your program to implement that course of action. In other words, is it a training issue, or should this be addressed through some other means?

NOTES

12-Step Process to Conduct a Needs Assessment*

Planning

1. State the issue and intended audience
2. Establish planning team
3. Perform an information and literature search
4. Characterize the audience
5. Establish the goals and objectives of the needs assessment
6. Select data collection methods and develop questions

Data Collection

7. Determine audience sampling scheme
8. Design and pilot data collection instrument
9. Gather and record data

Data Analysis and Reporting

10. Perform data analysis
11. Manage data
12. Synthesize information and create report

* The 12 steps that are used for needs assessments (front-end evaluations) are similar to those for evaluations at other points in the program (formative evaluations and summative evaluations).

NOTES

The Needs Assessment Planning Phase

1. State the issue and intended audience
 2. Establish planning team
 3. Information and literature search
 4. Characterize audience(s)
 5. Establish goals and objectives of the needs assessment
 6. Select data collection methods
-

Step 1. State the issue and intended audience

Ensure that you have a clear understanding of the issue or topic to be addressed. Why does this issue exist? What are the social, economic, or environmental conditions that need improving? This is the highest aim of the project—to affect this change in the desired direction. Who needs to make this change (all potential audiences)?

Step 2. Establish the planning team

The planning team should include all “project stakeholders.” This includes project partners, funders, audience, and resource persons (experts).

Step 3. Information and literature search

Before conducting a survey or directly (and possibly intrusively) talking to your target audience to assess their needs, search other sources to see what is already known about that audience on that issue. Has another organization done a needs assessment? What other sources of information are available about your audience and issue (not just peer-reviewed journals!)

Step 4. Characterize audience(s)

Who are your learners?

Purpose: Target population assessment will help you decide who needs training and how a specific program must be customized to meet participant interests and learning styles. In this activity, brainstorm what you know about your audience in the following categories:

- **Knowledge:** What degree of knowledge does the target population have relating to this issue? Understanding of current events related to the issue? Familiarity with terminology?
- What type of **prior training, skills, or experiences** does the population have related to the issue?
- What are the **personal benefits** to the population in learning about this issue?
- **Attitudes and biases:**
 - towards training opportunities
 - towards the issue
 - towards training methodologies
- **Ability to access or attend** or conditions that would encourage them to participate in training
- **Cultural characteristics**

Activity

In small groups:

Using the case studies on the following pages, characterize the identified target audience.

Consider the audience's KNOWLEDGE, SKILLS, ATTITUDES, PERSONAL BENEFITS, ABILITY TO ACCESS or ATTEND (How do they like to get information? What formats or delivery methods do they prefer? What is the most appropriate and convenient delivery format for them?), and CULTURAL CHARACTERISTICS.

Further instructions will be given upon completion of the characterization.

Case Studies

1. Audience: Local Officials

Issue: Smart Growth

- Many small towns and communities statewide are struggling with growth issues.
- Local officials are elected; in some of the larger municipalities their jobs are full time; in some of the smaller ones they are volunteers serving part-time as officials.

2. Audience: Staff for Nonprofit Conservation Groups

Issue: Nonpoint Source Pollution

- Local and regional conservation groups such as the local Audubon Society, the Friends of the State Parks, The Nature Conservancy, and the Sierra Club are beginning to work with the public and communities to reduce run-off and heighten awareness of nonpoint source pollution.
- Although the groups know the basics, there is some misinformation being given out. Actions being supported to date have been stop-littering campaigns and storm-drain stenciling.

3. Audience: Elementary and Middle School Teachers

Issue: Water Quality

- There has been a recent acknowledgment at the state level that students should learn about water (elementary level) and water quality (middle school level) as part of the standard curriculum.
- Teachers are now working to incorporate this information into their curriculum and lesson plans.

4. Audience: Landscapers

Issue: Nonpoint Source Pollution

- Landscape businesses are booming. More and more coastal residents are using landscape professionals to maintain their yards and gardens.
- Nonpoint source pollution problems associated with increased nitrogen and phosphorus continue to grow.

5. Audience: Public Land Managers

Issue: Invasive Plant Control

- Public land managers (state, local, and county parks; etc.) are facing a growing problem with invasive plant species outcompeting native plant communities.
- Best methods of eradication and maintenance are constantly changing.
- New and known invasive plant species continue to be sold through plant nurseries.

NOTES

Step 5. Establish goals and objectives of the needs assessment

- What are you trying to achieve with your instruction?
- What knowledge, skills, and attitudes do the learners need?
- How much content do you need in your instruction?

The **goal** of a needs assessment is to collect sufficient information about a particular target group or audience to design an effective program that addresses the group's needs and "wants."

Objectives: The **objectives of a needs assessment** identify what specific information is needed: review needs assessment goals and objectives.

For example:

- Demographics such as position, role, activities
- Knowledge of issue
- Access to tools (GIS, etc.) relevant to issue
- Ability to use tools
- Conditions: is the individual able to travel to attend training?
- For how long?
- Related interests, skill areas
- Incentives

Your needs assessment objectives could encompass any or all of the following:

- Assess existing degree of knowledge, skills, and the attitudinal characteristics surrounding a particular issue or topical area.
- Identify individuals or groups of individuals who most need additional skills training or access to information and technologies.
- Identify motivations and conditions that contribute to an individual's degree of interest in an issue.
- Identify an individual's ability to access or attend a workshop or training program.
- Solicit opinions about the issue, content, and delivery to draw participants into the design process, and build interest and active participation in the program.
- Identify preferred learning styles.

Step 6. Select data collection methods

There are a number of considerations that go into selecting the most appropriate data collection method.

- What method would the audience be most receptive to?
- What are the cost implications for method selected?
- How many questions will be asked?
- Are all the questions absolutely necessary?

There are a variety of tools that can be used to collect the data and information to meet the objectives of the project needs assessment. The answers to the above questions, as well as some considerations that will be discussed shortly, will help you determine which of the following common data collection methods is most suited for your purposes.

- Interviews
- Focus Group
- Questionnaires
- Observation
- Existing Data or Literature Searches
- Tests

We will review each of these in more detail later in this section.

The Needs Assessment Data Collection Phase

7. Determine audience sampling scheme
 8. Design and pilot data collection instrument
 9. Gather and record data
-

Step 7. Determine audience sampling scheme

- How many audiences do you wish to sample?
- How many individuals are in each audience
- How can you best reach them to collect data?
- How important is statistical precision?
- How many do you need to assess to have valid results?
- Is it a high stakes assessment?
- Better data requires more time, money, and resources
- Is contact information on target audience(s) available?

Except in rare cases when a project is very small and affects only a few participants, evaluations will deal with only a subset of the total anticipated audience. The preferred method for selecting that subset is random sampling, that is, using procedures that will reduce sample bias and response bias by selecting a sample that accurately reflects the population. A sample represents the population if members of the sample are selected randomly from the population, that is, if every person in the population has an equal chance of being selected. While larger sample sizes can reduce sampling error, sample bias and response bias are more likely to jeopardize the validity of findings (Sudman, 1976).

In general, to reduce sampling errors, make the sample as large as you can afford in terms of time and money. The larger the sample the more you may expect it to reflect accurately what you would obtain by evaluating everyone in the population.

Rules of Thumb

Population

50 or less
500 or less
1,000 or less
10,000+
U.S. population

Sample

50 or less
approx. 200
approx. 275
approx. 350
2,000 to 4,000

Source: Fitz-Gibbon and Morri. *How to Design a Program Evaluation*. Newbury Park: Sage Publications, 1987.

The following table shows some ways to minimize some sampling errors.

Minimizing Possible Errors in Random Sampling

Type	Cause	Remedies
Sampling error	Using a sample, not the entire population to be studied.	Larger samples—these reduce but do not eliminate sampling error.
Sample bias	Some of those selected to participate did not do so or provided incomplete information.	Repeated attempts to reach nonrespondents. Prompt and careful editing of completed instruments to obtain missing data; comparison of characteristics of non-respondents to describe any suspected differences that may exist.
Response bias	Responses do not reflect “true” opinions or behaviors because questions were misunderstood or respondents chose not to tell the truth.	Careful pretesting of instruments to revise misunderstood, leading, or threatening questions. No remedy exists for deliberate equivocation in self-administered interviews, but it can be spotted by careful editing. In personal interviews, this bias can be reduced by a skilled interviewer.

Step 8. Design and pilot data collection instrument

A. Structuring questions

- Open, closed questions
- Qualitative and quantitative information
- Terminology: avoid acronyms
- Clarity of questions

B. Piloting the instrument

- Select audience to pilot instrument
- Where and when will the instrument be piloted?
- Administer survey as planned
- Check reliability and validity of questions
- Revise instrument and or administration methods

Step 9. Gather and record data

A. Set the stage

- Etiquette: appointments for interviews, survey overview, follow-up
- For qualitative data, anticipate responses (your pilot will help with this), and have a plan for categorizing and coding the data.
- Who will do the actual data gathering?
- How will they set the stage?
- Will they need training?
- Identifying purpose, benefits of participation
- Are there language or vocabulary issues?
- What will be done to encourage responses?
- How will anonymity be ensured?

B. Record Data

- Formatting questionnaires, surveys, and other data collection instruments
 - How will data collection be standardized?
 - Formatting data recording instrument
 - Ensuring consistency of data records
 - How will the data be recorded during observations or interviews?
 - How familiar are the data recorders with the content area?
 - What technology is available that would be helpful?
-

NOTES

The Needs Assessment Data Analysis and Reporting Phase

10. Perform data analysis
 11. Manage data
 12. Synthesize information and create report
-

Step 10. Perform data analysis

Analyzing quantitative and qualitative data from your data-gathering instrument is often the topic of advanced research and evaluation. It is always a good idea, when feasible, to have a planning team member with survey and statistical analysis expertise on your team. When that isn't possible, there are a few basics that can help you to make sense of the data.

- Have a plan in place for how you will analyze, synthesize, store, and manage data before you start to collect it.
- Always start analyzing the collected data with a review of the needs assessment goals and objectives. (Why was the assessment undertaken?) This can give you some ideas for how to organize the data.
- Is the data analyst the same as the data gatherer?
- How will an unbiased analysis be ensured?
- Has coding for text-based responses been devised?
- How will non-responses to individual survey items be dealt with?
- Who is privy to raw data?
- What is the time frame of the analysis period?
- What statistical tests will be run?
- Who will input the data?

Step 11. Manage data

- Make copies of all data, and store a master copy of the original data in a safe place.
- How will anonymity be ensured in the event of future use?
- Will the raw data be retained? How will it be stored?
- What metadata (information about the data) are important to record?
- If contracted, who owns the data?

Step 12. Synthesize information and create a report

Share the information with others who are involved in the project or who may work with similar audiences and issues.

- When will the information be needed?
- With whom will the report be shared?
- What factors specifically need to be addressed in the report?
- Report must include methods
- Report must include problems or errors with the design and the implementation of the survey

Selecting data collection instruments and methods (step 6)

The following pages describe six common data collection instruments and methods and the benefits and limitations of each one.

- **Interviews**
- **Focus Group**
- **Questionnaires**
- **Observation**
- **Existing Data or Literature Searches**
- **Tests**

Some Data-Gathering Tools for Evaluation: Benefits and Limitations

Interviews, Focus Group, Questionnaires, Observation, Existing Data or Literature Searches, and Tests

Evaluation Tools

The following table summarizes the purpose, advantages, and challenges of some different data collection tools that you may use when conducting a needs assessment.

Method	Overall Purpose	Advantages	Challenges
Interviews	To fully understand someone's impressions or experiences, or learn more about their answers to questionnaires	<ul style="list-style-type: none"> • get full range and depth of information • develops relationship with client • can be flexible with client 	<ul style="list-style-type: none"> • can take much time • can be hard to analyze and compare • can be costly • interviewer can bias client's responses
Focus Groups	To explore a topic in depth through group discussion, e.g., about reactions to an experience or suggestion, understanding common complaints, etc.; useful in evaluation and marketing	<ul style="list-style-type: none"> • quickly and reliably get common impressions • can be efficient way to get much range and depth of information in short time • can convey key information about programs 	<ul style="list-style-type: none"> • can be hard to analyze responses • need good facilitator for safety and closure • difficult to schedule 6–8 people together
Questionnaires, Surveys, and Checklists	To quickly or easily get lots of information from people in a non-threatening way	<ul style="list-style-type: none"> • can complete anonymously • inexpensive to administer • easy to compare and analyze • administer to many people • can get lots of data • many sample questionnaires already exist 	<ul style="list-style-type: none"> • might not get careful feedback • wording can bias client's responses • impersonal • in surveys, may need sampling and statistical expertise • doesn't get full story

ADDIE

Method	Overall Purpose	Advantages	Challenges
Observation	To gather accurate information about how a program actually operates, particularly about processes	<ul style="list-style-type: none"> • view operations of a program as they are actually occurring • can adapt to events as they occur 	<ul style="list-style-type: none"> • can be difficult to interpret behaviors • observations can be difficult to categorize • can influence participants' behaviors • can be expensive
Literature Review	To gather information on the audience or the issue. Identify what previous investigators have found about the state of the knowledge, skills, behaviors, or attitudes of the intended audience with relation to the issue	<ul style="list-style-type: none"> • can provide much information in relatively little time • has most likely been reviewed or seen by audience • makes use of already gathered information • helps to chart changes over time • provides evidence about the problem • minimum effort or interruption of audience 	<ul style="list-style-type: none"> • can be out-of-date (e.g., technology needs) • data synthesis can be difficult • may not address specific questions of concern • not flexible means to get data; data restricted to what already exists • statistical data may not address perceptions of the problem, or may not address causes of the problem • reports may be incomplete
Tests	To determine the audience's current state of knowledge or skill regarding the issue	<ul style="list-style-type: none"> • helps identify a problem or a deficiency in knowledge or skills • results are easily quantified • individual performances can be easily compared • easily seen as job-related • helps determine if the problem is a training issue 	<ul style="list-style-type: none"> • limited availability of validated tests for specific situations • results can be influenced by attitudes • language or vocabulary can be an issue • people may be concerned about how results will be used • adults may resent taking tests

(adapted from C. McNamara, 1998)

1. Interviews

Active interchanges between people either face-to-face or via technology.

Benefits

- Variety of perspectives can be elicited
- Can be very useful way to build rapport with audience or participants
- Can generate broad and deep data about system
- Interviewer can clarify questions and ask for clarification of responses
- Interviewer can receive additional information in the form of nonverbal clues
- Can adapt questions if difficulties arise
- Less structure allows for new (unplanned for) information to be gathered
- Can ask for more information than people would want to write in a survey
- Respondents use their own words

Limitations

- Bias due to data collector's interest
- Time-intensive
- Self-reporting of participants may bias data
- Discussion can wander from purpose of interview
- Unskilled interviewers can make clients feel self-conscious
- Unskilled interviewers may gather poor data
- Variations occur if there's more than one interviewer
- Open-ended responses can be difficult to organize and analyze
- Difficult to capture everything said unless taping the interview
- Small sample
- Replication difficult

Techniques and Tips

- Can be used to generate "buy-in" from participants
- Use to increase the breadth of understanding and refine the initial perspective on a situation
- Can be used for initial input in association with survey which would then validate information
- Rich discussions lead to proportionally larger amount of time analyzing data
- Planned, focused discussion will take more time to create and less time to analyze
- Skilled interviewers can help keep the discussion productive
- Plan for a comfortable private environment free of interruptions
- Do homework before the interview, come prepared
- Avoid counseling the interviewee
- If the interviewee asks for a comment to be "off record," accommodate that wish
- Never betray your client's trust
- Know how to use active listening
- Plan a consistent preamble, including who the interviewer is, who they are working for, what kind of questions will be asked, time that will be needed, what will be done with the data

2. Focus Group

An interactive exchange between an interviewer or facilitator and a group of people.

Benefits

- May be inexpensive
- Input can come from wide range of people and perspectives
- Participants may have positive public relations impacts
- Can clarify different points of view
- Can really investigate root of problem
- Can use brainstorming techniques

Limitations

- Difficult and time-consuming to analyze, synthesize, and quantify
- May represent special interests
- Participants may use as "gripe session"
- May heighten expectations beyond what can be realistically provided
- One participant may influence attitudes and opinions of others
- Need to transcribe and code information for analysis
- Cannot capture all information without taping session
- Not all people are comfortable being taped
- Small sample size

Techniques and Tips

- Avoid getting people who already know each other very well
- Try getting people who are willing to share their opinions
- Get all stakeholders in on issue
- Establish ground rules to keep responses confidential
- Plan on telephone calls to remind participants of meeting
- Meeting room needs to be comfortable and free from distractions
- Facilitation is key. Must direct conversation without being part of it
- Structure questions from general to specific
- Should be recorded (audio or video), then transcribed
- Asking participants to write ideas down beforehand reduces influence of other participants

3. Questionnaires, surveys, and checklists

Data collection instrument through which individuals respond to printed or oral questions—may be completed by either respondents or data collector.

Benefits

- May be easiest to quantify, summarize, and report on the data
- Time-effective for use with geographically dispersed or large sample (respondents complete and return)
- Large sample size; data can be generalized to population
- Range from inexpensive to expensive (depending on design and administration)
- Can provide opportunity for expression without fear of embarrassment (anonymity)
- Can (should) be designed to be relatively bias-free
- Questions from other instruments can be used or modified
- Can get qualitative and quantitative data
- Respondents can complete at their convenience (for written instruments)
- Useful at all evaluation stages
- High level of return for interview-style surveys
- Does not depend on reading proficiency of audience (oral survey)
- Good for information that requires sequencing (they can't read ahead) (oral survey)
- Interviewers can clarify questions if conducted in person
- Can indicate strength to which something is felt through observation (if conducted in person)
- Easily adaptable to a wide variety of environments

Limitations

- May have limited provision for unanticipated responses
- Can't change once the survey is distributed
- Time and high level of skill needed to develop
- Pilot testing takes time
- Results depend on question quality
- Low return rates which can skew data
- Can be impersonal (written, self-response format)
- Questions may miss true issues
- Questions and answers can be interpreted differently
- People have been negatively conditioned to the value of surveys
- May heighten expectations
- Language or vocabulary may be an issue
- People tend to want to get the "right" answers
- People will use opportunity to vent or describe their issues
- The interviewer can influence the respondents
- People may hurry through answers without thinking about them

Techniques and Hints

- Questionnaires can be either open- or closed-ended
 - Open-ended: easier to construct but more difficult to quantify and interpret; audience less likely to answer
 - Closed-ended: more difficult to construct but easier to interpret
 - Use closed-ended if there will be 25 or more questionnaires
- For mailed surveys, follow-up phone calls or reminders can increase return rate
- Setting the stage is very important to get participation or high return rates
- Let people know how and when data will be used
- Separate data from names
- Questions must be very easy to read or understand
- If questionnaire is to be mailed, ensure correct and complete mailing list.
- Personal contact is best way to motivate people to complete questionnaire
- Consider computer-based questionnaires (if audience-appropriate), which can follow more complex question patterns than paper and pencil
- Develop or use question banks
- Always pilot the questionnaire
- In general people can express themselves better orally than in writing
- Train volunteers to be nonjudgmental and follow sampling scheme

4. Observation

Data collection based on watching a process or skill and systematically recording events—these observations may be made by people or using media.

Benefits

- Little interruption of work flow or group activity (if done properly)
- Works best with specific skill-based tasks
- Useful for goal-free evaluation
- Generates data about actual behavior, not reported behavior
- Can see program in action
- Good in-depth data
- Observer presence may improve program
- Avoids self-reporting problems
- Data collected in context
- An astute observer can recognize interaction problems not easily described by participants
- The observer can follow action at different points in the system
- Administrative costs can be kept to a minimum

Limitations

- Requires process and content knowledge by observer
- Observer can disrupt or alter the system
- Observer can be seen as a spy
- Hard to remain objective (data can be skewed by observer's biases)
- Data are not easily quantifiable
- Typically, small sample size
- Usually time intensive
- Don't know how participants view their actions
- Replication difficult

Techniques and Tips

- Clearly identify the purpose of the observation and specific phenomena to be observed
- Describe actions with narrative statements, checklists, or matrix
- Must have content knowledge about system
- Plan record keeping. How will data be quantified? How will data be collected and recorded? If more than one data collector, how will data be made consistent?
- Plan physical setting for data collector to blend in to
- Plan how you will explain data collector's presence to workers (why? how long? what will be done with the data?)

5. Existing Data or Literature Searches

Existing information in the form of reports, work samples, historical data, planning and budget reports, organizational structure charts, evaluations, career development reports.

Benefits

- Can be less time consuming
- Most likely has been reviewed or seen by clients
- Makes use of already gathered statistical data
- Easier to chart changes over time
- Provides excellent evidence of problem
- Minimum effort or interruption of workers

Limitations

- Can be out-of-date, e.g., technology needs
- Data synthesis can be difficult
- May not address specific questions
- Statistical data may not address people's perceptions of needs
- Causes of problems may not show up
- Reports may be incomplete (may lack metadata)
- Organizations can be hesitant to share if results reflect poorly on organization
- Reports may be adjusted or "selectively edited"

Techniques and Tips

- Census and economic data are typically already available
- Remember the purpose of a needs analysis is not to establish blame for why the "need" exists
- Check ethical or legal constraints in reviewing records
- Can include existing reports, job descriptions, performance appraisals, past needs assessments
- Use established networks to find data
- Review documents for relevant data
- If material is not immediately accessible, consider how much time will be wasted in searching for information that may not be available

6. Tests

An exam that assesses knowledge or skill level.

Benefits

- Helps identify a problem or a deficiency in knowledge or skills
- Results are easily quantified
- Individual performances can be easily compared
- Easily seen as job-related
- Helps determine if it is a training issue

Limitations

- Limited availability of validated tests for specific situations
- Validity issues – does it test knowledge and skills actually used on job?
- Results can be influenced by attitudes
- Language or vocabulary can be an issue
- People can be very concerned with how test results will be used
- Adults sometimes resent taking tests, which typically have a negative connotation

Techniques and Tips

- Look for established test
- If purchasing test, ask for reliability and validity information
- Make sure people know what will happen with the results of the test
- Evaluate how well-matched the original objectives of the test are to yours
- Does the measure seem appropriate for the age and ability level of the group being assessed?
- Ask if there have been problems with use of the test and if there are recommendations on how to address those problems
- Make scores available to test takers as soon as possible

Selecting the Right Data Collection Instrument

- Choose the instrument that's the easiest and least expensive way to provide data you can analyze and that will answer your questions.
- Choose an instrument that maximizes advantages and minimizes disadvantages given the situation, audience, and resources.
- Time, money, and the skill and philosophy of the evaluator strongly influence instrument choices.

No instrument is perfect in all situations.

The table on the next page provides a convenient resource to assist you in selecting the most appropriate needs assessment data collection instrument or method for different audiences.

Needs Assessment (or Front-End Evaluation) Instrument Selection Matrix

Instrument Type versus Audience

Evaluation Tools Audience	interview	focus groups	surveys and tests	observations	tracking and timing*	concept maps*	Rubrics*	Products* (journal, portfolio)	photos/ artwork*
adults (who know you or your organization)	good	good	good	na	na	good	na	na	na
adults (who don't know you or your organization)	good	good	fair	na	na	good to fair	na	na	na
decision makers / policy makers/ community leaders	good	fair	good to fair	good	na	fair	na	na	na
cultural groups (other than your own)	fair to poor	good to fair	poor	poor	na	good to fair	fair	fair	fair
teachers	good	good	fair	good	na	fair	good	good	fair
teens	good	fair	fair	fair	na	good	good	good	good
children (3 rd – 7 th grade)	fair	good	fair	fair	na	good	good	good	good
children (3 to 7 years)	fair to poor	fair to poor	na	good	na	na	na	na	good

Rating Scale: good = offers more benefits than limitations; fair = benefits and limitations are close to even; poor = offers more limitations than benefits;
na = tool in most cases is not appropriate for the project/activity.

* These instruments and methods will be discussed later in the workshop.

The Difference Between Needs and Wants

Needs are gaps – the space between what currently exists and what should exist

Wants are solutions – a proposed means to filling the gap

Examples:

I want to hire a budget analyst.

I need to have more accurate budget projections.

The fishermen want training to get their captain's licenses to run charters.

Fishermen need to find alternative means to earn a living as their catch declines.

Teachers in the outdoor education program want reserve interns to lead field trips.

Teachers need to have the outdoor habitats interpreted and presented correctly.

Too often people consider only one solution (a want) and discuss it as a need. Effective questioning can reveal the need behind the want. It is important to remember that the "want" may or may not be the best solution, but both the need and the want must be addressed to attract the audience AND to satisfy them. Participation in programs and projects aimed at adults must always answer the question "What's in it for me?" (WIIFM).

Activity

In pairs, each person lists three of his or her "wants" in the space provided.

LIST THREE WANTS

1. _____
2. _____
3. _____

Taking turns, each partner questions the other to identify the need or gaps behind the wants. List the needs that your partner identified through the questioning process.

1. _____
2. _____
3. _____

Some Considerations for Developing Good Questions

Determine Wants vs. Needs

Ask about problems or issues (training is one option, but it might not be a training issue).

Examples:

<i>What training do you need?</i>	Solicits their solutions
<i>What issues do you deal with?</i>	Addresses their problems
<i>What kind of training do you want? Why?</i>	Determines wants and needs
<i>What prevents you from solving the problem or implementing the solution?</i>	Identifies real or perceived obstacles

Use active listening skills

Communicate your understanding and show nonjudgmental acceptance.

- Ask nonleading questions: “can you tell me more about that?”
- Rephrase what the speaker said in your own words
- Reflect underlying feelings: “when that happens to me, I feel really bad”
- Avoid analyzing what was described
- Use personal disclosure: “I’m not sure I fully understand what you are saying”
- Avoid using probing questions
- Face the speaker
- Watch the speaker and listen
- Keep your mind on what the speaker is saying

Written Questions may be more convenient to administer and may be easier to standardize recording of responses.

Will it measure what you are trying to measure?

Can it be interpreted in different ways?

Common mistakes when developing questions:**Negativity**

- Stating a question in the negative form can be very difficult to understand
Example: Shouldn't the CZM program deny permits for beach renourishment?

Leading

- Can influence response; people want to give the "right" answer.

Repetition

- Can make respondents angry
- They become irritated when they think you are playing games with them
- At a minimum, change the wording (most folks will catch on)

Sensitivity

- Word things tactfully
- Place questions asking for sensitive information in the middle or end of questionnaire
- Usually best done face to face

Clarity

- Less than 20 words
- Grammatically correct and spelled correctly
- No jargon
- Highlight important words
- Define "wobble" words
- Never use more than one variable

Some Examples

Leading

Bad: Do you think that the bay is not polluted?

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

Better: How would you rate the health of the bay?

- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor

Negativity

Bad: Shouldn't the CZM program deny permits for beach renourishment?

Yes No Don't know

Better: How should the CZM program deal with permits for beach renourishment?

- ☐ Deny them
- ☐ Approve them
- ☐ Determine on a case-by-case basis
- ☐ Don't know

Sensitivity

Bad: What is your salary?

Better: Please circle the salary range associated with your position

15-25K 26-35K 36-45K 46-55K 56K+

Clarity—Incomplete Wording

Bad: Experience?

Better: Number of years in current position?

Clarity—Specialized Wording

Bad: Do you have outreach staff members at your office?

Better: Do you have staff members dedicated (1 Full Time Equivalency) to the promotion and marketing of your office's programs?

Poorly Defined Terms

Bad: How does your office utilize technology?

Better: Does your office use geographic information systems (GIS) technology for mapping land use changes?

Bad: How important is it for you to have beach access?

Better: On the average, how many times do you go to the beach each month?

Too Many Variables

Bad: Does your office use information generated by agencies and scientists?

Better: Does your office use findings of academic-based scientists in its management decisions?

☐ Often

☐ Sometimes

☐ Rarely

☐ Never

☐ NA

From Theory to Real World

The needs assessment process described to this point is a thorough, comprehensive methodology that requires planning and specialized expertise, as well as rigorous analysis in both the development and data analysis phases. This takes both time and money that may not always be available or practical in every extension and education project. Sometimes we know our audience well enough to skip the audience characterization step. For planning purposes, simple quantification of the data may be sufficient, and rigorous statistical analyses can be omitted.

Although it may not always be practical to conduct every step of the needs assessment at a level that can result in “publishable research-quality” results, it is important that you know the risks associated with skipping, or abbreviating, any part of the needs assessment process.

Activity

In your small groups, use the worksheet to list any consequence(s) that may result from skipping each step of the needs assessment process. Also, place a check mark next to those steps that you consider essential to the needs assessment process.

Theory to Practice

**** Indicate an essential step in the needs assessment process.

1. Confirm Issues and Audience			Comments
	Questions	Risks	
	New issues or audience for organization?	Unknown stakeholders; political blunders; content blunders	
	Widespread agreement up organizational chain?	Lack of support for results of needs assessment	
2. Establish Planning Team			Comments
	Questions	Risks	
	Are the stakeholders and partners new or well known?	Not instilling ownership in training	Good communication between planning team members is essential. Must establish protocols and job duties.
	How geographically/organizationally dispersed is the team?	Communication difficulties	
	Is there expertise within the team?	Can spend a lot of time without getting much accomplished	
3. Information and Literature Search			Comments
	Questions	Risks	
	Has this audience or this issue been surveyed in the past?	Results may be outdated; Wasting time and effort to do something that has been done before	Info search is always a good start. Often surveys are used to clarify or answer questions that have surfaced through reviewing reports.
	What other kinds of reports would shed light on the audience or issues?	Not knowing about information that would make the job easier or better	

Theory to Practice (continued)

4. Characterize Audience	Questions How long have you worked with the audience? How much variation is there within the audience?	Risks Assumptions can backfire Stereotypes don't always work	Comments The needs assessment can validate or demonstrate weaknesses in perceptions. Should be used to check critical characteristics.
	Questions Are goals widely shared? Are objectives measurable? Will the project be considered a success if the objectives are met?	Risks Different priorities from different team members or supporting organizations; people will disengage from the process You will not know if you have achieved them and to what degree Long-term support for doing needs assessments	Comments**** Goals and objectives drive the outputs (statistical analysis and reporting). This will prioritize the rest of your steps and determine amount of effort you spend on the needs assessment..
6. Select Data Collection Methods	Questions Have all the methods been considered? Do the audience's characteristics provide insight into what methods they would be receptive to? How much expertise is there in-house?	Risks The two most popular are also the two most intrusive Upsetting your audience Less experience means more time designing and analyzing and less concrete results	Comments**** Your decision here will affect much of the time and resources you have for this project. Even if contracting, you will spend significant time working with contractor.

Theory to Practice (continued)

7. Determine Sampling Scheme	Questions What's statistically recommended? What is the population size of your audience?	Risks Results may be invalid for "academic" Too many or too few in your sample	Comments **** Sample more than you think you need. The biggest threat to a survey is that the results are inaccurate because of the sample size not being representative.
8. Design and Pilot Collection Instrument	Questions How will you pilot your instrument? What kind of expertise is on your planning team?	Risks Instrument will not be clear or gather necessary data Same as above	Comments**** Always pilot your questionnaire!
9. Gather and Record Data	Questions Can you use untrained personnel to gather data? Can you use volunteers to gather data? Are you getting your desired response rate?	Risks Data will be biased Data will be biased Invalid study	Comments **** There are various strategies for increasing response rate.
10. Data Analysis	Questions How much statistical analysis do you do? Is the gap or issue best addressed through training?	Risks Under- or overwhelming your audience with your report Missing trends or patterns; Not accounting for other possible critical barriers	Comments Keep findings and interpretation of findings separate in reporting.

Theory to Practice (continued)

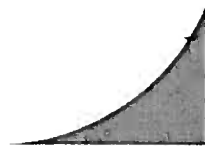
11. Data Management	Questions Will you ever need to refer to these data again?	Risks There may be unforeseen reasons that would necessitate the data being used again	Comments The importance of this step is often not recognized until it is too late.
12. Synthesis and Report	Questions Who is your audience for the report?	Risks People who are making the decisions not understanding process or results Not reaching your goal	Comments **** Always address your goals and objectives in synthesis. An executive summary is often helpful.
	Did you address your objectives?		

Project Design



Project Design

- **Broadly outline** the project.
- Define your **goals and objectives**.
- What are the **activity milestones** and **project timeline**?
- Develop an **evaluation plan**.



For a project to receive good evaluation results it must be well-planned and designed; this includes having adequate resources to achieve the desired impact. Project design includes defining goals and objectives to guide the content selection, outlining the work structure or broad course outline. This stage is also where project planners should consider how they will evaluate the project to determine whether they have indeed had these expected impacts.

To generate informative, helpful, and positive evaluations, the evaluation process must be incorporated into a project from the very beginning. It must be an integral part of the project design, development, and implementation. The evaluation criteria that follow are intended to measure how well the project components—audience (participants), designers or instructors, and materials—have met the project objectives, and answered the needs identified in the needs assessment.

The primary steps taken in the design phase are the following.

A) Content Design*

- 1) Develop the goals and objectives from the needs assessment results
 - a) Develop a brief **description** of the project (1-page project **logic model**)
 - b) Decide on the preferred medium to achieve these (based on the needs assessment results)
 - c) Develop an **evaluation plan** based on the goals and objectives

B) Work Structure Breakdown*

- 1) Outline the major steps to be taken (or milestones)
 - a) Steps for design and development
 - b) Formative evaluation design
 - c) Steps in implementation
 - d) Marketing plan
 - e) Summative evaluation design
- 2) Develop the project timeline

C) Resources*

- 1) Identify available resources
 - a) Fiscal
 - b) Expertise
 - c) Equipment
 - d) Facilities
 - e) Time
- 2) Identify additional resources necessary
- 3) Identify leadership support needed
- 4) Establish work team
 - a) Define roles and responsibilities
 - b) Define communication pathways
 - c) Identify partners

* Note: Although shown sequentially (A, B, C), these activities will be conducted simultaneously with information from each one feeding into the others.

Project Outline

What does the broad project outline look like?

Logic models are a useful tool to “draw” a project outline. The next section of the workshop will explain the use and development of logic models to provide an overview of the project objectives, resources, activities, outputs, and outcomes.

It is helpful to develop the project logic model at the same time that you consider how you will evaluate the project. The logic model can be used to identify appropriate points in the project design process, project activities, and outcomes for evaluation to occur.

Project Logic Models

What is a project logic model?

A logic model is a “picture” of how your project will work. Logic models link project outcomes (short-, intermediate-, and long-term) with project activities, outputs, and inputs (or resources). Logic models can also include the underlying theory and assumptions of the project.

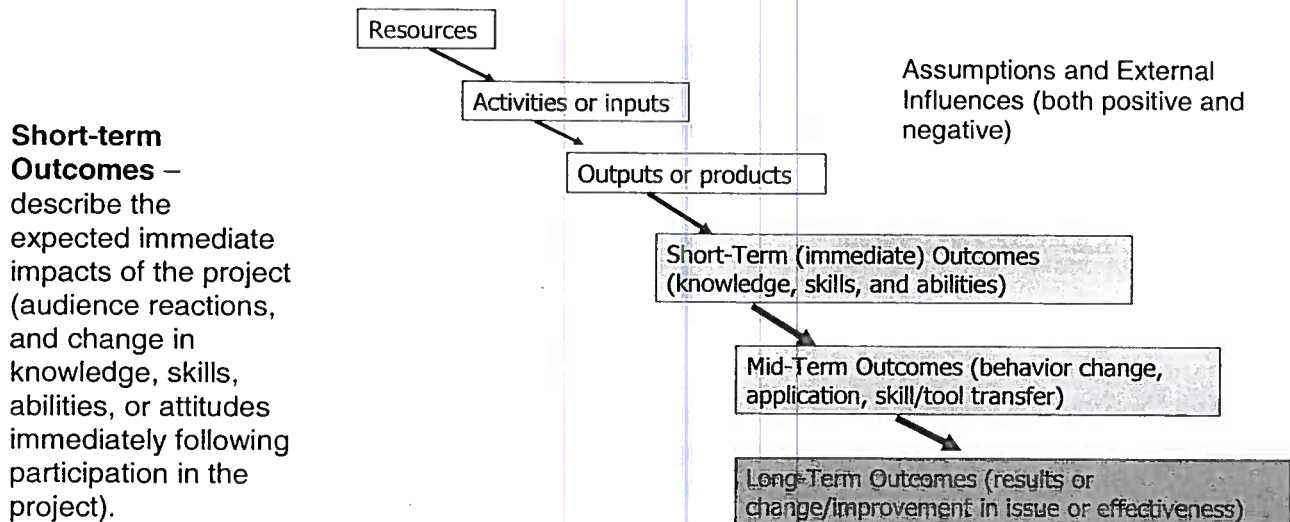
Logic models provide a road map of your project, showing how it is expected to work, the logical order of activities, and how the desired outcomes will be achieved.

Why would you want to do one for your program?

The process of developing a logic model facilitates thinking through, planning, and communicating about project objectives and actual accomplishments. It is a “conscious process that creates an explicit understanding of the challenges ahead, the resources available, and the timetable in which to hit the target.” (W.K. Kellogg Foundation, 2001).

What does a logic model look like?

Project Logic Model



How to Develop a Logic Model

Start at the end. What is the final or ultimate impact that you want this project to have on the audience and issue? This is the long-term outcome. What is the logical progression of changes that need to occur to the audience and the issue to reach this? These are short-term and mid-term outcomes. By identifying the expected project outcomes first, the project can be designed more efficiently. Any activities or outputs that do not contribute to achieving those outcomes should not be done.

The following are the steps to creating a logic model.

Step 1. Identify and describe the intended impacts of the project on the intended audience or issue. *Start with the “ultimate” or largest change in the audience and the issue that your project can expect to achieve.* These are the **long-term outcomes**. What actions or behaviors will change for the audience? How should this change the issue? These are the **mid-term outcomes**. What is the change needed in the audience’s knowledge, behaviors, skills, or attitudes for these outcomes to occur? These changes in the participants or audience are the **short-term outcomes**. Write these as short-, mid-, and long-term outcomes (on the right side of the logic model).

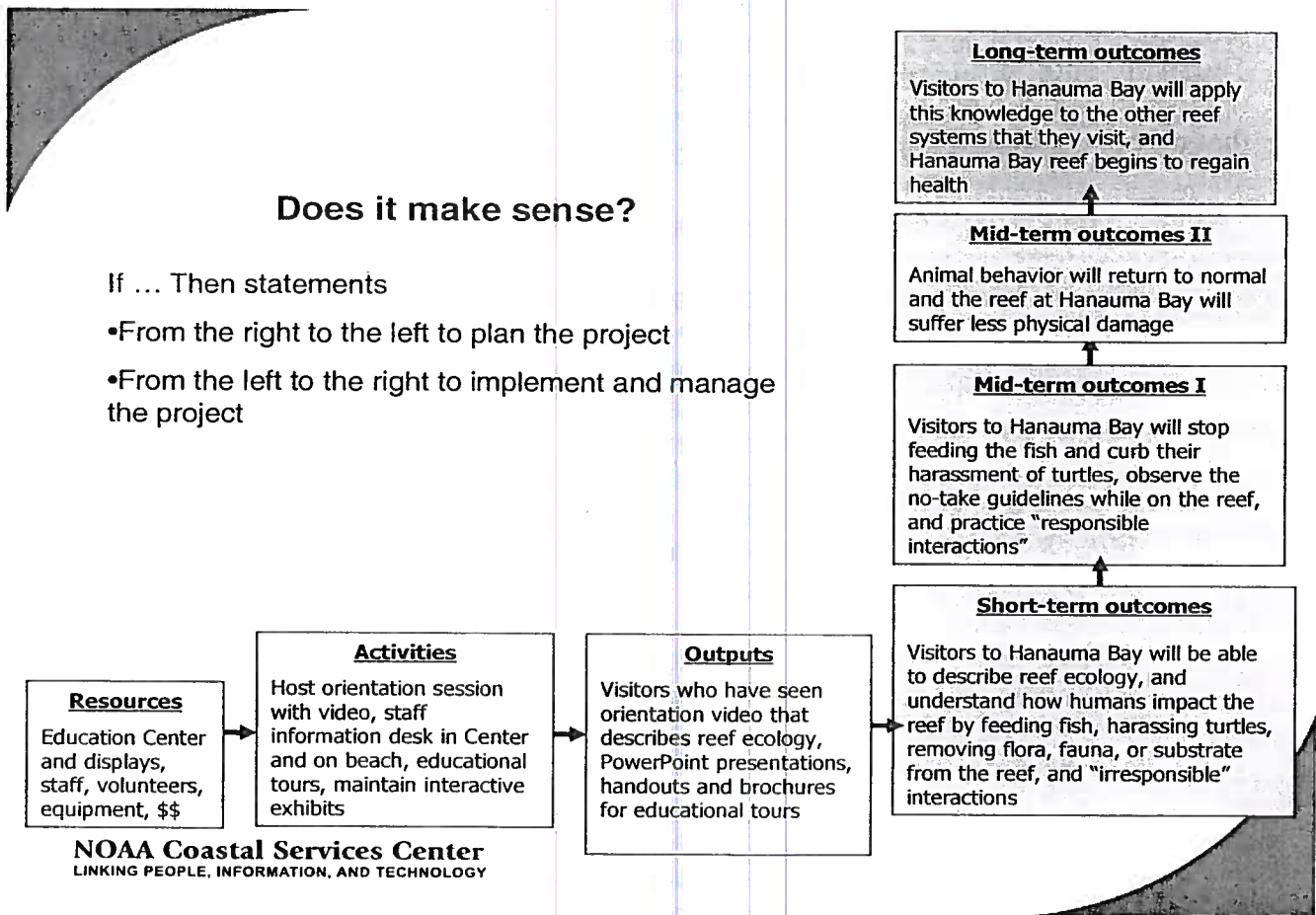
Step 2. List the activities and outputs that will support achievement of the objectives and outcomes. Do each of these activities support an objective (or lead to a desired impact)? Do each of the outputs support an objective (or lead to a desired outcome)?

Step 3. List the resources needed or available to undertake the project. Are they sufficient to achieve the desired outcomes? If not, can they be obtained? How? If not, amend the objectives to be realistic.

Step 4. Read the model left-to-right as a series of “If . . . then . . .” statements. Are these statements logical? If not, start over!

Step 5. Restate the outcomes as SMART objectives, and write these on the left side of the model. (SMART objectives will be discussed in the next section of the workshop.)

Using the Logic Model for Program Planning

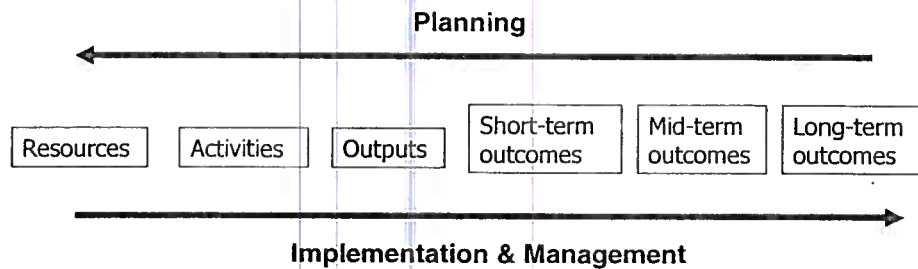


Logic models are read from left to right as a series of "if . . . then" statements.

IF I have access to, and invest the resources shown, **THEN** I can conduct the activities listed. **IF** I conduct the planned activities, **THEN** I will produce or deliver the amount of the outputs intended or needed. **IF** I conduct the activities and produce the outputs, **THEN** I will achieve the short-term outcome(s). **IF** I achieve these immediate outcomes and continue to conduct the activities and produce the outputs, **THEN** I will achieve the mid-term outcomes. Finally, **IF** I have implemented all portions of the planned project and achieved the short-term and mid-term outcomes, **THEN** I can expect the long-term outcome to occur.

How to Use a Logic Model

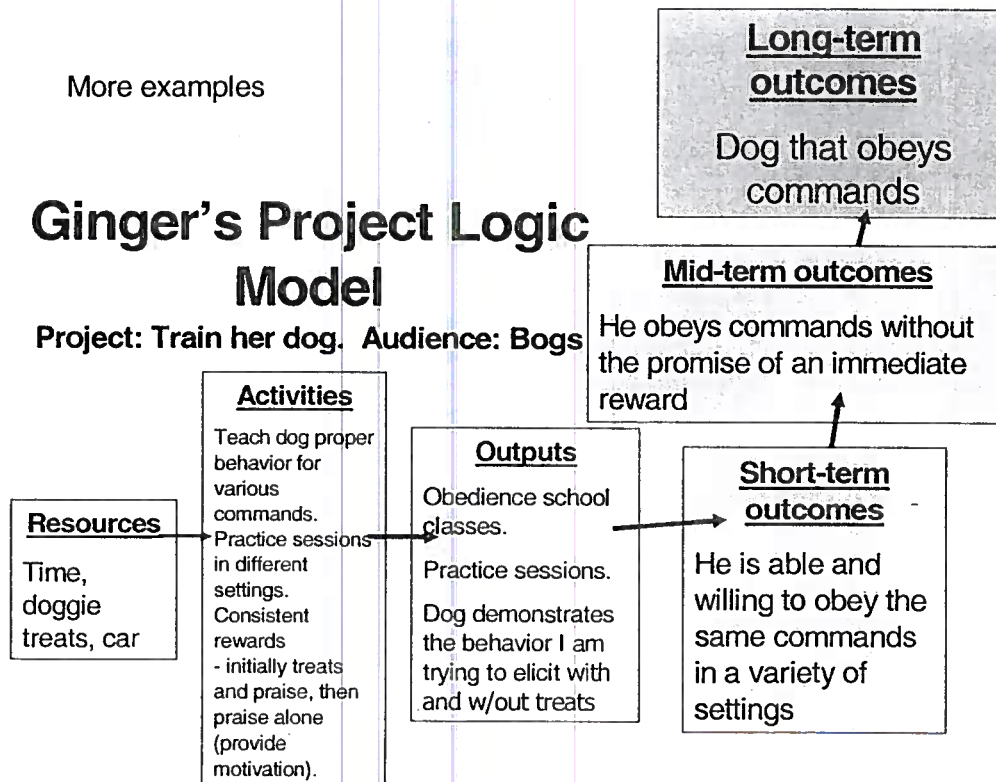
Project Logic Model



More examples

Ginger's Project Logic Model

Project: Train her dog. Audience: Bogs



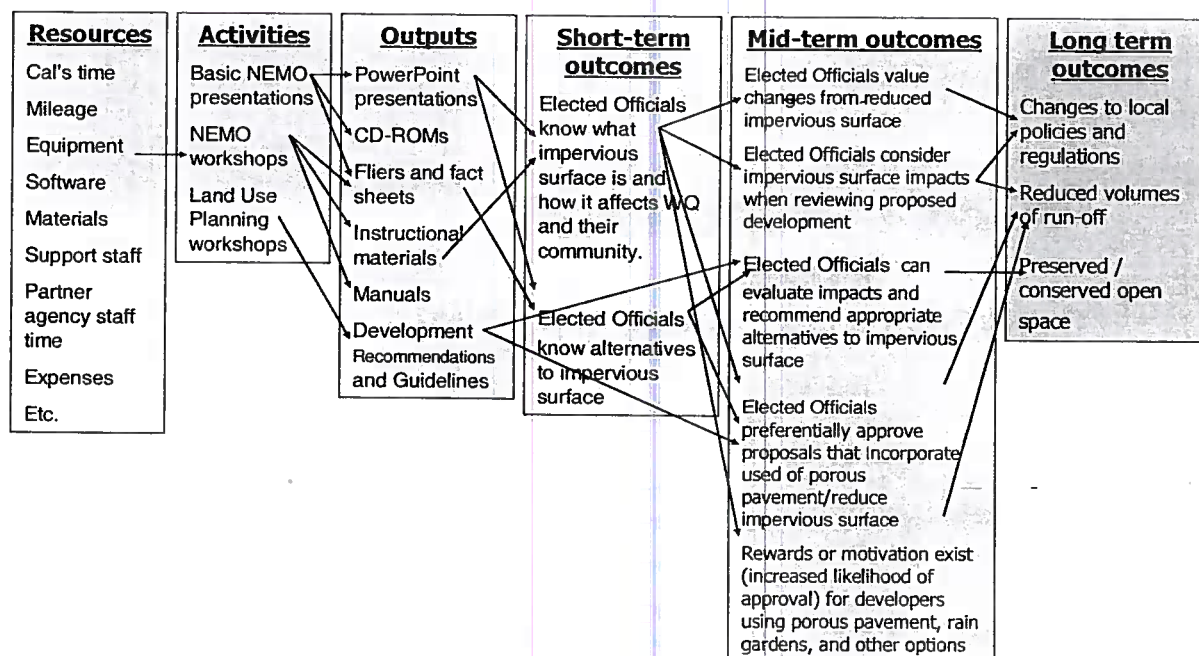
The previous discussion and examples showed a single-outcome project. In reality, your projects may have multiple outcomes. Many of the activities and outputs identified in the logic model may support more than one of these outcomes. The following logic model illustrates a more complex logic model, using the same components as the simple version.

This is a draft logic model for a project called Nonpoint Source Education for Municipal Officials, or NEMO. It shows a complex project with multiple outcomes, activities, and outputs. The arrows indicate which activities and outputs contribute to each outcome.

Nonpoint Source Education for Municipal Officials (NEMO) Project Logic Model*

Let's construct a logic model

Nonpoint Source Education for Municipal Officials (NEMO)



This is a sample model used to illustrate a complex project logic model, not the actual logic model developed for the South Carolina Sea Grant NEMO project.

- NSGO – National Sea Grant Office
- SCSG – South Carolina Sea Grant

Another way to approach logic models . . .

The purpose/mission of (your program or project)
Is to produce/provide (activities, products)
To/for (target audience)
So that they (short-term or immediate outcomes, or learning)
And will be able to (mid-term outcomes, or application)
Resulting ultimately in (long-term outcomes or change to the issue).

The Project Design and Evaluation workshop

The purpose/mission of the Project Design and Evaluation workshop
Is/are to produce/provide information, skills, and tools on sound instructional design and develop practices
To/for extension, education, and outreach professionals working in CRM
So that they describe the project design and evaluation process, including logic model use and construction
And will be able to apply appropriate instructional design theory and practices to project development
Resulting ultimately in improved projects and measures of the impacts and outcomes of CRM efforts.

Logic Models as Reporting Tools

Describing project plans and reporting on progress and results are important project elements. Communications is a key factor in a project's success, from obtaining the necessary resources to initiate and sustain the project, to reporting the project's success through achieved impacts. Logic models can help with this communication in some important ways.

- Describing programs in clear language that allows others to understand what is intended and evaluate what has been accomplished.
- Focusing attention and resources on priority project activities and key desired results in order to design and conduct effective programs.
- Developing targeted communication and reporting strategies.

The following table describes the relationship between successful projects and the benefits of using logic models.

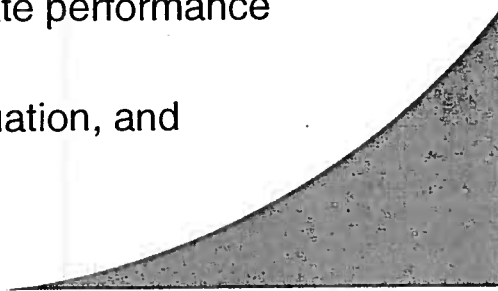
Program Elements	Criteria for Program Success	Benefits of Program Logic Models
Planning and Design	Project goals and objectives are well-defined at outset of project planning. Program goals and objectives are both plausible and possible (ambitious and realistic).	Identifies "gaps" in the logic of project components (resources, activities, outputs, and outcomes). Builds a shared understanding of what the project is about and how all components work together to achieve desired outcomes.
Implementation and Management	Relevant, credible, and useful performance data can be obtained.	Focuses attention of management on the most important connections between actions and results.
Evaluation, Communication, and Marketing	The intended users of the evaluation results have agreed on how they will use the information.	Provides a way to involve stakeholders in the design, process, and use of evaluation.

W.K. Kellogg Foundation, 2001

Benefits of Logic Models

- Shows how all the components fit together and differentiate between activities and objectives
- Helps individuals see how they contribute to the mission of the group
- Helps connect how resources are used and impacts from their use
- Helps identify appropriate performance measures
- Basis of planning, evaluation, and management decisions

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Common Pitfalls in Creating and Using Logic Models

- Get hung up on the language
- Work in columns/rows and forget the LOGICAL connections
- Viewed (or used) as an academic exercise or “paper product”
- Mix scales (different level of detail at different levels of organization)
- Viewed as a panacea
- “Cast-in-stone” rather than adaptive

Activity

Using a current or upcoming project, develop a logic model.

Start with a single long-term outcome and construct a simple model. (Additional long-term outcomes can be added once you've developed your strategy and model to achieve one long-term outcome.)

In pairs, compare and critique the models.

Develop a more complex model that incorporates additional long-term or mid-term outcomes.

Project Goals and Objectives

Define the goals and objectives.

Goals

A goal is a “big picture” or the ultimate impact desired for the project. It is difficult or impossible to measure or quantify, but “you’ll know it when you see it.” The reason a goal is difficult or impossible to measure is that it is not specific in its end point. Objectives provide the specific end points or measurable outcomes.

When writing goals, ask, “what will this situation look like in X (5, 10, n) years?” or “what’s the perfect world with regard to this issue/topic/project?”

There are many methods for writing good goals. The following examples illustrate three simple methods.

Examples:

1. State the goal as the present tense X years from now.

“Coastal Zone Managers have access to and use remote sensing and GIS in their decision making.”

2. Write the goal with an unspecified or indefinite endpoint.

“. . . to improve the ability of extension and education professionals to measure the impacts and outcomes of their projects and products.”

3. State the broad anticipated impact of the project.

“Improved reef health”

Objectives

To measure the **impact** of a project, it first and foremost needs objectives that are not vague and that produce observable action. Objectives describe what the specific impact of the project will be, and the degree to which that impact must occur. Behavioral objectives are based on an action by the [participant] that we can measure.

"A behavioral objective indicates what the student (participant) should be able to do or say when he has finished the lesson or, over the long run, when he has completed his education." – R. C. Anderson and G. W. Faust (1973)

Objectives specify what the audience or learners will be able to do, or perform, to be considered competent after having attended (viewed, read, participated in, been exposed to, etc.) the project. As such, they provide clear reasons for training. Another way to view objectives is that they are goals redrafted to state performances in terms that are clearly tangible to the reader.

Objectives should describe the intended impacts or results of the project on participants or on the issue (how will they change or how will the current situation with regard to this issue change) rather than the process of instruction itself (what we will do to them).

Reasons for objectives:

The purpose of training is to improve performance. By clearly stating the results (impact) that we want the learners to accomplish (the objective of the project), we can identify if they have gained the appropriate skills and knowledge.

Objectives are useful for the audience, instructors, and instructional designers. To select and design instructional content, materials, or methods, it is necessary to have a sound basis by which success can be measured. Clearly defined objectives allow designers and instructors a method to find how successful their material has been.

Because objectives should be stated before the audience begins its instruction, they [these objectives] provide participants the means to organize their efforts toward accomplishing the desired behaviors.

– San Diego State University Educational Technology Program

Objectives and outcomes are both statements of the impact(s) the project is expected to have on the audience and, in the longer term, on the issue. Objectives are statements of the intended impacts before the project (in planning the project). Outcomes are these same types of statements made about what the impacts will have been when the project is occurring or completed.

Components of a useful objective:

Many words are open to misinterpretation. "Fuzzies" are terms that are too broad to be clearly understood by the reader. It is necessary to communicate an objective in the most effective manner possible to avoid misinterpretation.

A useful objective successfully communicates an intended instructional result to the reader by successfully communicating your intent. The BEST statement is the one that excludes the greatest number of possible meanings other than your intent. In other words, it succeeds in communicating your intent of instruction yet avoids misinterpretation.

Well-written objectives have some characteristics that help to communicate their intent. These characteristics are as follows:

Specific actions the audience will be able to accomplish after the project.

A Measurable amount of change in the audience's ability to perform those actions.

The Audience is the focus of the objective statement.

They are Realistic about the extent to which the project can effect the change, while also being ambitious (the expected change from the present condition should be significant).

The change will occur within a specified Time.

These questions tell WHO will be able to do WHAT, HOW (and how well), by WHEN. An easy acronym to use when writing objectives is **SMART**.

SMART Objectives

Specific
Measurable
Audience-directed
Realistic and ambitious
Time-bound

Use words that describe **Specific** outcomes: "At the end of this workshop, participants will <know, apply, describe, construct, use> [refer to the list of words to use when writing objectives] <. . .>. " When participants complete this event or activity and are asked, "What did you learn or do?" they can answer with a concrete response: "I can <name, list, describe, perform, do, recite> <what it is that they can now do that they couldn't prior to the program/project/activity>."

Objectives are **Measurable** indicators of progress toward achieving a goal. How much can they do the specific action described above?

Written from the participants' or **Audience** members' perspective of what THEY will get out of it, NOT what we are doing to them!

The desired outcome should be **Realistic**. "What is a plausible program?" "How good is good enough?" "Can that really be accomplished?" While still being ambitious—this requires that you have done a thorough audience characterization!

The outcomes should be **Time-bound**. A time frame should be established within which the outcomes will be achieved. Is the time frame realistic?

Examples:

Fifty percent of the CZM programs will have three or more staff members capable of using GIS by 2008."

Specific = "capable of using"; **Measurable** = 50 percent of programs will have 3 or more (you can go count it); **Audience-directed** = what the CZM program staff will get from it; **Realistic** = cost-effective GIS training is available at the NOAA Coastal Services Center, and ambitious = currently less than 20 percent have this; and **Time-bound** = 2008

Learning Domains

Objectives can be written for any type of learning. A common way to categorize learning is by the domain in which it occurs. The three domains and ensuing type of objectives include the following:

Cognitive domain: thought or knowledge, "what the student is able to do"
(observable or measurable skill, knowledge, or ability)

Affective domain: feelings or choices, "how the student chooses to act"

Psychomotor domain: physical skills, "what the student can perform"


Objectives in the Cognitive Domain

Thinking, learning, and knowing are **cognitive** skills (the cognitive domain) that can be taught in an educational program. Objectives in the cognitive domain describe specific, measurable actions that the learner will achieve from the project.

The following table provides some action words that are helpful when writing objectives in the cognitive domain.

SMART (specific action) Words for Writing Objectives in the Cognitive Domain

Level	Know	Comprehend	Apply	Analyze	Synthesize	Evaluate
Words to use when writing cognitive objectives	Define Memorize Repeat Record List Recall Name Relate	Restate Discuss Describe Recognize Explain Express Identify Locate Report Review Tell	Translate Interpret Apply Employ Use Demonstrate Dramatize Practice Illustrate Operate Schedule Shop Sketch	Distinguish Analyze Differentiate Appraise Calculate Experiment Test Compare Contrast Criticize Diagram Inspect Debate Inventory Question Relate Solve Examine	Compose Plan Propose Design Formulate Arrange Assemble Collect Construct Create Set up Organize Manage Prepare	Judge Appraise Evaluate Rate Compare Value Revise Score Select Choose Assess Estimate Measure



The Good, the Bad, and The Ugly

Ugly:

- Teach seabird identification

Bad:

- They can identify seabirds

Good:

- After the program, participants will be able to correctly identify (by common name) at least four species of seabird in the field

- C. Parsons

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Hanauma Bay's Project Objective

Objective: After viewing the orientation video and exhibits, 80 percent of the visitors to Hanauma Bay will be able to describe reef ecology, and practice the basics of reef etiquette, which include recreating in the area's sandy bottoms, not removing anything from the marine environment, not feeding the fish, and not harassing the turtles.

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Objectives in the Affective Domain

Specific program objectives in the cognitive domain may not always capture some important desired outcomes of environmental education programs. Outcomes regarding the development of personal qualities, such as the audience “appreciating” the issue, for example, may be difficult to articulate. Objectives such as these are in the **affective domain** (Krathwohl and others, 1964). Objectives that describe internal change in interest, attitudes, values, and the development of appreciation all fall into this domain.

Affective behaviors can be thought of in a hierarchy similar to those in the table of cognitive behaviors shown on the previous page. There is a continuous modification of behavior from an individual being aware of a phenomenon, to that awareness being a pervasive outlook on life that influences all of one’s actions (McNabb and Mills, 1995).

One problem worth noting regarding use of the affective domain in project planning is that it is very difficult to arrive at agreement on the definitions and the levels of acceptance of various affective behaviors. Behaviors such as responsibility, self-esteem, and values are based on complex sociological, psychological, and philosophical precepts. These behaviors are culturally derived and defined, and are frequently endemic to a community in its religion, ethnicity, and influences of parenting. These factors make it virtually impossible to find any “common” definition of affective behaviors. Although there are concerns with using affective behaviors in project design, their ultimate importance in developing many of the skills, knowledge, attitudes, and behaviors that environmental education projects aim for makes understanding their use valuable.

SMART Words for Writing Objectives in the Affective Domain

Level	Receive/attend ↓	Respond ↓	Value ↓	Organize ↓	Internalized value ↓
Definition →	Being aware of or sensitive to the existence of ideas, material, or phenomena, and being willing to tolerate them.	Committed in small measure to the ideas, material, or phenomena by actually responding to them.	Willing to be perceived by others as valuing certain ideas, materials, or phenomena.	Integrating a new value into one’s general set of values, giving it some ranking among one’s general priorities.	Acting consistently with the new, internalized value.
Example →	Person would listen to a presentation about the issue.	Person would ask or answer questions about the issue, take notes, or review notes following the presentation.	Person shares information with others, generates discussions, or amends value system. Committed to learning more.	Level at which a person would begin to make long-range commitments to arrange further involvement in the issue.	Highest level of complexity. Person would be firmly committed to taking action to address the issue.
Writing affective objectives →	Attends Sees Listens Follows Selects	Tells/answers Discusses Reviews Participates Complies with Acclaims	Completes Describes Initiates Joins/Supports Proposes Debates	Adheres Alters Formulates ideas Theorizes Compares Examines	Resists /avoids contrary ideas Discriminates Influences Practices Resolves

Objectives in the Psychomotor Domain

A third domain that project objectives may fall into is the psychomotor domain. Psychomotor learning is demonstrated by physical skills, coordination, dexterity, manipulation, grace, strength, or speed. Actions that demonstrate fine motor skills such as the use of tools, or actions requiring gross motor skills such as the use of the body in athletic or physically demanding work, are psychomotor skills. A project may aim to develop these skills to different degrees.

A number of hierarchies of skill level have been described for the psychomotor domain. The differences among them are primarily due to the nature of the project being designed. For example, projects with the goal of evaluating developing motor skills and coordination in infants have different descriptors (reflex movements, fundamental movements, perceptual abilities, physical abilities, skilled movements, nondiscursive communication) than projects designed to develop manual labor skills—perception of the skill set (knowledge of steps, and their proper positioning), guided response (imitates the action), mechanism (demonstrates a simple skill), complex overt response (correct operation, form, performance), adaptation (adjusting to suit individual style or to better compete), and origination (creates new methods of performance). (derived from Simpson's Taxonomy, in Western Michigan, 2002)

The following table provides a general hierarchy that can be applied to most psychomotor skills.

SMART Words for Writing Objectives in the Psychomotor Domain

Level →	Imitation	Manipulation	Precision	Articulation	Naturalization
Definition →	Early stage in learning a complex skill; includes repeating an action that has been demonstrated or explained. Trial and error until an appropriate response is achieved.	Continued practice of the skill or sequence of steps until it becomes habitual. Performed with some confidence and proficiency. More advanced than previous level, but still some uncertainty on learner's part.	Skill has been attained. Proficiency is indicated by quick, smooth, and accurate performance of the skill. The overt response is performed without hesitation.	Even higher level of precision. Skills are so well developed that the individual can modify movement patterns to fit special or personal requirements, or to accommodate different situations.	Response is automatic. Person "acts without thinking." Individual experiments; creates new motor acts or ways of manipulating materials out of understanding, abilities, and skills.
Example	Participants can copy the picture of a pirate on the book of matches.	Participants can draw a pirate picture similar to that shown without copying or tracing the image.	Participants can draw a pirate in more detail and more realistically than the image shown.	Participants can adapt the picture to draw a human form other than that of a pirate.	Participants can create drawings using the artistic skills developed in this class.
Writing psychomotor objectives →	Begin Assemble Attempt Carry out Duplicate Follow Mimic Sketch/draft Practice Copy	(Same as imitation, plus . . .) Acquire Assemble Complete Conduct Execute Perform Operate Use	(Same as previous two, plus . . .) Achieve Accomplish Exceed Master Excel Reach	Adapt Alter Change Excel Rearrange Reorganize Revise Surpass	Arrange Combine Compose Construct Create Design Refine Originate

Another commonly used way to remember these components is to use the acronym:

ABCD

Who will be doing the behavior?	A udience
What should the learner be able to do?	B ehavior
How?	C onditions
How well?	D egree

Audience

The learners

Identify who it is that will be doing the performance (not the instructor)

Behavior (Performance)

What the learner will be able to do

Make sure it is something that can be seen or heard

Condition

State the conditions you will impose when learners are demonstrating their mastery of the objective.

What will the learners be allowed to use?

What won't the learners be allowed to use?

Under what conditions must the mastery of skill occur?

Degree (or criterion)

A degree/criterion is the standard by which performance is evaluated. The communication power of an objective increases when you tell the learners **HOW WELL** the behavior must be done. Focus on answering the question, "What's good enough?"

Common degrees include: Speed, Accuracy, and Quality

ACTIVITY

Write SMART objectives for the outcomes in your logic model. When finished, pair up with another participant and critique each other's project objectives.

What and how much content do you need in your instruction?

Work Structure Breakdown

One of the first tasks to be undertaken in project design is establishing a broad overview or work plan of the major steps (milestones) that need to be taken in designing and developing the project. This plan should include not only the project design and development, but also its marketing, implementation, and evaluation.

Although there are some common “milestones” in projects, such as reporting, content development, and piloting, different types of activities will have different specific milestones. Some examples of these differences are shown in the table below.

Activities	Workshop	Publication	Display
Milestones	<ul style="list-style-type: none"> • Confirm dates and facilities • Design content and process agendas • Recruit and confirm speakers • Develop distribution list • Advertise workshop to target audience • Prepare and copy appropriate materials • Complete registration process • Secure appropriate meals and refreshments • Name tags or ID • Room and equipment setup • Implement workshop • Document proceedings • Evaluation satisfaction, learning, and intent to apply • Follow up (if ongoing, modify based on formative evaluation results) 	<ul style="list-style-type: none"> • Develop outline • Develop marketing plan • Secure commitment from outside contributors, if needed • Complete research (literature search, interviews, etc.) for content • Write draft(s) • Complete internal review • Develop graphics • Complete external review • Edit • Print/publish • Distribute • Evaluate usability and learning 	<ul style="list-style-type: none"> • Develop concept design(s) • Select best design • Confirm site availability and suitability • Construct mock-up • Formative evaluation and modifications • Construct display • Install display • Evaluate learning and impact

NOTE: These steps are illustrative only. Depending on the nature of the event, some or all of these milestones may differ or occur in an order other than that shown here.

Resources

Resources are time, money, and staff (including volunteers) used to plan, promote, implement, and evaluate programs. Resources also include educational materials, organizational maintenance, communication technologies, and transportation.

At the onset of project planning, it is essential that existing resources be clearly identified. As project planning proceeds and objectives are developed, it is important to understand and respect the relationship between these resources and the ability to achieve the desired project outcomes. When drafting objectives, ask “what is the duration, continuity, frequency, and intensity of project effort and participation needed to contribute to achieving this objective?” and “will the resources we have allow us to do this?” Decisions on objectives have to include the **realistic** ability to achieve them given project resources.

If there is a discrepancy between the desired project outcome and the available resources, the project planning needs to include ways to obtain the additional resources necessary.

Another type of resource that may be needed is leadership support. Who has the authority to allocate resources such as staff time, equipment, and facility use? Are there key opinion leaders, political allies, or organizational management that must support the project for it to proceed and succeed?

The human resources needed for the project also need to be considered and organized. Not only the project planner or lead, but also partners from within and external to the organization must be identified and brought into the planning process. Before moving to the specifics of project content planning, establish the project work team, define roles and responsibilities, and ensure that all know what the team communication pathways are. This work team can also help you to identify any other partners who should be involved.

Start Considering Evaluation

How will you assess (evaluate) the learners' understanding and whether they have met the objectives of the instruction?

In applying the ADDIE model to your project, the **DESIGN** step is where you first consider **EVALUATION** of the project components. The three broad stages of the project-design phase described at the beginning of this section were the content design (logic model and SMART objectives), work structure breakdown, and resources. The final step in the design phase is to **develop an evaluation plan** based on the goals and objectives.

Note: *Remember, you have already conducted one evaluation—the Needs ASSESSMENT or Front-End Evaluation—to obtain information about your audience and to help define the project. The EVALUATION that you begin to plan for during the DESIGN phase of the process will measure the merit and worth of the actual project and its components.*

What Is Evaluation?

Evaluation is the systematic collection of information about activities, characteristics, and outcomes of projects to make judgments about the project, improve effectiveness, and inform decisions about future programming (adapted from Patton, 1997).

Project evaluation serves two purposes. First, it helps decide if a program should be continued and, if so, suggests ways to improve it. Second, it documents project (and program) accomplishments.

Project evaluation can include evaluation of the project design and delivery process, content, activities, and outputs (formative evaluation); outcomes (formative and summative evaluation); and the overall project impact (summative evaluation).

Evaluation of the design and delivery process looks at the resources, activities, participation, and participant/audience reactions to the project. Outcomes are evaluated based on the objectives (the desired outcomes), which are generally some degree of change in knowledge, skills, attitudes, or behaviors.

Types of Evaluation

Before undertaking project

Front-End Evaluation (Needs Assessment)

- Gathers information and data about the gap between the desired and current audience knowledge, skills, and attitudes (KSA).
- Conducted before the project is designed.
- Data can help confirm or negate assumptions of audience characteristics and appropriate content, define goals and objectives, and identify stakeholders and collaborators.

During project design, development, and implementation

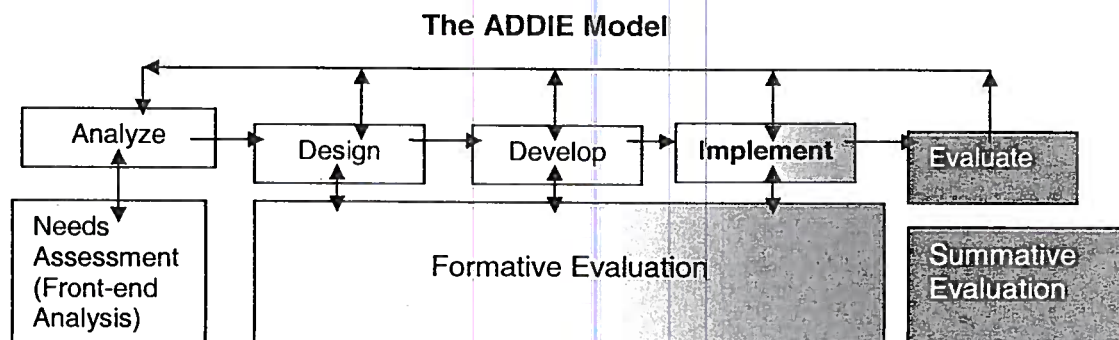
Formative Evaluation

- Gathers information and data about an audience's reactions to and learning from a project's pilot or prototype products. Changes may be made as a result of formative evaluation.
- Gathers information and data about problems with the delivery and progress towards outcomes of a project during implementation.
- Decisions about modification, continuation, or expansion of the program can be made from this type of evaluation (used to determine how to move forward with an existing project).

At the end of the project

Summative Evaluation

- Gathers information and data about the audience's KSA and behaviors after project implementation. Used to inform funders about the value of a completed program.
- Gathers information on the program development process; i.e., it can offer insights into the development of the next project.
- Decisions about continuation or expansion of the program are generally made from this type of evaluation (used to determine if the project was "successful").



Evaluation Questions

The evaluation will generally try to answer one, some, or all of the following questions, depending on the specific objectives of the evaluation.

- What are the nature and scope of the problem? Where is it located, whom does it affect, and how does it affect them? (front-end evaluation)
- What is it about the problem or its effects that justifies new, expanded, or modified projects or programs? (front-end and formative)
- What feasible actions are likely to significantly ameliorate the problem? (front-end and formative)
- What is the appropriate target audience(s)? (front-end)
- Is a particular project reaching its target audience? (formative)
- Is the project being implemented well? Are the intended activities, products, or services being provided? (formative)
- Is the project effective in attaining the desired objectives or benefits? (formative and summative)
- How much does the program cost? (front-end, formative, and summative)
- Is the program cost reasonable in relation to its effectiveness and benefits? (summative)

The Two Arms of Evaluation

Evaluation is the process of determining the merit, worth, or value of a project, and evaluations are the products of that process. It is not merely the accumulation and summary of data and information about a project. The second “arm” of evaluation makes decisions regarding this information. It requires a conclusion be drawn about the merit or net benefits of the project. This requires standards or criteria for comparison to make appropriate decisions about the project.

Rossi, Freeman, and Lipsey, 1999.

Activity

Please indicate what kind of evaluation each statement best describes:

Gathers information/data about the audience's reaction to pilot products or services.	
Gathers information about the audience's skills and behaviors after the project is completed.	
Conducted before the project is designed.	
Decisions about the continuation, modification, or expansion of the project can be made after this type of evaluation.	
Validates (or negates) audience characterization results.	
Can be used to inform funders about the value of the project.	
Gathers information on the project development process and can offer insights into the development of the next project.	
Gathers information about the gap between the desired and the current audience knowledge, skills, and attitudes.	
Gathers information about problems with the delivery or progress toward achieving the desired outcomes of a project during its implementation.	

Designing A Project Evaluation Plan

The process for designing an evaluation plan is similar to that described in the needs assessment portion of this workshop. The plan is an abbreviated form of the 12-step process for conducting any evaluation. We saw those 12 steps in our needs assessment discussion.



Components of an Evaluation Plan

- Program or Product
- People: Stakeholders, Audience, Evaluator
- Goals and Objectives of the evaluation
- Systematic Method(s)
 - design
 - sampling
 - instruments/tools
- Expected data and analysis
- Intended use of results

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Program, activity, or product to be evaluated: _____

People involved	Questions they have about the program's success?	Method (instrument, sampling scheme)	Expected data analysis	Intended use of results
Stakeholders: Funders Managers and Administrators Partners Project Staff and Management (others)				

People involved (continued)	Questions they have about the program's success?	Method (instrument, sampling scheme)	Expected data analysis	Intended use of results
Audience(s):				
Evaluators:				
Internal				
External				

Evaluation Objectives (these should be determined from the above information: which questions do you most need to answer?)

Conducting Formative Evaluations

The formative evaluation follows a similar 12-step process to the needs assessment. Two steps differ from the needs assessment process. First, the *Evaluation Plan* identifies the evaluation objectives in step 3. Second, what you are looking for in the literature search differs. In the formative assessment, search the literature and other sources for examples of data collection instruments others have used, results of formative evaluations from similar projects, and benchmarks or standards that may exist.

Planning

1. Reiterate the issue, audience, and project objectives
2. Establish planning team (including stakeholders, audience, and evaluators)
3. Establish the goals and objectives of the evaluation
4. Clarify the timing for when the activities and impacts (outcomes) are expected to occur
5. Perform a literature search (to establish benchmarks or standards, if appropriate; to find or help develop data collection methods; and, to see results of similar project evaluations)
6. Select data collection methods and develop questions based the evaluation goals and objectives

Data Collection

7. Determine audience sampling scheme
8. Design and pilot data collection instrument
9. Gather and record data

Data Analysis and Reporting

10. Perform data analysis
11. Manage data
12. Synthesize information and create report

Formative Evaluation Instrument Selection Matrix

The table below can be used to help identify the best data collection instrument or method for your project's formative evaluation.

Instrument type versus Activity or Delivery Method

Project/Activity	interview	focus groups	surveys and tests	observation	tracking and timing	concept maps	rubrics	products	photos/artwork	peer review
talk/lecture (short, single meeting)	poor	poor	fair	poor	na	fair	na	na	na	fair
workshop (longer, single meeting)	fair	fair	good	poor	na	fair	fair	na	na	good
series (long or short, multiple meetings)	good	fair	good	fair	na	good	fair	good	na	good
training (skill building)	good	good	fair	fair to good	na	fair	fair	good	na	good
tour (adults)	good	fair	fair	fair	good	fair	na	poor	good	good
tour (kids)	fair	good	poor	fair	good	fair	na	poor	good	good
performer or presenter	good	fair	fair	good	na	na	good	fair	na	good
event/festival	good	fair	good	fair	fair	na	na	na	fair	fair
interpretive sign(s)	good	fair	fair	fair	good	na	na	na	na	fair
interpretive cart/ table	good	good	good	good	fair	fair	na	na	na	fair
exhibit(s)	good	good	fair	good	good	good	na	na	fair	fair
curriculum packet/ materials	good	fair	fair	fair	na	good	fair	fair	fair	fair
kits/activities	good	good	fair	fair	na	good	fair	fair	fair	fair
print materials/ publications	good	fair	fair	poor	na	poor	na	na	na	fair
media: video, film, artwork	good	good	fair	na	na	fair	na	na	na	fair
interactive media: CD, simulations	good	good	fair to good	good	good	good	good	good	na	fair
Web site	good	fair	fair	good	fair	good	fair	good	na	fair

Rating Scale: good = offers more benefits than limitations; fair = benefits and limitations are close to even; poor = offers more limitations than benefits;
na = tool in most cases is not appropriate for the project/activity.

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Performance Measurement

Performance measurement is the collection, analysis, interpretation, and reporting of performance indicators to **monitor** progress toward achieving an outcome.

Performance monitoring refers to the systematic documentation of performance measures that are indicative of whether the project is functioning as intended or according to some appropriate standard.

Performance monitoring is a useful component of evaluation. It does not represent a single distinct evaluation procedure but rather a group of methods that are used in different contexts and for different purposes. These include monitoring project progress and impact, as well as the design and implementation process.

Program monitoring is designed to answer such evaluation questions as the following:

- How many people are receiving the project products or services?
- Are those receiving the products or services the intended target audience?
- Are they receiving the proper amount, type, and quality of products and services?
- Are there targets who are not receiving the products or services?
- Are members of the target audience aware of the project?
- Are necessary project functions being performed adequately?
- Are project resources, facilities, and funding adequate to support important project functions?
- Are project resources used effectively and efficiently?
- Is the project in compliance with requirements imposed by its governing agency, organization, or board? With professional or legal standards?
- Is project performance at some sites or locales significantly better or worse than at others?
- Are participants satisfied with the services they receive?
- Do participants engage in appropriate follow-up behavior after the project activities, services, or products?
- Are participants' conditions, status, or functioning satisfactory in areas the project addresses after the activities, products, or services are complete?
- Do participants retain satisfactory conditions, status, or functioning for an appropriate period after completion of services?

Monitoring

- Data gathered consistently
- Shows trends

Tells us what but not why

Changes indicate there may be a need for further study



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Water Quality Monitoring : Water Quality Research :: Performance Monitoring : Evaluation

Monitoring shows trends and changes, but does not indicate the cause. Research is needed to determine the cause. Performance monitoring tells us about trends and changes in project performance, but not the cause. Evaluation is needed to identify the cause of any trends or changes identified through performance monitoring.

Performance Measures

Performance measures are the specific objectives, quantitative indicators of various aspects of the performance of public programs and agencies. They are measurable characteristics that help tell how well the project is performing and how well objectives are achieved. If a project is not making progress toward its objectives or performing well, performance measures may identify that; however, they will not tell why. A complete program evaluation (or evaluation research) is needed to determine that.

Most education and extension professionals intuitively question the effectiveness of their projects, and “measure” this by observing changes in the audience. By focusing on performance measures, project staff members can document and report their observations to know what outcomes are occurring. Performance measures are not evaluation, but they are a tool that helps identify what may need to be evaluated, or when evaluation is needed.

Performance measurement is an essential evaluation activity. It is the principal tool for formative evaluation designed to provide feedback for project improvement. Performance measurement systems are particularly helpful for a new project trying to establish itself with the audience. Adequate process monitoring (the way the project is designed, developed, and implemented) is an important complement to impact evaluation. It can help to identify when the process, not the project, is faulty, and so allow for correction.

Where do performance criteria come from?

- Mission, goals, and objectives
- Internal and external stakeholders (needs assessment)
- Logic models

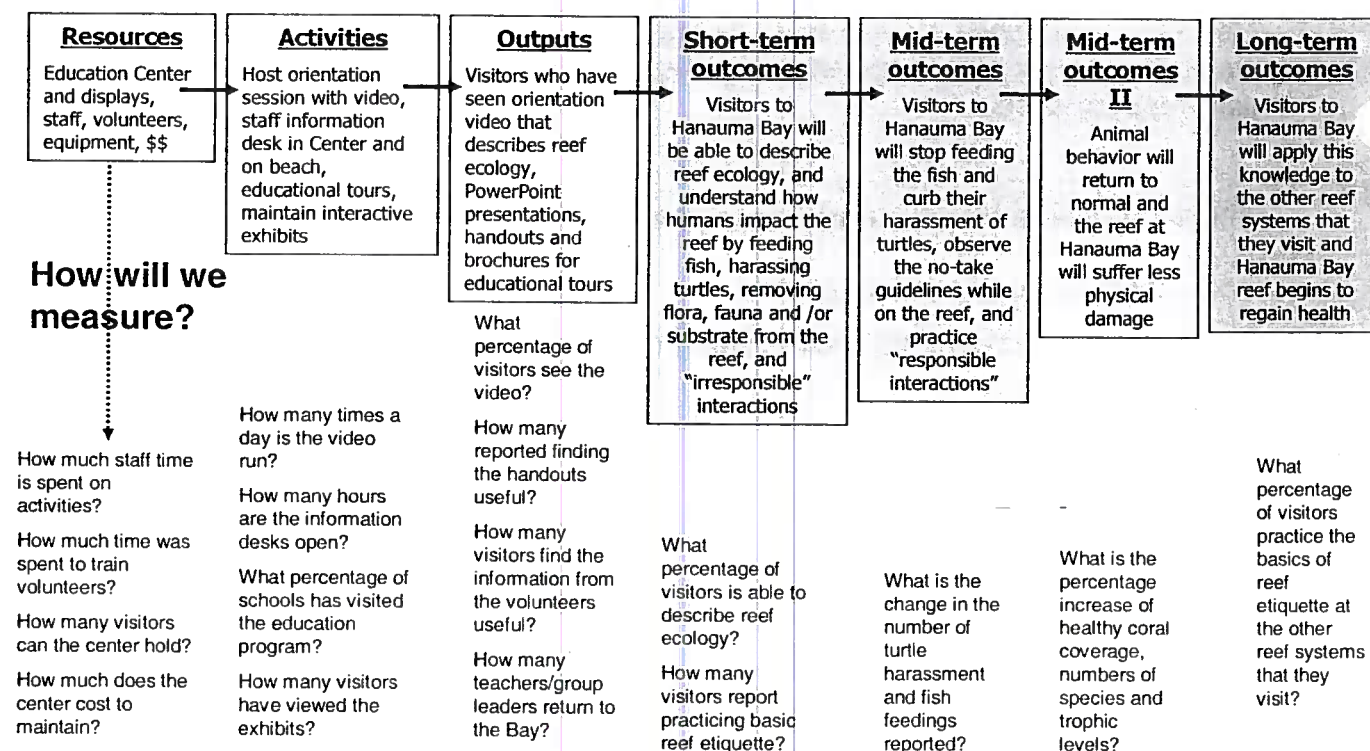
Moving from Logic Models to Performance Measures

Logic models provide an easy starting point for the selection of meaningful and realistic performance measures. You must understand the overall program logic to identify what needs to be measured, and logic models show this.

Program logic models “flesh out” programs and allow you to pick performance measures directly from them. Using your logic model allows you to

- Select more meaningful performance measures
- Select performance measures from all levels of outputs and outcomes
- Recognize how individual projects can contribute to the larger scale (program) goals

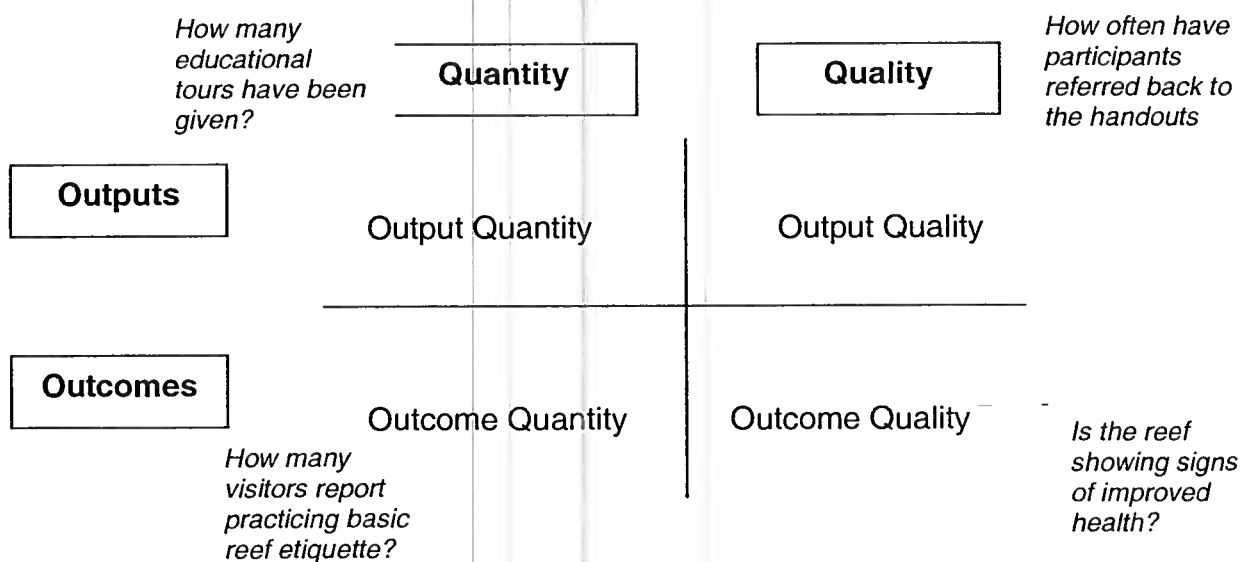
Using Logic Models to Select Performance Measures



Types of Performance Measures

- **Outputs** – How many? What type? Audience size? Audience satisfaction?
- **Efficiency** – How many per unit time? Number per unit cost?
- **Productivity** – How much was produced?
- **Customer satisfaction** – How happy is the audience with product/service/project or impact?
- **Service quality** – What is the level of quality or correctness or accuracy?
- **Effectiveness** – How well were expected impacts achieved?
- **Cost-effectiveness** – Was this the best allocation of resources to achieve the impacts? Was there a less expensive or time-consuming method to get the same results?

What Can We Measure?



(The Friedman Model)

Useful Performance Measures

- Meaningful and Understandable – should be easy to identify what the measure will tell about the project
- Balanced and Comprehensive – should measure outcomes and process
- Valid and Reliable – should provide consistent monitoring of the appropriate variables
- Cost-Sensitive
- Clear (re: the preferred direction of movement)
- Timely and Actionable – if you can't make a decision that can be acted on (and in a timely manner) for what is measured, don't measure it
- Resistant to Goal Displacement and Manipulation – the measure shouldn't change the focus of the project to "get a better score"

Analyzing Performance Data – To What Do the Measurements Compare?

- Over Time
- Against Targets
- Across Units
- Against Benchmarks
- Other (what is meaningful to your program?)
- Considering external influences

Benefits of Performance Measurement

- Provides a clearer project focus on agency mission and strategy
- Improved project management and decision making
- Improved performance
- Increased accountability

Limitations of Performance Measurement

- Selected measures may receive more emphasis than other project components
- “Corruptibility” of measures (tendency of those whose performance is being measured to “pad” the results)
- Incorrect interpretation

Example: Navigating in Rough Seas: Public Issues and Conflict Management (PICM) Logic Model

Activities and outputs (A&O)	Short-term outcomes (By the end of the workshop, 90% of the participants can . . .)	Mid-term outcomes (After one year, 75% of the participants will . . .)	Long-term outcomes (After two years, 50% of the workshop participants will . . .)
Workshop	Distinguish between content and process and correctly identify the role of each in meeting management.	Use process (meeting management skills and tools as a regular part of planning and conducting meetings.	Report improved process for meetings they are involved with as a leader or facilitator.
Manuals	Practice the use of good facilitation and communication skills and techniques.	Consistently apply good facilitation and communication skills and practices to meetings.	Report on improved participant satisfaction in meetings that they have led or facilitated.
Presentations	Know the importance of establishing a sense of "team" in the group when addressing public issues.	Use a method other than majority-vote in group decision making.	Report improved approaches to addressing contentious issues due to the application of workshop skills, tools, and techniques.
Activities and critical points for each topic	Explain how a well-designed collaborative process helps to manage conflict and controversy in public issues and forums.	30% of workshop participants will collaborate with other workshop participants on planning meetings to resolve public issues in their community.	Report improved collaboration with partner agencies and stakeholders.
Coordinate media panels	Discuss how use of good facilitation practices can help overcome resistance to change through process design.	50% of scheduled workshops are requested because of past participants' recommendations.	
Develop marketing strategy	Use strategies for dealing with difficult people.		
	Know six different decision-making strategies and select the most appropriate for a given situation.		
	Explain the steps in designing and conducting a systematic problem-solving process.		
	Consider the workshop valuable for others in similar careers/positions.		

A&O perf. measures	Short-term performance measures	Mid-term performance measures	Long-term perf. measures
<ul style="list-style-type: none"> Number of errors in manuals/PowerPnts. Is the sequence effective and appropriate? Are the topics the correct ones? Are topics covered in sufficient depth? Is the length of the workshop appropriate? Is mix of methods (lecture/activity) optimal for learning? 	<p>Number of participants reporting that they obtained or improved KSAs based on workshop</p> <p>Number of participants responding correctly to "test-type" questions on post-workshop evaluation form</p> <p>Number of referrals from participants to other agencies and organizations</p> <p>% participants completing the workshop evaluation forms.</p>	<p>% of participants who are still in the same position or office who respond to the follow-up survey</p> <p>% of participants who have applied facilitation skills and techniques</p> <p>% of participants who have referred to the manual</p> <p>% of respondents who report "better" of more effective meetings</p> <p>% of respondents who use alternative decision-making strategies in meetings</p> <p>Number of participants who have collaborated with a "new" partner due to the workshop</p>	<p>% participants who report improved meetings due (wholly or in-part) to workshop</p> <p>% of participants who report improved or increased participation in meetings</p> <p>% of participants who report using new skills and techniques from the workshop</p> <p>Number reporting use of specific skills and techniques</p>
Formative evaluation points and objectives	Formative (and summative) evaluation points and objectives	Outcome-based evaluation points and objectives: mid-term outcomes	Outcome-based evaluation points and objectives
<p>Pre-workshop: editing, dry-run, and pilot</p> <p>Post-implementation: pre-workshop surveys (each workshop); workshop exit surveys (each workshop); and questionnaire results (year 1 or first 12 workshops).</p> <p>Evaluation Objectives: Do the activities, presentation, and demonstrations enhance the content and message or the workshop and contribute to learning by the participants?</p>	<p>Formative (for course): Exit surveys, post-workshop questionnaires</p> <p>Summative (for individual workshops): Post-workshop questionnaires</p> <p>Evaluation objectives: Determine if</p> <ul style="list-style-type: none"> the participants acquired the knowledge and skills stated in the learning objectives the workshop was good use of their time the workshop is of value to them within the scope of their daily jobs? participants intend to apply the workshop information and skills to their jobs? 	<p>Formative (for course): Follow -up e-mail, fax, and phone questionnaires</p> <p>Evaluation objectives: Determine if workshop participants have applied the knowledge and skills since the workshop</p> <ul style="list-style-type: none"> are more effective because of application of the skills and techniques found the manual, materials, and information helpful and valuable in their work have worked with others from the workshop that they had not collaborated with prior to that 	<p>Summative: questionnaires and phone interviews.</p> <p>Evaluation objectives: Determine if workshop participants design and conduct meetings with beneficial outcomes as part of their jobs more effectively than they did prior to the workshop.</p> <p>Determine which tools and techniques have been most helpful</p>

Activity

Based on your logic model and SMART objectives, develop performance measures for your project. Consider all possible measures. Do not eliminate any because of cost, difficulty, technical limitations, or other constraining factors.

In pairs, review and discuss the performance measures that you selected. Did you include quantitative and qualitative measures? Did you include performance measures for the process of project design as well as the outcomes; that is, did you include some measures at each level of the logic model?

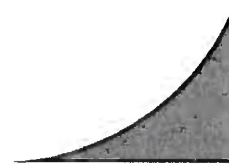
Project Development



Development

- Select the specific **content**.
- How will you **structure** the content?
- Select the appropriate **delivery methods**.
- **Sequence** the use of the various methods to ensure even flow, and varied levels of participation.

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Choosing Instructional Techniques and Training Materials

Before choosing instructional techniques and training materials, the designer must consider many factors:

- 1) Instructional objectives. Instructional techniques and activities must match the objectives—whether they involve cognitive learning (knowing), psychomotor learning (skills), or affective learning (attitude).
 - a) Cognitive learning involves mental processes and the acquisition of knowledge.
 - b) Psychomotor skills involve manipulation of objects or machinery using mental decisions. Training techniques include demonstration—practice, simulation, and mock-ups.
 - c) Attitude involves motivation and perceptions. Training activities include role play, discussion, and brainstorming.
- 2) Cost or budget. Cost-benefit must constantly be kept in mind when determining training media and activities—does the expense justify the effectiveness of the activity in helping learners meet the learning objectives?

- 3) Lesson content. Techniques and media must be consistent with the lesson content.
- 4) Learners' experience, knowledge, and expectations. Learners will come from different ages and backgrounds, and levels of experience and knowledge. Training activities must meet their needs, while avoiding the extremes of being overly simple or too complicated. Level of comfort with different activities must also be taken into consideration.

From: ASTD, 1989.

ADULT LEARNERS

To select the appropriate content for a project, it is important to revisit the results of the needs assessment, particularly the final audience characterization. Knowing the specific audience or segments of audience for whom you are developing the materials is essential to ensure the materials and delivery methods selected are appropriate. The following information on adult learners can provide insights for content, delivery, and sequence of presentation in project development. While it is common to focus on the project content, and on including the greatest amount of the best content possible, we often overlook the importance of including adequate time, opportunity, and activities to learn more about the audience.

Allowing two-way learning and exchange of information and experiences with participants can help projects become more effective. Balancing the need to "fit it all in" to the time allotted with the need to allow time for reflection, discussion, and internalization of concepts is an essential part of project development. This is often the most difficult part of instructional design.

Learning Theories

The following pages present four different learning theories. Each of these theories provides information and insight into how and why people learn. The four have many similarities, as well as different strengths and weaknesses.

The Adult Learner Theory (Andragogy)

A basic understanding of the adult learner will help the project designer select project content and activities. The following are six fundamental assumptions of andragogy (a set of assumptions on how adults learn – (Knowles and others, 1984). Understanding the adult learning process can help sequence the delivery and methods used in learning or training projects.

The Learner's Need to Know

Adults must know why they should learn something. They are used to understanding the reasons for what they do in life. The subject matter must be relevant to participants' personal interests.

Tips to help adult learners see the value of the project:

- Ask participants to reflect on what they expect to learn.
- Discuss how they might use this in the future. How does it relate to their life? Capture this information, address it, and refer to it throughout the project.
- Continue to solicit feedback from the participants on the relevance of the project to their situations.
- Review the information generated in these discussions and adjust information, presentation, or materials to more effectively meet their needs.

The Learner's Self-Concept

Adults resent and resist situations where they feel manipulated. If the intended audience perceives that the project is an effort of someone to impose their will on them, they will be less likely to fully participate. Learning that is threatening to the self (new ideas or attitudes) is more easily assimilated when external threats are minimized. Adult learners also need to be seen and treated by others as being capable and self-directed. Self-initiated learning is the most lasting and pervasive.

Tips to help adults want to learn, participate, and become self-directed:

- Write objectives from the audience point of view—how they will benefit from this, rather than “Here’s what we’re going to do to you” or “Here’s how my agency/organization will benefit.”
- Ensure that materials, format, and presentation are adapted and adaptable.
- Make efforts to tailor the level of information and presentation to specific audience segments.
- Tie learning back to “What’s In It For Me (WIIFM)?” of the participants.
- Ensure the location, participants, and sources of information (presenters or sponsors) will not be perceived as “threatening.”

The Role of the Learner's Experience

Adults have had a lifetime of experiences. This makes adult learners more heterogeneous than younger learners, and provides an additional base of knowledge that can and should be used in the project. Adults' self-identity, including habits and biases, are determined by their experience. Knowing about these experiences can help make your project more effective.

Tips to help adults use their knowledge to contribute to the project:

- Discuss, acknowledge, appreciate, and refer to participants' experiences.
- Use case studies, reflective activities, and group projects that call upon the expertise and experience of participants to resolve.

The Student's Readiness to Learn

Adults become ready to learn when they need to change in order to cope more satisfactorily with real-life tasks or problems. It is important that projects are concrete and relate to participants' real needs and future goals.

Tips to promote readiness to learn:

- Ask participants to reflect on what they expect to learn.
- Discuss how they might use this in the future. How does it relate to their life? Capture this information, address it, and refer to it throughout the project.
- Design experiences that simulate real-world situations that the participants may face.

The Student's Orientation to Learning

Adults are life-, task-, or problem-centered in their orientation to learning. They want to see how what they are learning will apply to their life.

Tips to use participants' orientation to learning:

- Provide opportunity to talk about participants' motivation for learning.
- Tailor materials, information, and presentation to specific audience needs, where possible.

The Student's Motivation to Learn

Internal priorities are also important motivators for many adults. Incentives such as increased job satisfaction, self-esteem, or quality of life are important in giving adults a reason to learn.

Tips to use internal motivation with participants:

- Relate learning objectives to internal motivational factors (quality of life, etc.).
- Use activities that build self-esteem or sense of accomplishment.
- Acknowledge appropriate changes in knowledge, skills, and abilities.
- Use participant input in the development of future project activities.

The Conditions of Learning Theory

This theory, developed by Robert Gagne, stipulates that there are five major types of learning outcomes: verbal information, intellectual skills, cognitive strategies, motor skills, and, attitudes. These correspond to the types of learning objectives shown in the Activity and Objectives Matrix on pages 117–118. Gagne's theory states that different types of learning require different types of instruction. It also states that different internal and external conditions are necessary for each type of learning. For example, for cognitive learning to occur (learning concepts or ideas), there must be a chance for learners to practice developing new solutions to problems; to learn attitudes, the learner must be exposed to a credible role model or persuasive arguments.

The following table provides examples of the types of actions or abilities associated with the five levels of learning, and it describes some of the conditions necessary for each type of learning to take place.

Examples of Abilities Related to Different Categories of Learning Outcomes

Learning Outcomes	Examples	Critical Learning Conditions
Verbal Information (Learning facts and theories)	Stating previously learned facts, concepts, principles, and procedures.	<ol style="list-style-type: none"> 1. Draw attention to distinctive features by variations in print or speech. 2. Present information so that it can be made into chunks. 3. Provide a meaningful context for effective encoding of information. 4. Provide cues for effective recall and generalization of information.
Intellectual Skills (Learning visual identification)	Discriminating among objects. Identifying concrete concepts. Defining new concepts. Applying single rules. Applying combination of rules to solve complex problems.	<ol style="list-style-type: none"> 1. Call attention to distinctive features. 2. Stay within the limits of working memory. 3. Stimulate the recall of previously learned component skills. 4. Present verbal cues to the ordering or combination of component skills. 5. Schedule occasions for practice and spaced review. 6. Use a variety of contexts to promote transfer.
Cognitive Strategies (Comprehending and applying facts, theories, and concepts)	Developing personal ideas and knowledge to guide learning, thinking, acting, and feeling.	<ol style="list-style-type: none"> 1. Describe or demonstrate the strategy. 2. Provide a variety of occasions for practice using the strategy. 3. Provide informative feedback as to the creativity or originality of the strategy or outcome.
Attitudes (Influencing attitudes or opinions)	Selecting actions based on values, understanding, and feelings.	<ol style="list-style-type: none"> 1. Establish an expectancy of success associated with the desired attitude. 2. Assure student identification with an admired human model. 3. Arrange for communication or demonstration of choice of personal action. 4. Give feedback for successful performance; or allow observation of feedback in the human model.
Motor Skills	Executing performances involving muscle movement.	<ol style="list-style-type: none"> 1. Present verbal or other guidance to cue the executive subroutine. 2. Arrange repeated practice. 3. Furnish immediate feedback as to the accuracy of performance. 4. Encourage the use of mental practice.

Planning and Preparing a Learning Experience

According to Gagne, the following steps need to be thought through when designing a learning experience:

1. Identify the types of learning outcomes.
2. Identify any required knowledge and skills.
3. Identify the internal conditions the learner must have to achieve the outcome.
4. Identify the external instruction needed to achieve the outcome.
5. Specify the learning context.
6. Document the learner's characteristics.
7. Select the appropriate media.
8. Develop a motivation for the learner.
9. Conduct formative evaluation.
10. Conduct summative evaluation.

Gagne's Nine Instructional Events

To optimize learning, Gagne suggests the following events of instruction be addressed when planning and implementing a learning activity.

1. Gain the learners' attention. Ensures reception of coming instruction by giving the learner a stimulus.
2. Tell learners the learning objective. Learners know what they will be able to do because of the instruction.
3. Stimulate recall of prior learning. Learners recall of existing relevant knowledge.
4. Present the stimulus. The learning or program content is displayed.
5. Provide learning guidance. Facilitate the learners' understanding of the material (semantic encoding) by providing organization and relevance.
6. Elicit performance. Ask the learners to respond or to demonstrate learning.
7. Providing feedback. Instructor gives informative feedback on the learners' performance to correct, enhance, improve, or support the response.
8. Assess performance. Instructor requests more learner performance and gives feedback to reinforce learning.
9. Enhance retention and transfer to other contexts. Provide varied practice to generalize the capability.

Example

The following example illustrates a teaching sequence corresponding to the nine instructional events for the objective.

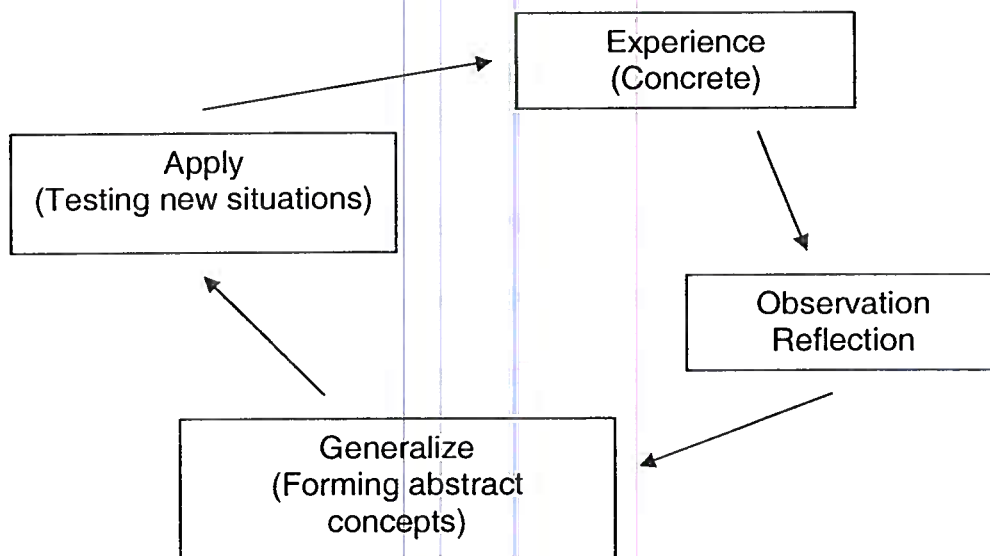
Learning outcome (intellectual skill): *Recognize an equilateral triangle:*

1. Gain attention: show a variety of triangles
2. Identify objective: pose the question: *What is an equilateral triangle?*
3. Recall prior learning: review definitions of triangles
4. Present stimulus: show an equilateral triangle and describe its properties
5. Guide learning: show example of how to create equilateral triangle
6. Elicit performance: ask students to create five different examples
7. Provide feedback: check all examples as correct or incorrect
8. Assess performance: provide scores and remediation
9. Enhance retention and transfer: show pictures of objects and ask students to identify equilaterals.

Experiential Learning

Experiential learning is a model that can guide the design and development of education or extension projects and is based on the assumption that people learn best by doing. Experiential learning also includes the kind of learning people do in everyday life free of any “planned or sponsored events.” People just reflect on things that have happened to them or on their experiences and learn for the next time.

Most theorists agree that the learning cycle can begin at any one of the four points and that the cycle should be considered continuous. The following figure shows the experiential learning cycle. It consists of four distinct phases or steps, which are described below.



Experience

This step has as much to do with the physical comfort of participants as it does with their motivation to learn. This step also includes making sure participants know the purpose of the experience they are about to have. In a written piece, it is important to tell readers up front what they will be reading about in the paper. This would be the core learning activity whether it is a workshop, a display, small group discussion, or computer-based learning. All that is experienced during this time becomes data for participants to process as the learning cycle is completed.

Reflection

After the participants have taken part in a common experience, they then think about it and share their reactions to the experience. Often questions such as “What did or didn’t you like about this experience?” or “How did you feel about X?” start the reflection process. This process often gets participants to associate feelings and beliefs with knowledge.

Generalize

This is the stage where the participants consider what other implications the learning from the experience might have in their lives. Instead of focusing on their reactions to specific details of the experience, they focus on the broader “take home” messages or learning that is related to other experiences they have had. Often questions such as “What is the most important part to you and why?” or “What main points will you remember” help participants think about the experience in a broader context. This is an important step if there is to be a behavior change or impact after the participant completes the experience.

Apply

Based on reflections of the learning experience and on generalizations from their own experience, the participant now has the ability to apply the principles learned to a new situation. So, for example, if participants have learned how to identify wetlands in one marsh system, they will be able to identify wetlands in a different but similar marsh system. Questions such as “How will you use this new information on your job?” or “Now what?” will help participants be able to apply the learning in the next situation.

Experiential learning is often discussed as primarily applicable to children or youth for environmental education. But it has influenced adult learning theory as well. The principles include the following:

- The more relevant the information is to the participant, the more learning that will take place.
- The more the new information agrees with and supports existing knowledge and values, the faster the learning.
- When new information threatens what the participant already knows or values, it is best assimilated when the participant is comfortable and is in a secure environment.
- Self-initiated learning is the strongest in terms of remembering and thoroughness.

If experiential learning is used as a learning design model, the role of instructor is to facilitate learning:

1. Setting a positive climate for learning
2. Clarifying purpose for the learner
3. Organizing and making available learning resources
4. Balancing intellectual and emotional components of learning
5. Sharing feelings and thoughts with learners (but not dominating)

Key concepts about experience:

- Often discussed as the difference between adult learning and childhood learning.
- Experience is culturally framed and shaped. How we understand and interpret our experience is subject to our existing values, cultural norms, language, etc.
- The quantity or length of experience is not necessarily connected to its richness or intensity.

Constructivist Learning Theory

Constructivists believe that learning is an active process in which people construct their own understanding of the world by reflecting on their experiences and build new ideas based on their current and past knowledge. Knowledge is not independent of the knower. The learner generates his or her own “rules” and “mental models,” which are used to make sense of their experiences. Learning becomes a process of adjusting the mental models to accommodate new experiences.

Guiding principles:

1. Learning is a search for meaning, so as instructors we should be focusing on the learners rather than the subject or lesson to be “taught.” We should encourage learners to discover principles by themselves.
2. In true learning, individuals construct their own meaning, not just memorize the “right” answer or regurgitate someone else’s meaning. As instructors we should provide feedback to the learner on the quality of their learning, making the assessment part of the learning process.
3. Learning is a social activity, and it is built on language. It is connected with the people around us: our teachers, our parents, our colleagues, and even the people next to us at an exhibit. As instructors, we should use teaching strategies that encourage interactions with others, such as conversations, open-ended questions, and extensive dialogue among learners.
4. We cannot separate learning from our lives. Individuals do not learn isolated facts and theories. We learn in relationship to what we already know, what we believe in, our prejudices, and our fears. As instructors, information and experiences should be facilitated in a way that builds on what the student already knows.
5. Learning takes time. For significant learning to take place, learners need to think about and reflect on their experiences and new knowledge, play with them, revisit ideas, and try them out. As instructors, we should pose complex realistic problems that are personally meaningful to the learner.

Constructivist Jerome Brunner believes that effective instruction should address four major aspects of learning:

- The learner’s predisposition towards learning (motivation)
- The way to structure the knowledge so it can be most easily grasped by the learner (relevancy)
- The most effective sequences in which to present the information (usually large concept, then move to details)
- The nature of rewards and punishments (minimize risk of failure)

Activity

Each group will be assigned one of the learning theories above. In small groups, review and discuss the information about that theory. Discuss the following:

Adult Learning Activity

- Describe and demonstrate the main points of the theory.
- Discuss the theory's:
 - strengths
 - limitations
- Give an example(s) when you have used this either knowingly or unknowingly

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Small groups will prepare a short presentation on their learning theory to present to the whole group. Each group will have approximately 10–15 minutes to “teach” the rest of the workshop participants about the group’s theory.

Activity

Take the quiz on the following pages to determine your learning style.

Discuss how the results apply to your teaching style.

LEARNING STYLES INVENTORY

Instructions:

The Learning-Style inventory describes the way you learn and how you deal with ideas and day-to-day situations in your life. Below are 12 sentences with a choice of four endings. Rank the endings for each sentence according to how well you think each one fits with how you would go about learning something. Try to recall some recent situations where you had to learn something new, perhaps in your job. Then, using the spaces provided, rank a "4" for the sentence ending that describes how you learn best, down to a "1" for the sentence ending that seems least like the way you would learn. Be sure to rank all the endings for each sentence unit. Please do not make ties.

Example of completed sentence set:

O. When I learn: 4 I am happy. 1 I am fast. 2 I am logical. 3 I am careful.

	F	W	T	D
1. When I learn:	<u> </u> I like to deal with my feelings.	<u> </u> I like to watch and listen.	<u> </u> I like to think about ideas.	<u> </u> I like to be doing things.
2. I learn best when:	<u> </u> I trust my hunches and feelings.	<u> </u> I listen and watch carefully.	<u> </u> I rely on logical thinking.	<u> </u> I work hard to getting things done.
3. When I am learning:	<u> </u> I have strong feeling and reactions.	<u> </u> I am quiet and reserved.	<u> </u> I tend to reason things out.	<u> </u> I am responsible about things.
4. I learn by:	<u> </u> feeling.	<u> </u> watching.	<u> </u> thinking.	<u> </u> doing.
5. When I learn:	<u> </u> I am open to new experiences.	<u> </u> I look at all sides of issues.	<u> </u> I like to analyze things, break them down into their parts.	<u> </u> I like to try things out.
6. When I am learning:	<u> </u> I am an intuitive person.	<u> </u> I am an observing person.	<u> </u> I am a logical person.	<u> </u> I am an active person.
7. I learn best when:	<u> </u> personal relationships.	<u> </u> observation.	<u> </u> rational theories.	<u> </u> a chance to try out and practice.
8. When I learn:	<u> </u> I feel personally involved in things.	<u> </u> I take my time before acting.	<u> </u> I like ideas and theories.	<u> </u> I like to see results from my work.
9. I learn best when:	<u> </u> I rely on my feelings.	<u> </u> I rely on my observations.	<u> </u> I rely on my ideas.	<u> </u> I can try things out for myself.
10. When I am learning:	<u> </u> I am an accepting person.	<u> </u> I am a reserved person.	<u> </u> I am a rational person.	<u> </u> I am a responsible person.
11. When I learn:	<u> </u> I get involved:	<u> </u> I like to observe.	<u> </u> I evaluate things.	<u> </u> I like to be active.
12. I learn best when:	<u> </u> I am receptive and open-minded.	<u> </u> I am careful.	<u> </u> I analyze ideas.	<u> </u> I am practical.

Total columns:

Place the totals from the columns in the appropriate circles below and subtract (it is possible to have a minus number).

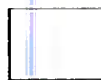


Transfer numbers from these boxes to the same boxes on the next page.

Dynamic

- Asks "What can be done with this?"
- Likes risks, change, action.
- Wants to carry out plans.
- Works in verbal reports.

feeling

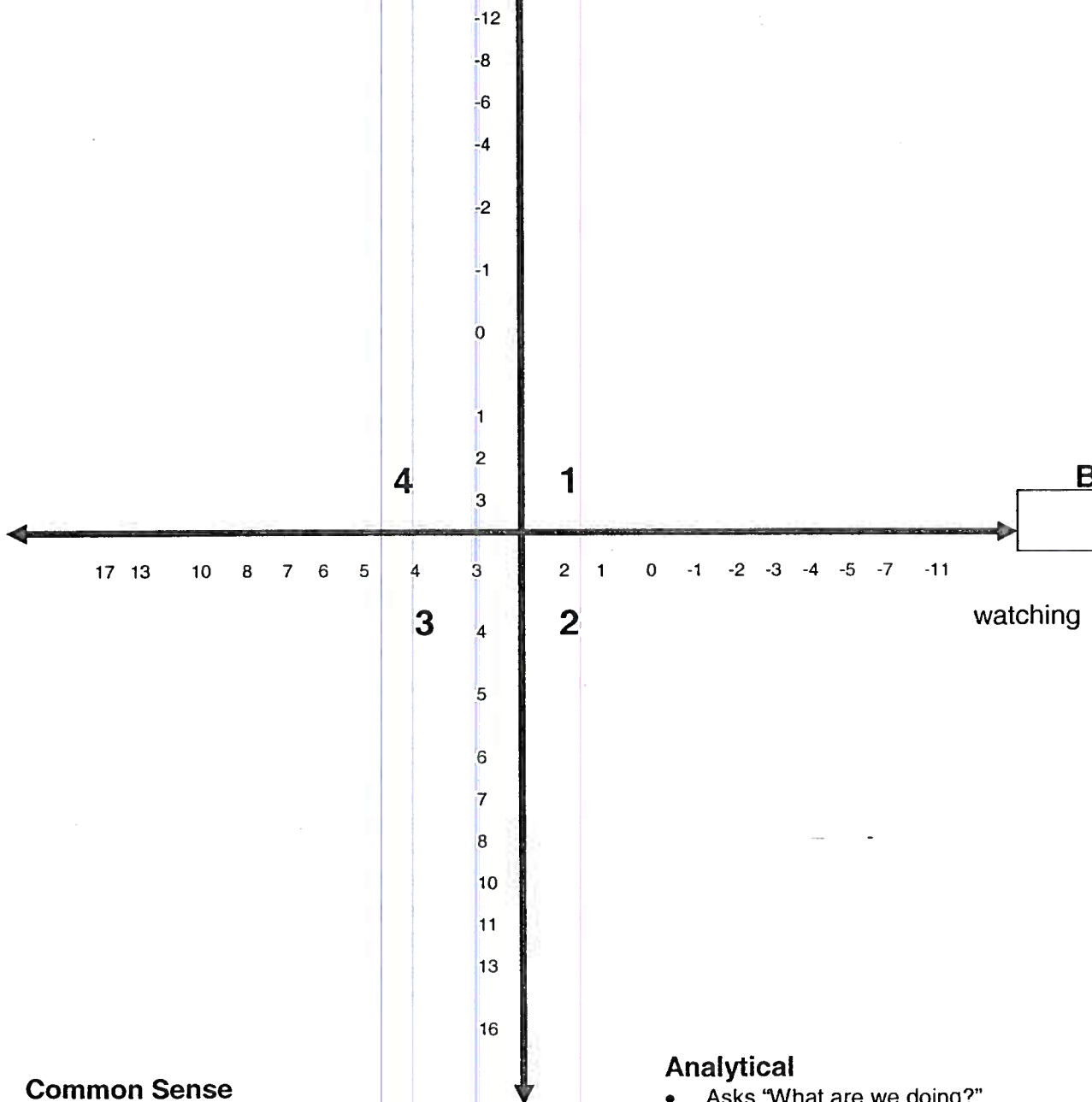


A
(Find # on the line)

Innovative/Imaginative

- Asks "Why are we doing this?"
- Likes discussions.
- Give these people a reason.
- They want the big picture.

doing

**Common Sense**

- Asks "How does this work?"
- Likes to look for a single, correct answer.
- Needs hands-on experience.
- Practical application of ideas.

thinking

Analytical

- Asks "What are we doing?"
- Likes information.
- Loves charts and graphs.
- Wants to know what the experts think.
- Prefers lead time and clear expectations.

Descriptions of Learning Styles

Dynamic

- Asks "What can be done with this?"
- Prefers lack of structure, creates own through experimentation.
- Gets involved with lots of new activities – good starter.
- Gets others' opinions, feelings, information, depends on them.
- Operates on trial and error, "gut" reaction.
- Dislikes routine.
- Involves and inspires other people.
- Can be impulsive.
- Enthusiastic, stimulating, ambitious, dramatic, friendly, accommodator.

Innovative

- Asks "Why or Why Not?"
- Sees lots of alternatives – the whole picture – "Gestalt."
- Prefers atmosphere of high involvement, creates own structure through struggle with ideas.
- Oriented to relationships with people, supportive.
- Good at seeing, imaging self in different situations.
- Likes assurance from others.
- Timing is important, cannot be pushed until ready.
- Creates with emotions, interest.
- Imaginative, diverger, supportive, dependable, willing, agreeable.

4 1

Common Sense

- Asks "How does this work?"
- Needs direct, hands-on experience.
- Function through inferences drawn from experiences.
- Likes to be in control of the situation.
- Speculates on alternatives.
- Works at probabilities and testing them out, coming to conclusions.
- Have limited tolerance to "fuzzy" ideas.
- Prefers sensory stimuli.
- Independent, practical, decisive, strong-willed, efficient, converger.

3 2

Analytical

- Asks "What are we doing?"
- A good theory builder, planner.
- Prefers systematic structure, subdued emotional climate.
- Less interested in people than ideas and concepts.
- Individually thinks through ideas and designs a plan or model in an organized way.
- Reacts slowly and wants facts.
- Need to know what the experts think.
- Pushes mind, analyzes ideas, critiques.
- Rational, logical, orderly, exacting, persistent, assimilator.

Adult Learning Principles

The following list of adult learning principles draws on all three of the previous theories. This list is intended to be used as a quick reference for review as projects are developed. It will help to ensure that projects are designed in a manner that is most conducive to learning for your audience.

ADULT MOTIVATION AND RETENTION

- Adults prefer to determine their own learning experiences.
- Adults are motivated to learn when **THEY** identify they have a need to learn.
- Adults are motivated by societal or professional pressure that requires a particular learning need.
- Adults can be motivated to learn when the **benefits** of a learning experience outweigh the learner's resistance.
- Adults use their knowledge from years of experience as a filter for new information and **don't change readily**.
- Adults learn best from their own **experiences**.
- An adult's experience is a filter that can function as a catalyst or barrier to learning something new.
- Ninety percent of what adults learn and retain in long-term memory is tied to previous learning ("Velcro" learning).
- Adults like tangible rewards and benefits from training.

ADULT METHODS OF TRAINING

- Some adults like some lectures. All lectures won't be liked by all adults.
- Adults like **small group discussion**.
- Adults enjoy **practical** problem solving. Adults want practical answers for today's problems.
- Adults retain learning that they **discover** and forget much of what they are told.
- **Practice** is a part of the learning process, not the result of it.
- **Assess**, don't assume.

ADULT LEARNING ENVIRONMENT

- Adults hate to have their **time** wasted.
- Adults like physical **comfort**.
- Refreshments and breaks establish a **relaxed** atmosphere and convey **respect** to the participants.

NOTES

Tools to Assist with Project Development

As the project developer, you can choose from a variety of teaching and presentation methods to accomplish the project learning objectives and incorporate components of the learning theories discussed here. The following matrix shows how well a variety of instructional media and activities lend themselves to achieving various learning objectives.

Activity / Learning Objective Matrix

Instructional Medium or Activity	Learning Objective				Level of Activity**
	Learning facts and theories	Learning visual identifications	Comprehending and applying facts, principles, and concepts	Performing perceptual motor skills	
Activities					1-10
Lecture	High	Low	Low	*Low	2
Discussion	Medium	Low	Medium	*Low	4-5
Inquiry-oriented discussion	Medium	Medium-Low	High-Medium	Low	6
Independent study	High	Medium	Medium	Medium	1-6
Demonstration	High	*High	High	High	3-7
Practice	Medium	Medium	High	*High	7-9
Role playing	Low	Low	High	High	7
Simulation	Medium	High	Medium	High	10
Tests	High	High	Medium	High	7-9
<i>Non-projected media</i>					
Drawings and illustrations	Medium	High	High	Medium	1-2
Photographic prints	Low	High	Medium	Low	1-2

Rating scale: High = very effective; *High = most effective; Medium = adequately effective; Low = not effective; *Low = least effective

** Level of activity is related to the "Methods Variety Scale" on page 121

Instructional Medium or Activity	Learning Objective					Level of Activity**
	Learning facts and theories	Learning visual identifications	Comprehending and applying facts, principles, and concepts	Performing perceptual motor skills	Influencing attitudes, opinions, or motivations	
Activities						1-10
Chalkboard	Medium	High	Medium	Low	Low	1-3
Models and mock-ups	Low	High	Medium	Low	Low	3-9
Simulators (sound and visual)	Medium	High	High	High	Low	4-10
Real objects	Low	High	Medium	High	Low	3-5
Exhibits and displays	Medium	High	Medium	Low	Medium	1-9
Programmed material	High	Low	High	Low	Medium	3-9
Printed material	High	Low	High	Low	Medium	1-2
Audio recordings	High	Low	Low	Low	Medium	2
Projected media						
Slides and PowerPoint	Medium	High	Medium	Medium	Low	1-5
Overhead and opaque projection	Medium	High	Medium	Low	Low	1-5
Motion picture, filmstrips, or video (silent)	Medium	High	Medium	Medium-High	Low-Medium	2
Motion picture or video (sound)	Medium	Medium	High	High	High	2
Television	Medium	Medium	High	High	High	2
Electronic (CD-ROM, distance, Web-based)	Medium-High	Medium	Medium-High	Low-Medium	Medium	1-9

Rating scale: High = very effective; *High = most effective; Medium = adequately effective; Low = not effective; *Low = least effective

** Level of activity is related to the "Methods Variety Scale" on page 121

Sequence the use of the various methods to ensure even flow, and varied levels of participation

Materials, activities, and information must be presented to the audience in a logical sequence.

The sequence of events in a project is important to ensure that new information, ideas, and skills are presented in a logical manner. Two tools for helping to organize and sequence the content of training projects are presented on the following page: the Methods Variety Scale, and Process Agendas.

Methods Variety Scale

One consideration in sequencing the presentation of information, activities, and materials is that of level of participation. Learners' or participants' involvement level should vary about every 15 minutes to maintain their maximum attention. The following scale can be used to "map out" the audience participation level to ensure maximum involvement and variety of methods.

NOTES

Directions: Plot learner's level of participation. Does activity vary every 15 minutes? Is the learner's participation over the level of 5 at least once an hour?

METHODS VARIETY SCALE

	10	9	8	7	6	5	4	3	2	1	0
Structured Experience											
Return Demonstration											
Self Assessment											
Role Play											
Case Study											
Small Group Discussion											
Large Group Discussion											
Participative Lecture											
Lecture or Film											
Reading											

Class Time: Numbers Are Hours

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NOTES

Agenda Development

Developing an agenda for project activities is one way to ensure the proper sequencing of events and activities in a way that is logical and that allows a progression of information dissemination or instruction to proceed from the simplest building blocks to the most complex, or in the appropriate chronological order.

Value of a Process Agenda:

- Clarifies which tasks, information, and issues must be presented
- Puts these into a logical order
- Links learning objectives and specific activities, materials, or outputs
- Helps to identify how much time will be needed to adequately achieve the objective
- Provides an outline for designing, conducting, and reporting on evaluation

The process agenda should identify the specific topic or item to be addressed, the learning objective(s) related to that topic, and the specific activities that will be used to achieve that objective.

Breaking down activities into their simplest parts and providing detailed descriptions of them also gives the project developers a “reality check” on the amount of time it will take to adequately complete the activities needed to achieve the objectives.

Finally, the process agenda identifies who is responsible for each action and what equipment, materials, and supplies are needed.

A portion of the PROCESS AGENDA that is being used for this training is shown on the next page.

DRAFT Course Process Agenda

DAY 1	Topic, objectives, and activities	Materials and trainer info
Time		
8:30	Introduction, workshop overview and objectives <u>Objectives:</u> Know other participants, workshop objectives, logistics, and the importance of proper project design and evaluation. <u>Activities:</u> 1. Welcome participants, thank hosts, "housekeeping." (5) 2. Overview of course and objectives. Why bother? Legislation and personal/project benefits. Emphasize importance of evaluation as part of each step in the project design process, not just an "add on" activity) (10) 3. Ice-breaker activity (identify your lime) (25)	Sacheen and Ann Manuals, data projector, ppt presentation, limes, timer
Total time = 40 minutes		
9:10	Instructional Design Theory <u>Objectives:</u> Understand the "big picture" of instructional design theory (what it is, what it entails). Correctly identify and describe the steps in the ADDIE model. <u>Activities:</u> 1. Review and discuss instructional design definitions in manual. (10) 2. Present each step of ADDIE (what the step is, what activities and outputs would occur in each step, all the types of "e's", and what type of evaluation would occur at each step (needs assessment, formative, summative) (15) 3. Fill in the blanks on the diagram of the instructional design cycle in the manual. Review. (10).	Ann Manuals, data projector, ppt presentation, instructional design graphic
Total time = 35 minutes		
9:45	Needs Assessment <u>Objectives:</u> Describe where needs assessment (NA) fits in the process of program and project planning; know the benefits of conducting a needs assessment; state the 12-step process for conducting needs assessments; know the goals and objectives of NAs and how these differ from project goals and objectives. <u>Activities:</u> 1. Discussion: What is an NA? (relationship to evaluation/type of evaluation—front end vs. others—define them and their use) Why and when do we do them? Review NA definitions and discuss. (20) 2. Present context – when NA happens. (5) 3. Present and discuss the 12-step process for conducting an NA. Focus on the planning phase. (10) 4. Discuss the goals and objectives of an NA. Compare and contrast these to project goals and objectives (10)	Sacheen Manuals, data projector, ppt presentation, instructional, sample NAs
Total time = 45 minutes		
10:30	Break	