Guide to Planning, Evaluating and Improving
Health Information Outreach

National Network of Libraries of Medicine,
Pacific Northwest Region (NNLM, PNR)

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February 3, 2000

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Beta-Test Version, February 2000

The National Library of Medicine (NLM) maintains an enduring interest in and places great value on evaluation as a tool to enable important management decisions and to assess the quality and impact of its programs and services. Some noteworthy examples: In the early 1980's, NLM closed the card catalog, and management was faced with the decision to install one of two very early online systems. A comparative evaluation was undertaken in the reading room as a controlled field experiment; one system was found preferable and it provided exceptional service to our users and staff for many years.[1] In the late 1980's, NLM helped usher in the era of CD-ROM technology with nationwide field tests in library and clinical settings. Countless new end-users had their first introduction to easy Medline searching.[2] At about the same time, NLM adapted a novel methodology, the Critical Incident Technique, once used to evaluate the performance of World War II bomber pilots. In the present instance, the intent was to document and assess the impact of using Medline-derived information on professional activities, especially on clinical decisions and patient outcomes. We found that Medline does, indeed, make a difference.[3] NLM has sponsored the development of evaluation frameworks for telemedicine and for health information privacy,[4] and has asked its contractors to apply these frameworks where appropriate.[5] During this past decade, outreach to underserved populations, including those in minority or rural communities, became one of NLM's highest priorities. Yet, effectively evaluating outreach has also been one of our toughest challenges. A five-year review carried out in the mid-1990s of literally hundreds of outreach projects had among its recommendations that "NLM and the RMLs should work together to develop further expertise in evaluation methodology… [and that]… evaluation components should be an integral part of all NLM-sponsored outreach.[6]

With this objective in mind, NLM and the Pacific Northwest Regional Medical Library, along with a stellar group of advisors, undertook to develop an evaluation guide for the medical library community. The underlying theme being that planning and evaluating an outreach initiative is one in the same process, and that asking the right questions at the beginning is essential for getting useful results at the end. Moreover, the guide would be practical in purpose, theory-based, and offer a range of methodological possibilities and strategies that can be adapted to the most simple or complex of outreach projects. Not an easy task.

To what extent have we succeeded remains to be evaluated. We prefer to think of this preliminary edition of the guide as a beta-test version; to be tried in the field by the RMLs; and to be tried in the classroom by schools of library and information science as part of curricula that seek to impart evaluation knowledge and skills. We very much need and welcome your feedback. Thanks very much for your help.

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ACKNOWLEDGEMENTS

The National Library of Medicine (NLM) conceived, funded, and oversaw the study conducted by the National Network of Libraries of Medicine, Pacific Northwest Region (NN/LM, PNR) upon which this manual is based. An integral part of the NLM's vision was to convene a group of 18 national experts to advise on its development and content. Among the advisory group, seven contributed white papers that review best practices and research in their field most relevant to the mission and goals of health information outreach. For full text versions of each paper, see http://www.nnlm.nlm.nih.gov/pnr/eval/reviews.html. Much of this manual is based on these white papers as well as on feedback from the entire advisory panel and input from NLM and NN/LM, PNR staff.

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INTRODUCTION

Health information outreach programs include activities undertaken by librarians to raise awareness and capability among health professionals or the public in accessing the health information they need.

Outreach programs are based on commonly held assumptions about the value of information access for improved delivery of health care. As such, the overall goals of outreach seek to affect capacities of the individual, organization, or community in effectively utilizing health information resources and addressing problems and barriers to its access. This guide presents ideas for planning and evaluating outreach programs to help improve and document success in reaching these goals.

How is this document organized?
This guide presents a programmatic and goal-oriented approach to outreach in which activities are directed toward the accomplishment of thought out goals and objectives. A fundamental premise of this approach is that evaluation is an integral part of the program development, beginning with an understanding of the needs and perspectives of the targeted audience and the priorities for outreach considered most important. Priorities might be difficult to shape because it seems that there is so much to be done. However, outreach programs cannot do everything, and by setting a strategic direction and incorporating evaluation into the process, activities are leveraged for effective impact.

There are several stages in planning and evaluation that contribute to the process called program development. Some textbooks describe program development as 1) identifying a target audience and conducting a community needs assessment, 2) developing written goals and objectives, 3) implementing activities to accomplish those objectives, and 4) evaluating the overall quality and success of those activities vis-à-vis the stated objectives.

However, the implication of this model should not be that evaluation is only thought of after the program is started or, worse yet, after it is completed. Evaluation starts with assessing and understanding audience needs, which becomes the cornerstone to setting goals and objectives, from which activities and strategies are determined, upon which their implementation is monitored for progress, and finally their ultimate impact is assessed.

The six stages described in this manual try to show how phases of evaluation are integrated in the whole process of planning and implementing outreach activities. Please refer to the flow chart “Planning and Evaluating Outreach” for a brief guide to content of the stages in this manual.

What are the benefits of evaluation?
As seen in the literature, evaluation research has been done in several outreach programs, mostly to assess needs (referred to in this manual as a community and audience profile) and improve practice (referred to as a process evaluation). Publishing these results helps our profession better understand our audiences and develop a knowledge base of best practices. This manual adds an emphasis on outcomes-based evaluation (referred to as summative evaluation) to determine what changes have been effected. That is, even if evaluation shows that activities are implemented and processes are monitored and perhaps even improved—what is accomplished as a result of all that work? Tracking outcomes helps answer that “so what” question.

Overall, evaluation helps refine and sharpen a focus for each outreach program, helping programs provide accountability to funders, managers, or administrators, improve quality so that effectiveness is maximized, and help to understand better what is achieved and how outreach has made a difference.

Limited attention given to outreach evaluation can result in continuation of outreach activities that are ineffective and/or inefficient; failure to set priorities; and an inability to demonstrate to funding agencies the excellence of outreach activities that are of high quality

Outreach in some library settings may not be conducted with advanced and methodical planning and evaluation. Planning requires time and resources. Evaluation adds another layer to that process. But if it can be afforded, the time and effort spent to do even a minimum of planning and evaluation will provide many benefits.

How realistic is planning and evaluation for small scale outreach programs?
The scale of work implied in the planning and evaluation process may seem daunting or unrealistic for library settings with limited resources and staff. In reality, there are different levels of expectations that planners can assume when using this manual. It is not intended as a prescription for what must be done to plan and evaluate a program.

Even though comprehensive evaluation is not necessary, an understanding of the basic principles involved in all phases of planning and evaluation might help direct useful small scale assessments so they can derive many of the benefits evaluation has to offer. Just the steps to identify the target audience and prioritize the program goals and objectives with input from the community will help ultimate effectiveness. Developing several objectives that both address what outreach will do (conduct x number of workshops) and the effect these activities will hope to have in changing information seeking behaviors helps maintain a clear focus on what outreach causes to happen. Getting baseline data in an audience profile about skills, attitudes, knowledge, or beliefs that outreach will hope to influence can be followed up with post-test questions added to satisfaction surveys, often conducted at the end of activities. Gathering follow-up data about outcomes after outreach has been completed will be important to understand sustained impact.

Thus, with a basic roadmap to evaluation, there is much discretion left to planners about what will be useful and doable in their specific programs. For example, one might choose not to evaluate the skill, attitudes, knowledge, and behavior change outcomes resulting from every outreach activity. Rather, several representative activities might be selected to get an overall impression of results, rather than a comprehensive analysis.

It is also not necessary to use this planning and evaluation manual only when beginning a new program or selecting a new audience. It could be a guide for reassessing what you are currently doing-- the audience you are targeting and the program goals and objectives you may be following, if only informally. For example, one outreach program decided to rethink the audience they assumed to be part of their target community after conducting a very informal and non-rigorous poll of visitors to exhibit booths at several conferences over the course of a year. There was a consistent finding that the majority of visitors already knew about PubMed, though they were interested in updates or improved skills. While improving skills are valid outreach objectives, the staff began to rethink whether the awareness raising objectives primary to exhibit activities were being well executed with these audiences. Perhaps there was a need to retarget the types of conferences chosen for future exhibits.

Why are health behavior theories important?
In Stage Three, this manual introduces several theories from the fields of health education and health communications that explain what can motivate or influence changes in behaviors, including:

Social Learning Theory
Extended Parallel Process Model

Stages of Change Model
Diffusion of Innovations Theory
Community Organization

The premise for introducing these theories is that successful outreach requires sustained adoption of new information seeking behaviors by the targeted audience. Thus, outreach often involves interventions (i.e., activities) to influence and change attitudes, skills, and behaviors in using electronic health information systems and resources.9

Outreach studies have already identified several barriers to effective use of electronic information sources and factors for successful outreach objectives to increase skill and motivate sustained use of those skills. Adding to that knowledge, behavior change theory explains the factors that shape behavioral action. Outreach planners need not be experts at understanding the theories introduced here, but the principles discussed can be effectively used in both planning and evaluating outreach activities. According to Witte, the key to successful outreach activities is the use of a theory to guide the intervention and evaluation. Theories cut the guesswork, increase efficiency, and allow one to understand why an intervention is or is not working [Witte, 1998 #20].

Challenges for evaluation

The evaluation designs, methods, and tools described in this guide are meant to provide an overall picture of what can be involved in an evaluation process. There will be exceptions and difficulties in carrying out or using some of the methods and techniques. For example, the rigorousness involved in using experimental designs with randomized control groups will be beyond the resources or need for most projects. It might be difficult to randomly assign participants to a control and experimental group. The quantitative data that is used for experimental designs may also not be as appropriate as a qualitative approach.

However, a discussion of the experimental design, with comparison to less rigorous approaches, is provided as a point of departure for those who can apply it to their situations.

Similarly, though surveys are frequently used in evaluations and needs assessments, consider other data collection alternatives (such as focus groups, interviews, or feedback forms), depending on the purposes of the research. Developing and conducting survey research is resource intensive, especially when statistical validity is really important to get data that is truly representative of the targeted population. If exploratory research is the focus (such as getting a better understanding of an audience), making generalizations from a sample survey to the larger population will not be necessary.

Stage One: Conducting a Community Assessment

Although the term "outreach" is used frequently in the library and information science literature, it is difficult to find a concise, agreed upon definition. Instead, outreach tends to be defined by the specific activities that are undertaken by librarians as they attempt to reach beyond or surpass the boundaries of their traditional on-site services and address the problems or needs of a targeted clientele (Marshall 1997).

Needs or problems that health information outreach programs are typically trying to solve include effective and efficient access to health information by health providers and the public. With the growing capability of libraries to deliver information to remote sites using electronic information storage and retrieval technologies, an increasing proportion of outreach activities promote, train and facilitate online heath information access, exchange, and use.

For example, health information outreach activities might include:

- Promoting biomedical information resources developed by the National Library of Medicine, such as MEDLINE and MEDLINEPlus, as well as other quality health information resources.
- Providing information access training, including the Internet, PubMed, Internet Grateful Med and MEDLINEPlus to a state association of school nurses, podiatrists, optometrists or other health professional group.
- Staffing an exhibit and conducting hands-on training sessions at an annual meeting of environmental health officers, public health nurses, or veterinarians.
- Training county health department workers to use the Internet and then assisting them in developing a home page.
- Assisting with Internet connectivity and training for a migrant worker clinic, long term care facility or community agency
- Working with Native American or Alaska Native communities to plan Internet connectivity that leverages tribal resources and delivers optimal benefit from Internet information resources and communication.

The process of designing outreach program that is useful to the community to be addressed will depend on discovering need and matching relevant solutions to objectives mutually developed. There are many factors to consider, including resources, setting, demographics, technology infrastructure, and information need. .

As described in Stage, the process of identifying and discovering the needs of a targeted community is referred to as a community assessment. This phase is a critical beginning to planning and evaluating a health information program as it sets the stage for developing relevant goals and objectives. A community assessment provides answers to questions such as:

- Who will the target audience(s) be?
- What are the health information needs of the community to be served?
- What are their access problems and needs?
- What problems should have the highest priorities?

For the health information outreach planner, a community assessment helps test, revise or refine assumptions about the need for and priorities of the program. Outreach programs that do not conduct community assessments are basing their activities on what is assumed to be needed, and not necessarily on what is most needed.

Another form of assessment, the audience assessment, is discussed in Stage 3. An audience assessment is conducted prior to an outreach activity to identify the more specific information needs, behaviors and attitudes of the activity participants (e.g. registrants for a training workshop). Data from the audience assessment helps refine the content and strategies used in promoting and conducting the activity. Questions asked in the audience assessment that again are repeated after the outreach activity provide a pre- and post-outreach comparison.

Identify the Targeted Community

Before developing a community assessment, a decision needs to be made about what community group(s) will receive outreach. To identify potential target communities, consider which groups fit into the mission of your organization.

A community represents a group of individuals who share certain characteristics, such as occupation, culture, or geographic location. Thus, communities targeted by outreach might be:

- Health professionals in rural hospitals or clinics
- Local health departments
- Health providers or consumers in Native American/Alaska Native tribes
- A professional community sharing occupation and not place or culture, such as primary care physicians, nurses, midwives, pharmacists, public health workers
- Groups of health professionals sharing specific health concerns, such as AIDS
- Spanish-speaking consumers

Clientele that might be targeted by outreach programs will vary according to type of library and parent organization.

Given the probability that the community group(s) served by your library are numerous, the next step is to establish priority outreach communities. When prioritizing communities for outreach, consider:

- Which communities can you best reach and influence?
- Which communities are most in need?

Example: The Regional Medical Library (RML) at the University of Washington is headquarters for the Pacific Northwest Region of the National Network of Libraries of Medicine (NN/LM), a technical assistance and training program funded by the National Library of Medicine (NLM). The RML was provided grant monies for outreach to American Indian/ Alaskan Natives, one of the region's largest ethnic minority. The RML needed to determine which tribes would receive outreach. A decision was made to distribute a "request for proposals" to tribes in the region through key contacts and tribal organizations. The selection process for the populations (tribes) that received outreach funding used several criteria, including demographic and health status factors, level of need and readiness to change, and sustainability after funding expires.

Conduct a Community assessment

With a community identified for outreach, a community assessment will provide a deeper understanding of the needs and problems that an outreach program might address.

To begin, first establish a broad understanding about the targeted group of health information users and their environment, such as:

- type of health care needed and provided

- numbers and types of health providers
- clientele served
- available infrastructure and information services available
- environmental, political, or social factors that affect information use

Secondary data from national and local data sources can help define demographics, health status, priority health concerns, and patterns of healthcare (see Figure 1).

Figure 1 Health Status & Patterns of Care

- Depending on the type of community you serve, health status might be found in city, county, regional, state, or federal health sources.
- Patterns of healthcare, including the availability of manpower and the organization of service delivery describes the resources for providing health care.
- National health data sources provide a general idea of the extent and patterns of healthcare and allow a comparison of the community's health with the nation as a whole. (Walton 1996)

If possible, get feedback from key contacts and leadership within the community to help gather facts and establish a mutual agreement about the need for outreach. For example, see the "Computers and Electronic Communications" survey in Appendix A for an example questionnaire about local public health department's access to computers and electronic communications and the need for training.

The literature is an excellent source when trying to establish assumptions about a community's information needs. Dorsch cites several studies that specifically address the information needs of rural health professionals (Dorsch and Pifalo 1997). Marshall lists other studies of health professional information needs, including nurses in the work environment, physicians in office practice, and primary care physicians and their opinion leaders (Marshall 1997), (Marshall 1995). Baird, et al published an annotated bibliography about needs assessments of health professionals (Baird, Meakin et al. 1991).

After reading the literature, it is helpful to conduct some sort of study particular to your community. You might confirm or reject the needs identified in other studies, and identify needs unique to your targeted community. The methodology you use to gather data will vary according to the goals of your assessment and the staff resources available to conduct the research. If wanting to conduct research that can be generalizable and with statistically valid results (representative data gathering), the time and staff resources required would be more demanding than using exploratory techniques to get an overall picture of what is happening. Each methodology will be addressed next.

The Environment of Local Public Health Departments
Adopted from: Dragonfly, the newsletter of the NN/LM PNR

So you want to work with your local public health department? As with reaching out to serve and collaborate with any group, it pays to know something about who they are and what they do.
What do you know about your local public health department? Who are their "customers?" Who funds them? To whom do they report?

What does a local health department do? Many health departments do provide some patient care (e.g., immunizations, STD clinics, prenatal screening, and nutrition counseling). But local public health has become much more than that. It is a mix of services designed to meet the needs of communities in preventing the spread of disease, protecting people from unsafe drinking water, air, and hazardous waste, and ensuring that people have the information and resources needed to live healthy lives.

Who are the health professionals on staff? You may find physicians and nurses who also care for patients at the hospital or clinic. There are public health nurses who work in a variety of roles with childcare centers and school districts, mental health and drug and alcohol treatment programs, and law enforcement agencies. There are environmental health specialists who inspect drinking water, who work with solid waste programs, who inspect restaurants and train food workers. In larger jurisdictions there will be epidemiologists and others trained in tracking infectious disease outbreaks. The list is a long one and it depends on local needs and programs.

Information needs are very broad and overlap with subject areas that we don't usually think of as being health-related. Local health departments are strongly oriented toward the state health department. It's a good idea to spend some time combing through the state department's Web site to get an idea of what resources and data are there. This will be a limited view because it's only what is publicly available. Nevertheless, the state health department's Web site will give you a glimpse of what's happening and some of that will be reflected at the local level too.

Obtain User Input
Direct user input is preferred when trying to establish what really happens from a user's perspective. Input from members representing the community can provide a basic understanding about problems, satisfaction, and unmet needs regarding information access.

There are two basic techniques to gathering information directly from the user:
- exploratory data collection; and
- representative data gathering.

Each varies significantly in approach and statistical validity. A full description of each approach is fully described in Biblarz, et al (prepress)(Biblarz, Bosch et al. prepress). Selected points are summarized here.

Exploratory data collection

Exploratory data collection is a means for getting a general understanding and impression about issues that are important to the target audience. It is a way to understand users from their own perspectives by using open ended questioning techniques such as:

- focus groups,
- open-ended survey questions;
- critical incident surveys;
- internal staff feedback;
- user interviews.

According to Biblarz, user interviews with major stakeholders are frequently the simplest and most effective way to gather information. Stakeholders are those with a vested interest in the availability of health information resources. Depending on your community, stakeholders might be:

- health providers
- health care administrators
- continuing education officers
- public or rural health officials
- faculty
- consumers

Local medical societies, public health associations, and other associations or collegial networks can help identify major stakeholders and opinion leaders. In American Indian communities, it is especially important to identify tribal leaders directly or through an individual who has established contact with tribal leadership.

By just asking stakeholders how they use information, what are the information resources they believe they need, what type of outreach activities are needed, or similar questions, issues and assumptions can be quickly discovered, though the results are not generalizable to the whole population.

Another exploratory data collection technique is the focus group. According to Biblarz, focus groups have the advantage of obtaining perceptions in a permissive, non-threatening atmosphere. Questions are asked in a non-directive way allowing information to surface that a structured interview might block. For those readers interested in a detailed explanation of conducting focus groups, you are referred to the text by Glitz (1998) (Glitz 1998).

For a practical example of focus group research to discover health professionals' information needs, see Mullaly-Quijas et al (1994) (Mullaly-Quijas, Ward et al. 1994). Figure 2 shows selected questions asked in the focus groups reported by Mullaly-Quijas.

Figure 2 Sample Focus Group Questions

Specific services

1. Are you familiar with the National Library of Medicine and the services it provides?
2. For those familiar with the services, how familiar are you with them? How did you come to learn about them?
3. How frequently do you utilize the service(s)?
4. What are your perceptions regarding the service(s)?

Information-seeking behavior

1. What sources do you use to obtain medical information?
2. Do you utilize a library? For what percent of information needs? What are your perceptions of this source?
3. What factors play a role in your decision to use various sources of information?
4. What are the biggest barriers to gaining access to this information? (Probe for time, money, equipment and knowledge/skills)
5. How do you use the information? How do you determine the quality of the information?
6. Describe the ideal information system. How would it work and what information should it contain? Where would it exist and how would you access it?
7.

Representative Data Gathering

According to Biblarz, the purpose of representative data gathering is to collect data about a community that can be considered truly representative of the entire user population. Typically, survey research is used, with questions that produce quantitative results. Statistical validity and reliability are key criteria, meaning that the survey measures exactly what was intended, and if repeated, results would be the same or very similar. Random sampling is also important, so that all people being surveyed have an equal chance of responding to the survey questionnaire (Biblarz, Bosch et al. prepress). See more discussion of random sampling in Appendix A2.

Developing a valid and reliable survey requires testing each question using various types of studies. A brief description of this process is provided in Figure 19, page X of Stage 5. For more detail about studies to test surveys, see Issac (Isaac and Michael 1995). Or, there are less rigorous ways to pretest survey instruments, such as a pilot test (see page X in Stage 5).

Realistically, the work required to develop a valid survey instrument and ensure that it is distributed to a representative sample of the population may be beyond the resources and time available for some outreach programs. Whether or not to strive for statistical validity is a judgement call to make when planning for evaluation. How do you expect to use the results of your survey? Do you want to make generalizations about the population as a whole? If so, taking the time to develop valid instruments will greatly benefit the quality of your study, and provide results that other programs can rely on.

Developing a well-designed questionnaire requires considerable training and skill. If possible, seek assistance from survey research experts within your institution or local area. Or, consider adopting questions from other instruments, if appropriate. Selected needs assessment studies with published questionnaires, standard sources for identifying needs assessment, and tips on question development are described in the Toolkit at the end of this chapter. "Question Formats" in Appendix A1 provides samples of several types of question types. For a classic resource on survey development, please refer to Dillman (1978) (Dillman 1978).

Utilize Results

To be useful, the information gathered from interviews, focus groups, or surveys in a community assessment should be analyzed to help set an agenda for outreach goals and objectives. To know what the results mean might not be a straightforward matter. By identifying "what is" in a community assessment, it is not automatically clear as to "what should be."

When examining results, organize the data to fill in answers to the following questions:

1. What is the targeted community (as specific as possible)?

   _____

2. What does this community need (or what are they lacking) according to your perspective?

   _____

3. What does the community need (or what are they lacking) according to their perspective?

   _____

4. What does the community need (or what are they lacking) according to (NLM, funding source, management, etc) perspective?

   _____

5. Are outreach resources adequate to deal with the problem?

   _____

6. Will outreach make a difference in the problem?

   _____

7. Is the group responsive to solutions or ready for change?

   _____

8. What work is already underway?

   _____

9. What is the political landscape of the problem in this group?

   _____

If planners focus on describing a community's information seeking problems and then examine the types of changes that outreach can help facilitate, and the information resources and services that offer solutions relevant to the needs of the population, then the community assessment becomes a very useful tool for planning.

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Urquhart, C. J., et al (1996). "Comparing and using assessments of the value of information to clinical decision-making." Bulletin of the Medical Library Association 84(4): 482-9.

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Wood, F. B., et al (1997). "Transitioning to the Internet: results of a National Library of Medicine user survey." Bulletin of the Medical Library Association 85(4): 331-40.

Additional Sources for Needs Assessments:

Databases

Health and Psychosocial Instruments Database (HaPI)
Cumulative Index to Nursing and Allied Health Literature (CINAHL)

Print Sources

Anderson, J. G., Aydin, Carolyn E., Jay, Stephen J. (1994). Evaluating health care information systems: methods and applications. Thousand Oaks, Sage Publications.

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The Bulletin of the Medical Library Association publishes questionnaires with some articles reporting survey results

The following tips provide some general guidelines for presenting, sequencing, and choosing types of questions.

- The questionnaire or interview should begin by explaining the purpose of the study and why the individual's responses are important.

- Include a cover letter and stamped, addressed return envelope with mailed questionnaires, explaining the need for the information and how to supply it. Udinsky, Osterlind, and Lynch (1981) have developed the following guidelines for writing a cover letter:

1. The letter should contain a clear, brief, yet adequate statement of the purpose and value of the questionnaire.
2. It should be addressed to the respondent specifically.
3. It should provide good reason for the respondent to reply.
4. It should involve the respondent in a constructive and appealing way.
5. The respondent's professional responsibility, intellectual curiosity, personal worth, etc., are typical of response appeals.
6. The letter should establish a reasonable, but firm, return date.
7. An offer to send the respondent a report of the findings is often effective, though it carries with it the ethical responsibility to honor such a pledge.
8. The use of a letterhead, signature, and organizational endorsements lends prestige and official status to the letter.
9. The letter should guarantee anonymity and confidentiality.
10. Each letter should be signed individually by the researcher.
11. The researcher should include a stamped, self-addressed envelope for the return of the instrument.

Source: From *Evaluation Resource Handbook: Gathering, Analyzing, Reporting Data* (p. 120), by B.F. Udinsky, S.J. Osterlind, and S.W. Lynch, 1981, San Diego, CA: EdITS Publishers. Reprinted by permission of EdITS Publishers.
[NOTE: [Getting permission to reproduce this table]

- For telephone or face-to-face interviews, the introduction about the purpose of the study can be followed by general questions to put the respondent at ease or to develop a rapport between the interviewer and the respondent.

- For written questionnaires, start with interesting questions that will draw the respondent in. Leave questions about demographics for the end.

- Response rate for written questionnaires is typically low. Short questionnaires and those that clearly explain the need for the information are more likely to be returned. Questionnaires should be attractive, easy to read, and offer ample space for the respondent's answers.

- Write clear and unbiased questions. Avoid leading questions ("How have you enjoyed the class?") that might guide the answer.

- Keep a question close to direct experience (i.e. avoid the need for extensive recall). Give a specific time frame whenever possible.

- Avoid two-part (double-barreled) questions. For example, "Using PubMed is easy and fun" – Strongly disagree to Strongly agree – is a double-barreled question because it assesses (1) if PubMed is easy and (2) if PubMed is fun. What happens if the respondent thinks PubMed is fun but not easy? She/he cannot accurately answer the question.

- The most structured or closed types of questions have yes-no or multiple-choice responses, typically used for knowledge questions. These are the easiest to tabulate, but also force the respondent into a choice that may not reflect their own perceptions. Use an "other" category to give the person another option. Involve several targeted audience members in the testing and formation of the questions to ensure that the most common responses to questions are included in the multiple choices.

- Attitude questions generally use less structured formats. Scales, such as Likert or semantic differentials, are often used. The respondent chooses a response along a continuum, generally ranging from a five- to a seven-point scale.

Likert scale example:

I am at risk for falling behind current medical knowledge

Strongly 1 2 3 4 5 6 7 Strongly
Disagree Agree

Semantic differential example:

PubMed is:

Undesirable 1 2 3 4 5 6 7 Desirable

- ***Unstructured or open-ended questions, such as short-answer questions, journals or logs, may be used to gain descriptive information. They are generally not used for quantitative data because the response categories are not specific and may be difficult to code for analysis. However, they can provide impressions, in-depth information, and outcomes that you may not have anticipated.***

Stage Two: Developing Goals and Objectives

Setting goals and objectives is an important step in developing an outreach agenda. Goals allow you to prioritize the needs of your targeted audience and develop relevant objectives and strategies. The feedback you received while conducting the needs assessment in Stage 1 will help guide you in addressing the following:

- What do you hope to change through outreach?
- What are the goals of your clientele – what do they hope to get from outreach?
- Can you mutually agree on outreach goals?
- What changes (and how much) should be implemented that are reasonable steps toward those goals?
- What measurable objectives can be established to define success?

Stage 2 describes the process of constructing goals and measurable objectives. The discussion is based on an overall assumption that timely and effective access to knowledge-based health resources improves delivery of health care. Therefore, to reach outreach goals, programs must develop effective and relevant objectives that will contribute to improved access.

Once goals and objectives are identified, it is easier to focus on planning the types of activities and strategies that will be needed, as described in Stage 3. Objectives provide criteria for measuring outreach, and are useful for both the process and summative evaluation phases described in Stage 4.

If well developed, objectives need to specify outcomes, or expected results, and the ways they can be measured (the *indicators*).

Outreach evaluations have typically measured outcomes such as numbers of exhibits or training sessions conducted and numbers of audience reached (e.g. training class participants). These number counts do not reflect the impact of outreach on participants' learning and behavior outcomes, such as gained knowledge, changed attitudes, changed beliefs, developed skills, or increased use. Nor do number counts measure other factors that can influence access, such as adequate technology or attitudes of decisionmakers or opinion leaders.

The factors that influence changes in information seeking behaviors are more fully described in Stage 3, but they are important elements to consider when developing outreach objectives and will be introduced in this chapter.

Setting Goals

Goals are long-range statements describing a desired condition or future that outreach is working toward fulfilling. Goals describe, in general terms, the conditions that will exist when outreach has been successful.

To formulate goals, ask yourself and key contacts from your targeted audience:

- In the long run, what effect do I hope to have on information access problems for this community?
- What is the overall improvement I want to achieve?
- What are the goals of my targeted audience– what do they want to achieve or see happen as a result of the outreach program?

For example, goals for an outreach program to rural health clinics might be:

- Health care providers at (named) clinics can access current health information with ease and convenience.

- Health care providers access quality Internet-based resources at the point of need to inform patient care decisions

In the above example, goals reflect mutual priorities of both the target audience and the outreach program. For rural health clinics, "ease and convenience" of access is critical. For the outreach staff, the ultimate goal is improving patient care, thus shaping the goal that access will inform patient care decisions.

The concept of setting goals *with input from the outreach audience* is an important principle borrowed from health education. Rather than deciding what you think should happen, develop an agenda that includes the community's needs and concerns. You will be far more likely to be successful in the change process if plans are based on the community's perceived needs and concerns rather than a personal or agency agenda. (Nyswander 1966).

Identifying Objectives and Outcomes

Goals are general enough to describe an ultimate ideal. However, to reach that ideal, several steps are implied. These steps include various types of *objectives* that are considered essential to realizing the goals and the *outcomes* that will hopefully result.

There could be several types of objectives that are needed to assess outreach effectiveness. As discussed under "Constructing Objectives," there could be process objectives that state what the outreach staff will do—i.e. conduct X number of skills training workshops. Then, there will be learning, behavioral, and environmental objectives that are measured not by what the staff has done --i.e. facilitated Internet connectivity -- but by how that new technology has impacted outreach participant or their environment. In other words, outcomes-based objectives are linked to differences made by outreach on the targeted audience.

For example, typical goals for an outreach program are to improve access, use, and exchange of health information. The objectives to reach these goals would hopefully result in outcomes that influence changes in information seeking behavior, including:

- ❖ Environmental outcomes such as adequate access and support for technology

- ❖ Cognitive outcomes such as awareness of Internet-based health resources

- ❖ Affective outcomes such as attitudes toward Internet-based health resources

- ❖ Skills outcomes such as knowledge and ability to find health information

- ❖ Behavior outcomes such as utilization of Internet-based health resources

- ❖ Social and community outcomes that support initial and sustained behavior changes

- ❖ Quality of care outcomes such as improved patient care decisionmaking

When thinking about possible outcomes that can become part of your objectives, it is important to make the outcomes both realistic and measurable. Making them measurable means identifying the *indicators* that provide some type of logical evidence that the intended outcome occurred. For example, a hoped for

outcome from outreach might be a change in attitude toward the Internet. But, what can indicate an attitude change? It will not be precise enough to ask the audience if their attitudes have improved after outreach. Something needs to be identified as an "indicator" of an attitude, such as "fear of information overload."

When considering measures that might "indicate" the outcomes of your objectives, be realistic about the types of indicators you choose. For example, you may want to measure an outcome related to improved quality of health care. You hope that outreach can influence this outcome, given the assumption that more informed decisions ultimately lead to better health care. The indicator of interest here would not be some long term measure of improved health, such as changes in morbidity or mortality rates. These measure would be very difficult to link to your outreach activities. However you could measure "better decision making," as measured by the extent that outreach participant make decisions based on Internet-based health information.

See Figure 3 for an example of the outcomes that one outreach program might hope to achieve and the indicators to measure them.

Figure 3 **- Sample Outcomes & Indicators**

Outcome: Environmental support to enable access
- Worksite funding for professional librarian/library
- Worksite policies allow Internet access at work
- Adequate hardware and software for Internet connectivity
- Interlibrary loan services

Outcome: Attitudes about the Internet
- Feelings toward Internet-based resources (e.g. level of fear re: information overload)
- Value placed on Internet-based resources for specific uses (e.g. culturally relevant information; patient care decisions)

Outcome: Beliefs or thoughts that useful health information can be found
- Awareness of specific Internet-based health resource
- Self-confidence in skill to find health information

Outcome: Online information seeking skills
- Knowledge of search skill concepts

Outcome: Satisfaction with Internet-based resources
- Repeat use of online resources
- Ratio of successful versus unsuccessful search experiences
- Satisfaction that online time is well spent

Outcome: Attitudes, beliefs, and behaviors of community
- Adoption or sustained use of online resources by opinion leaders
- Repeat requests for outreach activities
- Information found online is discussed with doctor or between health care professionals

Outcome: Quality of healthcare
- Value placed on online resources for patient care decisionmaking

Constructing Objectives
As stated earlier, objectives can be defined as the steps required to reach a goal and outcomes specify the results you hope to achieve. You have prioritized the overall outcomes that seem to address the problems or goals for information access in your targeted audience. Now, your next decision will be to identify objectives that can measure progress toward your intended outcomes.

Include several types of objectives that together contribute to the outcomes you envision. In the health education literature, these types of objectives are hierarchical, leading to the ultimate objectives of a program (the *program objectives*). The following discussion presents the four types of objectives as described by McKenzie et al (1994) (McKenzie and Smeltzer 1997).

A. Process Objectives
The process objectives are what you do to accomplish all other levels of objectives. Think of them as the inputs and process components needed to carry out the program. For a very comprehensive process evaluation, you may choose to create specific objectives that will track all possible components, which could include:

- Program resources (materials, funds, space)
- Type and appropriateness of activities
- Target population exposure and attendance

Educational Objectives
Educational outreach activities can be divided into four general categories: awareness, knowledge, attitudes, and skill development. The premise of this hierarchy is that if the targeted audience is to adopt and maintain information-seeking behaviors to alleviate health information needs, they first must be aware of the need or value of current information. Second, they must expand their knowledge of available and appropriate resources. Third, they must adopt and maintain beliefs in the effectiveness of these resources and their own ability to use them. And fourth, they need to possess the actual skills in getting information efficiently.

C. Behavioral and Environmental Objectives
The third level of objectives include the behavioral changes that resolve health information needs, thus moving toward the ultimate program objectives for improved health care. Environmental objectives can be loosely defined as those that remove physical and social barriers to enacting the behavioral changes.

D. Program Objectives
Program objectives are the ultimate objectives of an outreach program, expressed as outcomes from individual and community changes in using or providing health information.

Although it may seem burdensome to develop four types of objectives, it is important for getting a complete picture of what is happening and why when you assess results. For example, you may be able to detect an increase in use of health information resources, but it might be less than your stated behavioral objectives. If you use this as your only criteria for success, you have missed the possibility of measuring other outcomes, such as:

- increased awareness about the value and effectiveness of using Internet resources to answer questions; or

- a strengthened social network of modeling and support from opinion leaders or community resources that will encourage eventual adoption and maintenance of new behaviors.

Borrowing again from health education, much of its literature recommends developing objectives that are specific, time-limited, and measurable. The clarity of your objectives will provide direction to planning strategies and activities. According to McKenzie (1994), an objective should include the following elements:

1. The outcome to be achieved, or what will change.
2. The conditions under which the outcome will be observed, or when the change will occur.
3. The criterion for deciding whether the outcome has been achieved, or how much change.
4. The target population, or who will change.

The first element is the outcome, which is the consequential action or behavior that will change as a result of the program. Outcomes are usually identified as verbs of the sentence, such as *cause, connect, convert, demonstrate, develop, eliminate, reorganize, and supply.* McKenzie emphasizes that outcome verbs must refer to something measurable and observable; thus *appreciate, know, internalize,* or *understand* by themselves are not good choices for outcomes.

The second element – conditions – describe how or when the outcome will be observed. Typical conditions might be "upon completion of the class," "as a result of participation," "by the year 2001," "three months after the program," or "during the class session."

The third element of an objective is the criterion for deciding when the outcome has been achieved, or how much change will occur. This element is the standard that you will attach in order to measure whether the outcome is performed in an appropriate or successful manner. Examples might include "30% of class participants," "100 flyers," "ten opinion leaders," "five follow-up classes," etc.
The last element that needs to be included in an objective is mention of the target audience, or who will change. Examples are *all professional clinic staff*, or *constituents of the Miloxi tribal reservation*.

Sample objectives provided in Appendix B are constructed according to the four elements of an objective described by McKenzie. A workform is provided in the *Tool Kit* at the end of this chapter to fill-in goals and objectives for your program.

If accustomed to objectives that use action verbs, the structure of the objectives presented in Appendix B may seem awkward. For example, outreach planners may be accustomed to an objective such as:

- To provide training in the use of medical bibliographic databases with emphasis on Internet Grateful Med and Pub Med.

Consider revising the above objective to focus less on what outreach staff does (conduct classes) and more on what the audience does that provides evidence of progress toward improved information access, such as:

- During the next twelve months, at least 50% of health providers in each of four rural clinics will participate in one outreach promotional or educational activity

Then, develop additional objectives that focus on the learning and behavioral outcomes you hope to achieve, such as:

- After viewing a hands-on demonstration of searching for health information, at least one out of three will be able to access a health resource via the Internet and find the accurate answer to a question.

- One month after training classes have been completed, 30% of those who participated will report increase use of PubMed or another appropriate Internet resource.

The revised objectives thus emphasize more accountability for numbers of participants and outcomes that demonstrate or predict changes in information access.

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McKenzie, J. F. and J. L. Smeltzer (1997). Planning, Implementing, and Evaluating Health Promotion Programs: a primer. Boston, Allyn and Bacon.

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Goals and Objectives Workform

Outreach Goal :

Administrative Objective(s): _____

Outcome (what):
Target population (who): _____
Conditions (when): _____
Criterion (how much): _____

Learning Objective(s): _____

Outcome (what): _____
Target population (who): _____
Conditions (when): _____
Criterion (how much): _____

Behavioral Objective(s): _____

Outcome (what): _____
Target population (who): _____
Conditions (when): _____
Criterion (how much): _____

Environmental Objective(s): _____

Outcome (what): _____
Target population (who): _____
Conditions (when): _____
Criterion (how much): _____

Program Objective(s): _____

Outcome (what): _____
Target population (who): _____
Conditions (when): _____
Criterion (how much): _____

Stage Three: Planning Activities and Strategies

With goals and objectives identified, Stage 3 of outreach program development includes several steps for selecting and developing effective outreach strategies, and planning the activities to implement them. Three topics are covered in this stage, including:

- Theory about factors and strategies that influence behavioral and environmental changes.
- Using evaluation to tailor outreach strategies and to obtain baseline data for comparison with post outreach measures.
- The use of an implementation plan as an important tool for effective planning.

A Major part of outreach development is planning activities and strategies that will best address the program's objectives. No single activity is likely to solve the problems of information access, as there are too many levels of need and various factors that contribute to the problems. According to Marshall (1997), research and evaluation studies on health sciences library outreach characterize the following barriers to effective information seeking and use:

- Lack of time
- Lack of financial resources
- Lack of interest in conducting literature searches as a bases for clinical decision-making
- Preference for synthesized information ready for application to patient care
- Lack of search skills
- Lack of equipment
- Lack of telecommunications infrastructure
- Lack of computer skills
- Lack of an onsite library
- Slow turnaround time for document delivery
- Need for non-literature types of information (networking with colleagues, statistical data, program planning, directory and referral information)
- Increased demand on local resources without increased support

Outreach to address these problems, needs, and barriers include *promotional* activities to persuade or motivate interest and awareness; *logistical* activities to facilitate adequate onsite resources (human and hardware); and *educational* activities to develop knowledge and skills in effective access.

Thus, outreach activities generally fall into three broad categories.

Promotional
- Exhibits
- Brochures, fact sheets, etc.

Logistical
- Providing equipment
- Facilitating connections
- Developing local resources
- Intermediated search services
- ILL/Loansome Doc/document delivery

Educational
- Training classes
- Demonstrations

Theories about behavior change
Success in reaching outreach objectives for improved access to health information can be challenging. Changing behavior patterns (such as information seeking behaviors) requires outreach activities that provide more than just information. Strategies are needed to help motivate, facilitate, and reinforce change.

Factors for success in reaching these outreach objectives have been identified by several outreach project, as cited by Burnham and Perry (1996) [1], and include:
- Train one-on-one
- Provide a variety of follow-up interventions
- Change information seeking behavior
- Focus on patient care
- Stress education/CME
- Provide money for computer equipment
- Identify and cultivate a site liaison

Personal contact between the target audience and librarians has also been shown to help develop and sustain changes in information seeking habits [2].

Health education theories described in this chapter both reinforce and expand upon knowledge gained from library research about what works when trying to influence behaviors and facilitate effective access. If adopting health communications theory to information seeking behaviors, there are three factors that shape behavioral action, as displayed in Figure 5A:

Predisposing factors provide the motivation or reason behind a behavior; they include knowledge, attitude, beliefs, and readiness to change.

Enabling factors make it possible for a motivation to be realized; that is, they "enable" persons to act on their predisposition. Enabling factors include available resources, skills, and information services.

Reinforcing factors come into play to reward a behavior, therefore increasing the probability that it will continue. Community or institutional support, peer influence, and opinion leader involvement are factors that reinforce and predispose behavior change.

According to these factors, if outreach planners hope to change behaviors, outreach strategies should address the following objectives:

- Increase awareness
- Increase knowledge
- Influence attitudes
- Influence beliefs
- Facilitate technology access
- Develop skills
- Reinforce behaviors
- Build community or institutional support

Outreach designed to accomplish the above list of objectives will have better success at influencing behavior change.

In the following section, five selected theories and models are presented that will help guide strategies to influence behavior change:

- Social Learning Theory
- Extended Parallel Process Model
- Stages of Change Model
- Diffusion of Innovations Theory
- Community Organization

When planning activities and strategies, choose a theory that makes the most sense to you and that you believe might explain your experiences with past outreach efforts. Figure 5B suggests which theories might work for selected outreach objectives.

These health education theories offer more than strategies to use when planning or conducting activities. Each theory identifies important variables and how they work together. As will be discussed, assessing these variables in an audience profile and then again at a later point (during a process and/or outcome evaluation) can help *explain* why outreach was successful (hopefully) or why it didn't work out as planned.

A. Social Learning Theory

In the 1970s, Albert Bandura published a comprehensive framework for understanding human behavior, which he named the Social Cognitive Theory, often called Social Learning Theory [3].

According to Social Learning Theory, factors that play a role in behavior change include behavioral capability, outcome expectations, self-efficacy, and observational learning. These concepts are defined in Figure 5C.

Behavioral capability maintains that a person needs to know what to do and how to do it; thus, clear instructions and/or training may be needed.

Outcome expectations are the outcomes that a person thinks will occur as a result of recommended action.

Self-efficacy, which Bandura considers the single most important aspect of efforts to change behavior, is self-confidence in one's ability to successfully perform a specific type of action.

Example*: In order for busy health professionals in tribal clinics to adopt the use and development of electronic resources, they need to know what online resources work best and how to use them properly (behavioral capability); to believe that information they need relative to American Indian health is potentially available (expectations); and to have the strength of confidence in themselves to refine or adjust their search queries if they face initial difficulties in getting what they need (self-efficacy).*

Observational learning is often referred to as "modeling," that is, people learn about what to expect through the experience of others. This means that people can gain a concrete understanding of the

consequences of their actions by observing others and noting whether the modeled behaviors are desirable or not.

Observational learning is most powerful when the person being observed is respected or considered to be like the observer.

Example: *When conducting outreach to American Indian/Alaska Natives about the use of online resources for accessing health information, have a respected Native (perhaps an elder) model a prototypical search in a live or videotaped demonstration.*

Self-efficacy
Because self-efficacy is considered so important in the Social Learning Theory, it is discussed in more detail here. With today's overabundance of available information, people are apt to feel overwhelmed and distrust their ability to find information they need – in other words, they have low self confidence in their search abilities. Self-efficacy is important because if people are not confident of their own abilities, they readily abandon skills they have been taught if they experience failure or difficult challenges [3].

The advantages of greater self-efficacy include higher confidence in the face of obstacles and better chances of persisting over time outside a situation of formal instruction. Specific to electronic search skills, people of high efficacy are quicker to discard or refine failed strategies, do not give up as easily, are good at time management, and know how to learn from mistakes and avoid feeling deflated [4].

How can outreach activities increase self-efficacy? Self-efficacy can be nurtured through skill development, using techniques presented in Figure 6.

B. The Extended Parallel Process Model (EPPM)

A health risk message theory, the Extended Parallel Process Model (EPPM), is a model for *motivating* action through both cognition (thoughts) and feelings (primarily fear). The EPPM is formally called a "fear appeal theory" because it focuses on the use of fear as a motivator to action. Most risks are inherently fear-producing. For example, fear might be induced by feelings of not knowing how to use the Internet, of not having adequate or up-to-date information regarding patients' conditions, or of being perceived as being ignorant or behind-the-times [5]. The EPPM specifies how to channel that fear into productive, adaptive action. If underlying fears are not addressed in outreach messages, they may cause one to engage in maladaptive actions such as denial of the need to learn the Internet. Thus, fear can either motivate or inhibit productive action, depending on the type of message given to clients or audience members.

According to the EPPM, some fear needs to be induced to motivate action. The theory suggests that if people do not believe there is a threat or a risk from failing to use Internet resources (for example) then they will not be motivated to use them. If, however, individuals believe there is a significant threat to not using available resources (e.g., potential malpractice suits, falling behind of current medical knowledge, being embarrassed because everyone else has used theWeb, etc.), then they will be motivated to act.

Perceived efficacy of the recommended action determines *how* people act (in outreach, the recommended action is to use the Internet to access health information). If people are motivated to act because they feel threatened in some way, *and* believe they are *able* to perform an *effective* recommended response to diminish this threat, then they will *control the danger* and engage in the recommended action. In this case, a person's fear motivated them to act in an adaptive, protective manner (i.e., they attend a class on how to use the Internet).

In contrast, if people feel motivated to act because they feel threatened in some way but do *not* believe they are able to engage in an effective response that would diminish the threat, they will be motivated to *control their fear* (because they feel unable to control the danger). In this case, clients or audiences might deny they need Internet resources and engage in reactance (a type of defensive reaction where individuals lash out in anger, e.g., "this is just another time waster, we want no part of it"). Figure 7A shows important definitions in the EPPM and how they might relate to outreach.

Overall, research on the EPPM has demonstrated that high threat/high efficacy messages motivate substantial and long-lasting behavioral change. For example, see Figure 7B for examples of how outreach activities can use the EPPM theory. Message "A" to motivate action would convey a threat of not using the Internet (this is the threat portion of a message).
Then, offer messages to address self-efficacy perceptions because they increase one's perceived ability to perform a recommended response (see "B-D"). Then, present message "E" to address one's perceived response efficacy because it focuses on whether or not the recommended response "works" in averting the threat

Please note that threatening messages motivate action – any kind of action (both positive and negative) – while a target audience's perceptions of self-efficacy and response efficacy toward your recommended response determine whether that action is adaptive and helpful (controlling the danger) or maladaptive (controlling their fear). For effective outreach efforts, develop high threat/high efficacy messages to motivate long-lasting and consistent behavioral changes.

When applying the EPPM to outreach strategies, it is critical that high threat messages are accompanied by high efficacy messages. If it is difficult or impossible to promote strong perceptions of efficacy (i.e. PubMed has the answers you need), then one probably should not use fear-arousing messages which may backfire.

Decisions about using the EPPM will depend on your ability to convey motivational messages and on the relevance of using fear appeal messages with your audience. Messages can be delivered in print educational materials, through electronic media, or in classes and demonstrations. Promote your messages through channels that are credible sources to your audience. For consumers, get cooperation for promotional messages on grocery bags, radio, or TV, or through doctor's offices or clinics. Channels that are credible sources for those in a clinical setting might be employers or colleagues, a department chair, a noted expert, a professional association, or a conference exhibit. In the American Indian/Alaska Native community, the elders might be credible sources.

C. The Stages of Change Model

The Stages of Change Model provides a framework for explaining how behavior change occurs [6]. As displayed in Figure 8, there are five stages of change. People at different points in the process of change can benefit from different interventions, matched to their stage at that time. [7, p. 17]

The principles of this theory are easily incorporated into any strategy development. Using the Stages of Change helps remind you that change is a process and not an event. For example, outreach activities may falter if you assume that your audience wants to change their information seeking behaviors and are willing to use computer resources for their work. If your assumption is incorrect and the audience is still in the Contemplation stage, they might better respond to awareness/promotional activities (e.g. a lively demonstration) that help persuade further action.

On the other end of the Stages of Change process, if outreach is not designed to include efforts for building infrastructure or follow-through, the process of change may not be maintained.

Example: *Dr. Wu, a busy physician practicing in rural Montana, has not learned to use Internet resources and wonders if it would be worth his time (precontemplation). At a recent conference, he saw a demonstration of PubMed and was impressed by how easy it is to use. In his rural practice, Dr. Wu misses the opportunities to stop colleagues in the hall for a quick consult and worries that sometimes he might not have enough information for quick decisions. He wonders if it would be worth his time to learn how to use the Internet (contemplation). He decides to look into Internet training about PubMed and signs up for a class (preparation). On the day of the training, Dr. Wu hears from the instructor that the president of his local medical society took the same class and continues to use the skills gained almost daily. Dr. Wu was asked to bring a recent patient problem. He brings a question about the accuracy of prenatal ultrasound in determining congenital hydrocephalus. The instructor shows him how to use PubMed's clinical queries and finds the information in a relevant abstract right away. Armed with this positive experience, Dr. Wu resolves to take the time in the future and begins using his computer (action). However, several weeks pass and Dr. Wu tends to put off trying it again on his own (relapse). Then, he makes a phone call to a respected colleague for a quick consult. She says she has recently taken a course on computers, and says that Dr. Wu could have gotten the answer quicker than waiting for her return phone call by looking on PubMed. With this friendly reminder, Dr. Wu tries his own search with success (success). With this success, Dr. Wu now regularly uses the Iternet for questions (maintenance).*

D. Diffusion of Innovations Theory

Based on social science research conducted in the 1940's by Everett Rogers, Diffusion of Innovations Theory addresses how new ideas or products spread within a society or from one society to another [8]. Key principles of the diffusion process are:

- most people consider adopting an innovation, not on the basis of scientific research by experts, but because people they respect (opinion leaders or early adopters) endorse it

- innovation is adopted first by people who are considered innovators (2.5% of individuals in a system). The next 13.5% to adopt an innovation are considered "early adopters"

- critical mass is the point at which enough individuals have adopted an innovation that any further rate of adoption becomes self-sustaining. Early adopters and opinion leaders are instrumental in getting an innovation to the point of critical mass.

If the use of technology to answer health information questions is considered an innovation, the Diffusion of Innovation theory describes a pattern of adoption followed by an outreach audience. Outreach activities should target innovators and early adopters because they can help persuade others about the benefits of using these resources, encourage continued use, and might even promote the role of the library for consultation, training, or resource access.

Example: *When planning your skills training classes, you contact opinion leaders and early adopters for your audience to encourage ways that they can help influence the success of your efforts to train end user information seeking behaviors. Suggested participation by the opinion leaders could be:*

- *attending a training session or providing a testimonial about their experience in using the Internet*
- *offering their endorsement for use in promotional literature*

- *agreeing to "spread the word" in conversations with colleagues about the message you want to convey (e.g. making time to learn how to find and share useful information will help you and your patients).*

Another principle of the Diffusions of Innovation Theory says that innovations that are perceived by individuals as having *greater* relative advantage, compatibility, trialability, observability, and *less* complexity will be adopted more rapidly than other innovations. For illustrations of how outreach can apply this principal, see Figure 9 and other examples in Appendix C.

E. Community Organization

Community Organization is not a theory in itself, but a process by which community groups are helped to identify common problems or goals, mobilize resources, and develop and implement strategies for reaching their goals. The sense of group identity promotes motivation for change. Outreach planning may not literally strive to "organize" a community to change at a grassroots level. However, principles of community organization will help outreach planners consider a community level perspective, with measures that consider social or cultural factors of the community involved.

The conceptual framework for community organization in the public health literature is that health promotion initiatives are designed to serve communities and targeted populations, and not just single individuals [7]. Similarly, outreach programs with a community perspective see their work toward successful outcomes involving more than just individual change. There are various community approaches for that have key concepts in common (see Figure 10). The process of *empowerment* is intended to stimulate problem solving and activate community members. *Community competence* is building the confidence and skills to solve problems effectively. *Participation and relevance* involve citizen activation and a collective sense of readiness for change. *Issue selection* concerns identifying "winnable battles" as a focus for action, and critical consciousness stresses the active search for root causes of problems. [7]

According to Bowes [9], success in courting community participation can result in labor savings (through volunteers and local supervision), linking of influential community leaders to project goals, and adapting programs to local idioms. This type of "localization" can help sustain the effect of an outreach program long after outreach funding has expired.

Example: *An outreach program in the Pacific Northwest called Tribal Connections works with the communities of 16 American Indian/Alaska Native tribes. The goal is to help tribes reach their own tribal-wide health information access goals (empowerment), interpreting health in the broadest sense according to the needs of each community (relevance).*

The methodology is community-based, encouraging development of a sense of involvement within and across tribes (competence). It is hoped that the project will broaden its focus beyond improved network connections to improved human connections. For example, the tribes will share development of a project website that will link not only to credible secondary resources, but will also provide links to first hand tribal information and better communication between tribal communities. One of the objectives will be to create a sustainable online community of individuals interested in the promotion of tribal health. So far, one tribe reports that involvement in this project has opened doors between tribal agencies in their community; for example, it has greatly increased communication between the tribe's Department of Health and Human Services and the school.

How Does an Audience Profile Fit In?
Using one or more of the above-described theories in your outreach activities will help make your efforts "theory-based." After selecting the theory or theories that make sense to you, conduct an *audience profile* that includes questions about variables relevant to the theory you will use.

An audience profile will help you better understand your audience and how the theory might be relevant to their situation.

For example, prior to outreach, questions might be asked of the audience about their attitudes or beliefs regarding Internet use, or stage of readiness in adopting new information seeking behaviors. See Figure 11 for a brief overview of variables important to behavior change theories that could be assessed in an audience profile.

Assessing the variables of interest prior to outreach also provides a baseline for comparing any change or difference after outreach has happened. For example, suppose you will be conducting an outreach training to improve Internet search skills. You might create a self efficacy rating scale about Internet searching by adopting questions from the survey example in Appendix D, originally created to rate self efficacy in conducting a CD-ROM literature search. The factors you choose to rate self-efficacy are assessed prior to outreach to determine areas of focus needed in skills training. Following the Social Learning Theory, ways to increase self-efficacy are used in the outreach session, such as guided mastery, proximate goals, and feedback. Then, self-efficacy is measured again at the end of the workshop to determine if there has been any change (hopefully an increase).

How is an Audience Profile Conducted?
Decisions about how to gather data for an audience profile will depend on how that data will be used. The discussion in Stage 1 about exploratory versus representative data gathering also applies to audience profiles. Most of the time, outreach programs will not have the resources or need to conduct representative data gathering, such as rigorous survey research, where generalizations are made to a larger population based on statistically valid results. In exploratory research, statistical validity is of less concern because the data will be used to gain a better understanding of your specific audience to help improve the strategy you plan to use. Focus groups, for example, would be useful for exploratory data gathering, unless you plan to repeat the questions post-outreach, in which case, interviews or feedback questionnaires might be more appropriate.

In the library science literature, an audience profile is typically called a "needs assessment," gathering data about:

- types of information needed
- purpose
- frequency
- sources used (colleagues, journal articles, etc.)
- factors determining sources used
- previous computer experience
- barriers to gaining access.

For the purposes of this manual, some of the above information may already be gathered in a community profile (described in Stage 1) to help inform outreach program goals and objectives. But, outreach strategies that use a theory-based approach will need to add questions to an audience profile prior to an outreach activity that pertain to behavior change theories being applied. Appendix E presents example questions for each of the important variables identified by behavior change theories.

Ideally, you will be able to conduct an audience profile prior to each outreach activity. Realistically, this could mean more evaluation than available time or resources. Use sampling techniques described on page X to gather representative data about your audience.

Appendix F provides a sample audience profile survey. On the sample survey, note that some questions are designed to be asked again on a post outreach evaluation.
For example, based on principles of Social Learning Theory (SLT), questions about level of ability are asked prior to and after outreach, to determine changes in *self-efficacy* regarding Internet search skills. Called a pre-test/post-test, this type of evaluation design is typically used to assess changes that may have resulted from an outreach activity. However, it is a weak design if there is not also a control or comparison group. Please see Stage 4 for further discussion of evaluation designs.

Example: *To embark on outreach to a tribe in Eastern Washington, the Regional Medical Library conducted a community profile by talking with several tribal leaders to discuss health information needs and barriers. The Regional Medical Library discovered that convenient Internet access was not yet available at all worksites. Another and perhaps more important factor included the perception that health resources on the Internet are based only on Western medicine and that American Indian health needs are not adequately represented. Thus, the gap between culturally specific information needs of this group and their perceptions of relevant resources available to them became a barrier to their information seeking behaviors. The Regional Medical Library staff knew they could assist solving problems of telecommunications access, but they were not in the position of immediately changing content of national Internet resources (e.g. MEDLINE). However, they could begin to address the gap by working with the tribe to build their own community-based health resources.*

Further feedback from conversations with several tribal health providers pointed to another contributing factor to information access problems. The health care providers indicated that even when Western-based health information is needed, it is too difficult to find credible and relevant information easily and quickly. The Regional Medical Library knew that behavior change theories attribute beliefs as important factors in one's willingness to change. They decided to conduct an audience profile to gather data on variables important to several behavior change theories that might help change attitudes toward searching the Internet.

The questions included in the audience profile were based on the Stages of Change model and Social Learning Theory. Outreach staff wanted to determine whether demonstrations about Pub Med would be more appropriate than starting immediately with hands-on skills training. The survey questions identified that many had not heard of Pub Med, or thought about using it, so a lively demonstration seemed a better start. The survey also asked questions to determine baseline levels of confidence on a variety of computer and Internet skills, ranging from 1, or "Barely Confident," to 5, or "Very Confident." The questions were designed with the intention of being asked again at the completion of outreach. With that data, outreach staff developed a followup hands-on workshop that focused on skills needing attention. Also, the hands-on workshop included demonstration searches by a local health provider from the tribe (following the principle of observational learning in Social Learning Theory).

Finally, using principles of high threat/high efficacy from the Extended Parallel Process Model, outreach staff gathered "testimonial" examples from a respected colleague of how lives were saved or conditions dramatically improved through searches on the Internet. Specific "case studies" of patients with medical conditions commonly seen by the tribal clinic were used for example search formulations, demonstrating that relevant information is available.

Planning for Activities

Developing a written plan is important for effective operation of an outreach program. A plan provides a general blueprint for a program, including tasks associated with various phase of evaluation. The plan should summarize information gathered about the community, its members, and their needs, and include a program implementation outline and a timeline for the various activities.

A written plan holds the outreach program accountable and ensures that steps are not taken randomly. It provides an invaluable rationale or logic that link a program's activities with the intended effects. This helps spell out assumptions about how project activities and strategies tie directly to the program objectives.

Thus, when developing an implementation plan, each objective developed in Stage Two must be thought out to determine what strategies and activities are needed to accomplish them. Based on best practices from outreach studies and theories that you think might work, identify and plan strategies that will address each objective. Figure 12 presents a summary of sample strategies for factors related to behavior change objectives, based on selected theories and best practices identified in this chapter. As described earlier, some theory-based strategies require feedback from the audience before implementation. Tasks to obtain feedback should be included in your implementation plan.

An implementation plan in Stage Three should:

- Describe the overall community and its needs
- List program goals
- List administrative objectives
- List learning, behavioral, environmental and overall program objectives
- Specify theory-based strategies and best practices to accomplish each objective
- Specify activities to each objective
- Include a timeline
- Identify interim tasks to be accomplished (e.g. design and conduct audience profile)
- Identify who is responsible for each activity.

Implementation Plan Workforms A and B, with fill-in steps to develop an outline and a task list by activity, are included in Stage Three Toolkit on pages X-XX.

See Appendix G for a sample implementation plan outline and Appendix H for a sample list of tasks by activity and person responsible.

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Figure 5A: **Behavioral Action**		
Predisposing Factors	**Enabling Factors**	**Reinforcing Factors**
Knowledge (awareness); Attitudes; Beliefs	Availability of technology; Skills training; Ability to obtain resources	Attitudes and behaviors of opinion leaders; Community-level participation

Figure 5B **- Behavior Change Theories and Models For Outreach Objectives**					
	Social Learning Theory	**Extended Parallel Process**	**Stages of Change Model**	**Diffusion of Innovations Theory**	**Community Organization**
Increase awareness		X	X	X	
Increase knowledge		X	X	X	
Influence attitudes		X	X	X	
Influence beliefs	X	X			
Develop skills	X		X		X
Reinforce behaviors			X	X	
Build community, institutional support					X

Figure 5C - Social Learning Theory		
Variable	***Concept***	*Outreach application*
Behavioral Capability	Knowledge and skills about recommended action	**Provide information and training about recommended action (e.g. online searching).**
Expectations	Beliefs about likely results of action	**Demonstrate searches that provide relevant results.**
Self-Efficacy	Confidence in ability to take action and persist in action	**Teach skills in small steps; give feedback and encouragement; give in-class exercise problems that provide challenge.**
Observational Learning	Beliefs based on observing others like self	**Point out others' experience; provide demonstrations by role models (e.g. clinician; senior citizen; member of minority population physical changes; identify role models to emulate.**

Figure 6 - **Techniques to encourage self-efficacy**	
Guided mastery or **modeling**	A person who is held in respect and is similar to the observer (student) gives a hands-on demonstration of an online search. This helps persuade students that if someone similar to them can do it, so can they. Because searching is also an intellectual skill, it is important that the model verbalize aloud how decisions are made about the search process. It is efficient and just as effective to video-tape a guided mastery session geared for a specific targeted audience (e.g. American Indians) so that live models need not be recruited for every outreach session.
Proximate goals	Class exercises are designed to help students master skills progressively. Depending on the student's level of ability and "stage of change," assigned tasks may range from learning to use the mouse to finding a specific answer to a clinical question. When students reach proximate goals, they benefit from self-satisfaction about their progress.
Feedback	Feedback can enhance self-efficacy by providing clear information about how to best perform a skill and strengthening beliefs in personal capability. Feedback may be self-demonstrated by successfully performing an assigned task. And, if students are assisted in finding alternative solutions for ineffective searches, their ability to learn from search mistakes is enhanced.

***Figure 7A* - Definitions from the Extended Parallel Process Model**			
Variable	***Dimension of Variable***	Definition	Outreach Application
THREAT	Severity of Threat	The severity or seriousness of the problem.	Individuals don't believe that lack of information is a serious problem; your message should outline the hazards of **not** being up-to-date on medical information.
	Susceptibility to Threat	The degree to which one is at-risk of experiencing the problem.	Individuals don't think that they themselves will experience negative consequences if they don't use the internet; your message should give examples of people just like them who experienced negative consequences (e.g., were sued because they didn't use up-to-date medical information).
EFFICACY	Self-Efficacy	The degree to which one feels able to do what's recommended to avert the problem.	Individuals may not know **where** internet resources are or **how** to use the internet; messages should state where classes are held and/or give relevant sites.
	Response Efficacy	The degree to which one feels that what's recommended to avert the problem works.	Individuals may not believe the information on the www is accurate or useful; messages should give examples of how and where useful information is found and how it can be life-saving.
OUTCOME	Danger Control	Adaptive, protective actions taken when one is motivated to act and believes s/he can act.	Individuals take courses and use the internet regularly.
	Fear Control	Maladaptive, defensive actions taken when one is motivated to act but doubts s/he can do anything (a sense of futility, hopelessness).	Individuals deny they need to use resources and/or respond defensively (and sometimes angrily) at the suggestion that these resources might be helpful; this type of response usually suggests a need to increase perceived efficacy (above).

Figure 7B Outreach Messages Using EPPM

Convey outreach "messages" in promotional materials, or during discussion in classes or demonstration workshops:
(A) about the threat of not using the Internet;
(B) about how easy it is to use the Internet;
(C) about specific skills-training classes offered;
(D) about where Internet-connected computers are located in the work setting or community, and
(E) about the effectiveness of Internet usage in avoiding a threat (i.e., "resources on the Internet provide the most up-to-date information on how best to treat your patients")

Figure 8 - *Stages of Change Model*

Variable	Concept	Outreach application
Precontemplation	Not thinking of changing a behavior	Introduce awareness of health information sources
Contemplation	Thinks about using the Internet for information access	Increase awareness of the need for change
Preparation	Makes plans to learn information seeking skills via the Internet	Facilitate computer access; offer skills training with varied formats personalized to local need
Action	Uses Internet sources when seeking new information	Assist with technical support; publish articles about search tips; train onsite liaison to offer support or provide intermediary searches
Maintenance	Continues new information seeking behaviors	Offer advanced and refresher classes; continue to partner with opinion leader advocates to reinforce new behaviors

Figure 9 - *Diffusion of Innovations Theory*

Variable	Concept	Outreach application
Relative Advantage	The degree to which an innovation is seen as better than the idea, practice, program, or product it replaces	Point out unique benefits of product (e.g. PubMed), such as getting time sensitive info faster; having access in a remote area miles from a library
Compatibility	How consistent the innovation is with values, habits, experience and needs of potential adopters	Promote products that have relevant information needed by targeted audience (e.g. AIDSLINE for an AIDS outreach program).
Complexity	How difficult the innovation is to understand and/or use	Tailor training to level of computer experience
Trialability	Extent to which the innovation can be experimented with before a commitment to adopt	Provide hands-on training for trial practice in a very safe environment (e.g. presentation at a professional staff meeting).
Observability	Extent to which the innovation provides tangible or visible results	Use relevant examples tailored to actual need of targeted audience (e.g. farm accidents for a rural Public Health department).

Figure 10 - Community Organization

Concept	Definition	Outreach application
Empowerment	Process of gaining mastery and power over oneself/one's community, to produce a change	Give individuals and communities tools and responsibility for making decisions that affect them
Community Competence	Community's ability to engage in effective problem solving	Work with community to identify problems, create consensus, and reach goals
Participation and Relevance	Learners should be active participants, and work should "start where the people are"	Help community set goals within the context of pre-existing goals, and encourage active participation
Issue Selection	Identifying winnable, simple, specific concerns as focus of action	Assist community in examining how they can communicate the concerns, and whether success is likely

***Figure 11* - Theory-based variables**

Social Learning Theory

- How much skill and knowledge does the audience have about finding health information on the Internet? (*behavioral capability)*
- Do they expect the information they need exists and is available? *(expectations)*
- How effective do they feel they are themselves in finding health information on the Internet? *(self-efficacy)*

Extended Parallel Process Model

- Does the audience perceive any negative consequences for being misinformed or lacking information? (*perceived threat*)
- Does the audience believe that using information technology works in accessing accurate health information? (*perceived response efficacy*)
- Does the audience believe they have the access, skills, and knowledge needed to effectively use information technology? (*perceived self-efficacy*)

Stages of Change Model

- At what stage of readiness are they in using Internet or email (*precontemplation, contemplation, preparation, action, maintenance*)

Diffusion of Innovation

- Who are their opinion leaders?
- What people or groups might be influential or motivate their use of electronic resources?

Figure 12 – **Sample outreach strategies by factors that influence behavior change**		
Factors	**Objectives**	**Sample Strategies from Theory and Best Practices**
Predisposing	Increase awareness Increase knowledge Influence attitude Influence beliefs	Based on *Stages of Change Model*, assess audience awareness and readiness for learning new skills or adopting new technology. Then, determine priority activities. For example, ➢ if a site has little technology and technical support, but much motivation and interest in accessing information resources, the outreach priorities might be to first facilitate access and then motivate and train individuals to use the access effectively. ➢ However, if technology is lacking and users are not aware of the benefits that access can provide, your priorities would first focus on activities to promote awareness and interest in outreach products and services. Based on *Extended Parallel Process Model*, influence attitudes and beliefs by first assessing the audience about threat and efficacy variables. Then, convey messages about the threat of being misinformed or out-of-date and about effective ways to cope, such as learning easy to use and convenient Internet resources. ➢ Messages can be delivered in print or electronic media, or in classes and demonstrations ➢ Use channels credible to audience, e.g. employers, colleagues, department chair, community leader, tribal elder, noted expert, professional association, conference exhibit. For consumers, channels could be grocery bags, radio, TV, or doctor's offices or clinics. Based on *Diffusion of Innovations Theory*, identify opinion leaders and early adopters who will recruit outreach participation due to their influence and respect. Based on *Diffusion of Innovations Theory*, identify opinion leaders and early adopters who can help influence attitudes that electronic access can provide a better and easier way to get relevant information Based on library outreach research, use a variety of promotion methods
Enabling	Develop skills Facilitate access	Based on *Social Learning Theory*, provide training that will increase self-perception of ability : ➢ have someone who is respected or similar to the student give hands-on demonstrations, verbalizing aloud as decisions for search formulation are made, ➢ use proximate goals designed to help students master skills progressively, and feedback to encourage self-efficacy; ➢ demonstrate searches that are very relevant to audience needs; ➢ assist students in refining searches, thereby learning from mistakes Based on *Stages of Change Model*, support the taking action stage by providing or training onsite technical support, publishing search tips, or providing intermediary searches. Based on library outreach research, provide money for computer equipment Based on *Community Organization*, involve stakeholders in decisions about hardware use and location.

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IMPLEMENTATION PLAN WORKFORM A: List Goals, Objectives, Strategies and Activities

Outreach Goal(s):_____

Administrative Objective(s):_____

Strategy(ies):_____

Activity(ies):_____

Learning Objective(s):):_____

Strategy(ies):_____

Activity(ies):_____

Behavioral Objective(s)

Strategy(ies):_____

Activity(ies):_____

Environmental Objective(s):

Strategy(ies):_____

Activity(ies):_____

Program Objective(s):

Strategy(ies):_____

Activity(ies):_____

Stage 4: Planning Evaluation of Implementation and Outcomes

A typical model for program development includes the following phases:

1) identifying a target audience and conducting a community needs assessment, 2) developing written goals and objectives, 3) implementing activities to accomplish those objectives, and
4) evaluating the overall quality and success of those activities vis-à-vis the stated objectives.

In reality, planning and conducting a program and its evaluation is more complex than a four-step process. Different types of evaluation correspond to different phases of program development. Thus, as seen in Figure 13, the model should be at least a 6 step process that integrates various types of evaluation throughout.

This manual has thus far discussed ways to conduct evaluation for a community and audience profile, part of program development phases I-III in Figure 13**.** This chapter will describe an overview of evaluation planning to assess a program's implementation and outcomes, part of phases IV-V in Figure 13.

Then, in the next chapter, data collection and issues of validity and reliability will be introduced, as planning should also consider the extent of need to protect the evaluation from bias. Stage 5 will also introduce considerations for data analysis.

Explaining the various considerations that go into evaluation planning is complicated and the next two chapters give just a brief overview. For further information, several sources are listed in the *Tool Kit*s at the end of Stage 4 and Stage 5. An outstanding and comprehensive source is the nine volume kit edited by Joan L. Herman called *Program Evaluation Kit,* Newbury Park, CA, Sage Publications, 1987.

Figure 13 **- Program Evaluation Flow Chart**

Program Phases	**Question to Ask**	**Evaluation Phase**
I. Identify Problem/Need	What is the targeted community? To what extent are information needs being met?	Community Profile
II. Develop Goals and Measurable Objectives	What changes will address unmet needs?	
III. Select Activities and Strategies and Design Implementation Plan	What kinds of activities/strategies will produce changes desired? How will activities and strategies be tailored to the needs of the targeted group? How should program be put into operation?	Audience Profile
IV. Program Implementation	Is the program operating as planned? Are participants learning what is expected? Is the audience satisfied with results? Is the program reaching the intended audience?	Process Evaluation
V. Program Outcomes	Were objectives reached? What is the impact of the activities? (e.g. what is the value/usefulness to delivery of health care?)	Summative Evaluation
VI. Feedback	How realistic were initial goals? What programmatic changes need to be made?	

Developing an Evaluation Plan

The three important topics that should be addressed in an evaluation plan include:

1. Questions or issues you will address in the evaluation.
2. What you will measure and how
3. Resources needed to accomplish the evaluation tasks

To be most effective, plans for evaluation should be in place before outreach activities begin. Thinking ahead will make it easier to plan whether and what baseline data will need to be collected. Data collection instruments, such as surveys, may need to be developed and pilot tested in advance. If there are plans to compare a specific strategy with an alternative to see which is more effective, time is needed to work out the logistics about when and to whom the two strategies will be tested.

And, even though an evaluation report is completed at the end of the program, it is difficult, ineffective, and not very objective to begin thinking about evaluation after the program is over. Therefore, it is best to plan ahead, before activities begin, about what will be measured and how.

To develop an evaluation plan, the following issues require consideration:

a. Outreach goals and objectives
b. Plans for implementation, or what is currently happening if the program is already in place
c. Evaluation objectives-purpose of the evaluation and its role
d. Evaluation questions to be addressed
e. Design –when and from whom data will be collected
f. Types of information that will be accepted as evidence of the effects of the program
g. Data collection—what and how data will be collected
h. Resources
i. Timeline for evaluation

The first two steps in evaluation planning involve clarifying the goals and objectives of your outreach program and plans for implementation. Both of these steps are described in detail in Stages 2 and 3. Equally important is establishing the *evaluation*, as described in the next section.

Evaluation objectives will help determine the specific issues or questions the evaluation will address. Then, decisions about the research design—when and from whom data will be collected, must be made. Decisions about how to gather measurements will include considering what types of information (qualitative or quantitative) will be most appropriate and accepted as evidence.

Each of these considerations are addressed in this chapter, with a brief discussion of how much evaluation is realistic for your program. Issues of data collection--what and how data will be collected—is discussed in Stage 5.

Establishing Evaluation Objectives

One of the most challenging aspects of evaluation is clarifying what it is you want to find out. When planning what data your will collect, think of the questions that may be asked by all interested parties when you announce results of the evaluation you have conducted.

Identify the "stakeholders" who will have an interest in the evaluation results. They might include:

- Funding agency
- Targeted community
- Your boss

- Outreach staff

Think about what these stakeholders will look for in the evaluation report. For example, although information about the overall results of the program might be needed by the funding agency, the targeted community may want to know how to maintain what outreach has started (e.g. job skills for onsite technical support, costs to maintain telecommunications access, etc.). Other outreach programs with similar audiences may be interested in how you conducted your program and what worked best. Or, your outreach staff may be interested in determining whether a particular strategy is more effective than another.

Ask stakeholders about their criteria for success - what outcomes from the project are most important to them. Do they also want to know if it was successful compared to an alternative (such as another type of outreach program, or no program at all)? Is the program being evaluated as a pilot study for possible replication?

One way of prioritizing the evaluation questions is to ask yourself *and* those interested in the evaluation how the information gained about a particular question will make a difference. What decisions will be made as a result of the data? Or, how will the information help improve the program?

It will be important to refine the broad purpose or objectives of an evaluation into the specific questions that should be asked. Questions addressed by evaluation during and after outreach can be categorized as process and summative. Note to the reader: some evaluation textbooks differentiate process evaluation as part of formative evaluation and summative evaluation as another term for outcome/impact evaluation.

Process Evaluation Objectives

Process evaluation helps to keep track of an outreach program as it is happening so that modifications or improvements can be made on an ongoing basis.

Very generally, process evaluation questions address:

- Is outreach working as intended?
- How can it be improved (while it is going on)?

While reading through the next section, use the "Workform for Process Evaluation Objectives" in Stage 4 Toolkit to focus the types of data you may want to address in a process evaluation. A filled in workform is provided as a sample in Appendix I, "Sample Evaluation Objectives for Process Evaluation." Then, Appendix J1, "Sample Ways to Measure Process" provides selected measures for several of the evaluation objectives in Appendix I.

There are many possible questions for a process evaluation, and choosing which ones to ask will depend on how the data will be used. The following section provides examples of several purposes for process evaluation data, based in part on a more thorough discussion by [King, 1987 #46].

Accountability: To provide accountability (did you do what you said you would do in your outreach?) to stakeholders such as funders, partners, and directors. To do this, first decide what characteristics are important to success of the program (do not forget the perspective of your targeted audience – what do they think is important)? Some might be:

- Costs (staff, materials, equipment, facilities)

- Relevance of equipment, resources (e.g. PubMed), and services (e.g. interlibrary loan) provided or promoted with respect to user need (i.e. are resources likely to be useful in terms of content, understandability, language, or cultural relevance?)
- On-site administrative and opinion leader support
- Facilities (location, size, and number of computers allotted for training)
- Time allotted to activities
- Use of best practices

The above characteristics are just examples. Modify the list according to the characteristics most important to the success of your outreach program and decide how each will be monitored. "Sample Evaluation Objectives for Process Evaluation" (Appendix I), under Accountability, provides an example list of characteristics important to an outreach program. Note that it is helpful to review the objectives, outcomes, and overall plan for the program that will be implemented when selecting characteristics to monitor.

Program improvement: To assess progress toward objectives so adjustments can be made that are targeted and effective. Planners need to decide in advance what indicators to measure, which will depend on the outcomes identified in each objective (see Appendix B "Sample Outreach Objectives"). Some example indicators could be:

- numbers or percentage of target audience reached;
- evidence that promotional activities increase awareness of NLM -or other recommended-resources
- evidence that participants increase their level of self-efficacy (confidence) in search skills;
- evidence of quality (e.g. relevant or useful or efficient) search results
- an increase in ILL requests;
- evidence of actual or intended use of electronic resources (e.g. Website hits, if relevant, or survey responses about intentions to use electronic resources).

The data collected to measure progress toward objectives will give valuable feedback about what might be working and what needs adjustment.

If one is conducting a theoretically-based evaluation, then it is important to track the variables identified in the theory to determine whether or not the intervention is operating effectively. For example, say that the Extended Parallel Process Model was used to develop the intervention and evaluation. In a process evaluation, researchers would measure perceptions of severity, susceptibility, response efficacy, and self-efficacy to determine whether the intervention was promoting danger control actions (i.e., adoption of the recommended response) or fear control actions (i.e., defensive avoidance, reactance against the recommended response). If the results of a survey indicated high threat and low efficacy, then according to the theory, one would know that the intervention was failing, because it was promoting fear control responses. However, if the results of the survey indicated high threat and high efficacy, then one could be fairly confident that the intervention was producing the actions desired (danger control responses).

See a more detailed example of theory-based process evaluation in Appendix I "Sample Objectives for Process Evaluation," under Program Improvement. Keep in mind that, ultimately, the actual outreach objectives themselves may need modification if they are not being reached. But, monitoring progress *during* the outreach program will provide opportunities to make changes that might impact overall level of success.

*Replication***:** If your outreach program is a pilot project, another purpose for process evaluation might be to allow effective replication of your program (in other communities or locations). Here, the role of the process evaluation is to gather information that realistically depicts what actually happens when the outreach is implemented. If results of your outreach are successful and you can say – "It works!" – the descriptive information you gather will answer the question – "What works?" The description might be informal, such as a written outline generated from the implementation plan that is periodically updated to describe what actually happens. This serves as an historic record and a realistic picture of the time, staff, resources, problems, successes, etc. See the "Workform for Process Evaluation Objectives" in Stage 4 Tool Kit for example evaluation questions to ask when collecting descriptive program information.

Summative Evaluation Objectives

While process evaluation questions help determine how well outreach is working while it is ongoing, summative evaluation helps determine what outreach accomplished.

Very generally, summative evaluation questions address:

- Did outreach meet its objectives?
- What difference (i.e. outcomes) resulted?
- Are the outcomes beneficial or deleterious? To whom?
- Are the outcomes those originally envisioned?

The purposes for a summative evaluation can range from making judgements about overall program effectiveness (were objectives reached?), to finding out what happened as a result of the activities (discovering outcomes), to testing effectiveness of specific strategies.

*Overall program effectiveness***:** Monitoring and compiling a final tally about whether goals and objectives have been achieved is one of the basic purposes for a summative evaluation. As described in Stage 2, an objective helps measure what changes occurred (the outcomes). Note that checking on progress toward objectives is also one purpose of process evaluation. So, collecting outcome data (to measure the objectives) will be used for both process and summative evaluation purposes. In a process evaluation, progress toward the objectives need only be spot checked. For a summative evaluation, data should be collected from a representative sample of outreach sites or participants so that staff will have good information to describe what the program achieved, and documentation about whether it met its goals.

See Appendix J2, "Sample Plan for Measuring Outcomes" that illustrates how objectives might be tracked. Appendix J3 "Sample Measures for Behavior Outcomes" provides sample questionnaire items that will measure outcomes for behavior change objectives.

*Program effects—what else happens as a result of outreach***:** Summative evaluation questions might also help determine the impact of outreach on variables not addressed by objectives. Data can be collected to provide a perspective about other effects that outreach has made (in addition to those intended by the stated objectives.)

For example, an outreach objective might be: "at least 25% of participants will report that outreach training influenced the way they subsequently obtain information for patient care decisions." Note that this objective does not specify collection of information about what *type* of decision is influenced. Data about the type of decision might be collected in a summative evaluation and reported to a hospital administrator or other interested party.

Other examples of variables not included in program objectives that could be assessed in a summative evaluation are impacts on worklife, such as job productivity (see Anderson, et. al. (1993) for survey examples to measure impacts on worklife).

The point is that summative evaluation can be designed to measure whatever outcomes are of interest. Planners may want to collect information about unintended outcomes, to provide a rich picture of the impact of outreach. For example, an open ended question might ask "what happened that was not expected (either positively or negatively)?"

*Effectiveness of specific strategies***:** Finally, in a summative evaluation, one can research *causal links* between outreach strategies and hoped for outcomes. For example, if a strategy based on Diffusion of Innovation theory is used for an objective with changed information seeking behavior as the outcome, you may want to test the assumption that the strategy actually *caused* the hoped for outcome. By focusing your data collection on variables that are critical to the theories you use, your evaluation can identify those strategies that seem to make the most difference, so you can *explain* rather than just describe the outcome.

Example*: To reach an outreach objective that X numbers of people will report increased use of PubMed, opinion leaders are recruited to a workshop and asked to encourage others to use PubMed for patient care decisions.*

The specific hoped for outcome (stated in the objective) is to increase use of PubMed in at least 30% of the class. The underlying assumption (based on Diffusion of Innovations Theory) is that involvement of opinion leaders will positively impact the spread and adoption of a new idea or innovation. However, the best strategy for including opinion leaders has not been identified. You would like to test whether class participation by opinion leaders does impact followup use of PubMed by other class participants.

With an implementation plan (see Appendix G for example), assumptions about outreach strategies and activities are clearly linked to program objectives. You can look to the implementation plan you developed in Stage 3 to help clarify what assumptions you may want to test about causal links between strategies and outcomes. By using evaluation research to test these defined assumptions, you can more easily determine why and how the strategies succeed or fall short in reaching their stated objectives. The purpose of thinking through the specific questions is that it helps to clarify what data to collect.

Selecting an Evaluation Design

When planning an evaluation, consider the best evaluation design for your situation.

The evaluation design structures how one will assess or measure the effect of an "independent variable" on a "dependent variable(s)." An independent variable is what the planner has control over –such as the intervention (training). The dependent variable is the outcome or what changes (e.g. use of PubMed) as a result of the independent variable (it depends on the independent variable). Thus, dependent variables are typically the outcomes that are measured in the evaluation process.

Independent and dependent variables need to be identified when thinking about design. For example, if assessing the effect of an outreach activity (e.g. skills training) on outcomes of interest such as attitudes, beliefs and behavior, the independent variable is the skills training and the dependent variables are changes in attitudes, beliefs and behavior. Another measure might be to assess the effect of a particular strategy, such as class participation by opinion leaders (the independent variable) on frequency of use of PubMed in the following month (the dependent variable).

An evaluation design dictates when and from whom measurements will be gathered during the course of an evaluation [Fitz-Gibbon, 1987 #49, p.9]. Options for when measurements are taken usually include a pre-test/ posttest, a posttest only, or a time series where measurements are taken at multiple times before and after the intervention.

The advantage of a pre-test/posttest design or a time series design is that one can determine how much change there was before and after the intervention, especially if results are compared between the intervention group and a control or comparison group. However, some prefer to use a posttest only design because they are afraid that the pretest sensitizes individuals to respond in a certain way and may result in increased socially desirable responses where people indicate change because "they're supposed to" [Witte, 1998 #20].

Decisions about from whom data is gathered will dictate whether the design is non-experimental or quasi-experimental or purely experimental, as discussed next (see Figure 14 for commonly used evaluation designs).

Experimental design

The most rigorous design is the simple but powerful comparison between individuals or groups randomly assigned to an intervention group and a control group. This type of design is called experimental and is depicted on Figure 14, I.1, I.2, and 1.3.

The advantage of the experimental design is that randomly assigning people to an intervention or control group ensures valid and accurate comparison of results.

***Figure 14* - Evaluation Designs**

I. Experimental design

1. Pretest-posttest design

-Intervention group	®	O	X	O				
-Control Group	®	O		O				

2. Posttest-only design

-Intervention group	®		X	O				
-Control group	®			O				

3. Time series design

-Intervention group	®	O	O	O	X	O	O	O
-Control group	®	O	O	O		O	O	O

II. Quasi-experimental design

1. Pretest-posttest design

-Intervention group			O	X	O			
-Comparison group			O		O			

2. Time series design

-Intervention group		O	O	O	X	O	O	O
-Control group		O	O	O		O	O	O

III. Nonexperimental design

1. Pretest-posttest design

-Intervention group		O	X	O				

2. Time series design

-Intervention group		O	O	O	X	O	O	O

Key: ® = Random assignment
O = Measurement
X = Intervention

In random assignment, it is presumed that any pre-existing differences in your subjects (such as skill level, intelligence, race, etc.) will be evenly distributed between the intervention or control group. Random assignment avoids "selection bias" issues where individuals or groups may self-select themselves into either the intervention or control group based on pre-existing characteristics such as familiarity with computers.

Random assignment also controls "threats" to the validity or accuracy of your results. For example, how do you know that your intervention alone caused increased usage of PubMed? Perhaps a new promotion by America Online featuring free Internet access caused the increase in usage and not your persuasive message. Without random assignment, you cannot know for sure whether or not changes are due to your intervention, or due to something special about people who chose to be in the intervention group (maybe they're fascinated by computers and are more motivated to learn than computer phobics who chose to be in the control group).

How random assignment is achieved

Random assignment can occur at the individual level (i.e., each person may or may not receive the intervention) or at the group level (i.e., different groups may or may not receive an intervention). If there is a concern that members of a group will talk to each other about an intervention, then it is best to randomly assign by the group instead of by the individual. Otherwise, you will not get a clear picture of how the intervention worked if those in the control group were exposed to the intervention through friends or colleagues.

Typically, each subject or group is given a number from one on up and then a random numbers table (which may be found in the back of any basic statistics text) is consulted to place subjects in either the intervention or control group. An arbitrary decision is made before hand about which numbers in the random numbers table will be the control group and which numbers will be the intervention group (e.g., the odd entries will be the intervention group and the even entries will be the control group).

Alternatively, one can simply place each person or group's name on a piece of paper, throw the names into a hat, and designate the first 20 draws as the intervention and the next 20 draws as the control group, and so on.

Quasi-experimental design

Random assignment is a key feature of an experimental design, distinguishing it from a *quasi-experimental* design in which a *comparison* group is included, but participants are not randomly assigned, though they are as similar as possible to the intervention group (see Figure 14, II.1 and II.2).

In most outreach situations, it may not be possible or ethical to randomly assign participants to a control group, so the quasi-experimental design is a good option. For example, one can create comparison groups by dividing potential participants into several groups and staggering the intervention. Individuals or groups should still be matched on various characteristics (like demographics, psychographics, etc.) to other similar individuals or groups and then compared for results.

Quasi-experimental design results in interpretable and supportive evidence of outreach effectiveness, but usually cannot control for all factors that affect the validity of results. For example, if variations exist between the groups in a quasi-experiment, it may be because of the intervention (you hope) or it may be because of other unique, idiosyncratic factors between the groups (e.g., one group has unrestricted access to the Internet, while the other group follows a strict use policy). There are ways to statistically control

for known covariates (or influences on outcomes) but it is best to randomly assign groups or individuals to either the intervention or control group.

For either the experimental or quasi-experimental design, the size of the intervention and control or comparison groups is determined according to "power" estimates. Specifically, you want enough people per group to detect significant differences between the group if in fact significant differences exist. Usually a minimum of 20 per group can provide an adequate degree of power for attitudes toward an intervention; however, it is best to consult power tables when determining how many individuals or groups you need per group, given a specific outcome [Witte, 1998 #20].

Non-experimental design

If it is impossible to assign a control or comparison group for your research, you can use the one-group pretest/posttest approach. Called a non-experimental design, there is no control or comparison group (see Figure 14, III.1 and III.2). This design is relatively inexpensive and easy to administer. However, it is a weak design if trying to answer questions such as:

1) How good are the results? Could they have been better? Would they have been the same if the outreach had not been carried out?

2) Was it the outreach that brought about these results or was it something else?

Time series measurements of a single intervention group can provide better information than a simple one group pre-test/post-test. For example, surveys may be administered to a sample of randomly selected individuals of an intervention group at multiple times before and after an intervention.

A summary of evaluation design pros and cons, and level of resources required for planning, execution, and data analysis, as based on [Reisman, 1994 #45], is presented in Figure 15.

Figure 15 - **Level of Resources for Various Evaluation Designs**				
Type of Design	**Description**	**Disadvantages**	**Advantages**	**Resource Intensity**
Post-Outreach Measures	Use of evaluation tools to describe outcomes (e.g., behavior, attitudes, or knowledge) *following* outreach.	No comparison with people not exposed to outreach No certainty that outcome has changed (may have been the same prior to outreach)	Simple to administer Inexpensive	Low
Post-Outreach Measures with a Control Group	Same as described above, but with the addition of collecting similar scores for a *control group.*	Using a control group requires additional research participants Additional participants will not receive the outreach (unless it is offered to them at a later point) It is difficult to randomly assign outreach participants	Avoids pre-test sensitization Strong basis for comparison, so if there are differences in outcomes between the groups, can have confidence that outreach had some effect	
Pre- and Post-Outreach Measures	Describes participants' "scores" on expected outcome variables (e.g. behavior, attitudes, or knowledge) *prior* to outreach and scores *following* outreach.	Changes in scores could be due to some other source (e.g. media promotion of health resources) No comparison with people not exposed to outreach	There is some basis for comparison (before and after) Every participant receives outreach	Moderate

Pre- and Post-Program Measures With a Control Group or Comparison Group	Same as described above, but with the addition of collecting similar scores for a *control group* or a *comparison group.*	Using a control or comparison group requires additional research participants Additional participants will not receive the outreach (unless it is offered to them at a later point) It is difficult to randomly assign outreach participants (to a control group) If use a comparison group (not randomly assigned) cannot control all factors affecting validity	Strong basis for comparison, so if there are differences in outcomes between the groups, can have confidence that outreach had some effect.	High
Multiple Pre- and Post-Outreach Measures (Time Series)	Same as pre- and post-outreach measure approach, with additional scores *obtained several times before and several times after the intervention*	Additional measures must be obtained If obtaining behavioral measures, need to allow sufficient time to measure behaviors before intervention can occur.	Helps to validate whether changes in outcomes sustain over time Helps to obtain a more complete picture of dependent variables before intervention occurs.	High

Types of Data
Evaluation methods are divided into two general categories: quantitative and qualitative.

Quantitative data
Quantitative methods have been most prevalent historically, especially when measuring outreach effects, producing hard data, such as counts, ratings, scores, or classifications. Examples of quantitative data would be numbers of outreach participants reached, percentage of users satisfied with class instruction, pretest scores about attitudes towards computers, or percentages of users who indicate increased use in followup survey.

The purpose of the quantitative evaluation focuses on attributing cause and generalizing results by measuring the effects of an independent variable on a dependent variable. It is difficult to generalize results from one outreach evaluation to another program, however, unless the independent variable is

consistent across programs. In programs that have standardized curriculum, such as curriculum for K-12 public schools, some outcomes can be measured with high validity and reliability using quantitative methods based on experimental design.

However, outreach programs tend to be tailored and customized to the unique and specific needs of the target audience. Therefore, what might be measured with high validity and reliability for one outreach program may not be important or indicative to all programs. [Dignan, 1992 #13, p.164].

Qualitative data
Combining quantitative methods with a qualitative approach, described next, can provide information in greater depth than use of either method alone.

The qualitative approach is based on the need to discover rather than to test the impact of programs [Dignan, 1992 #13, p.165]. The goal is to develop an understanding about what is happening during implementation of a program and how, as well as why results are or are not achieved.
Qualitative methods consist of at least three kinds of data collection:

1. in-depth, open-ended interviews or focus groups
2. direct observation
3. written documents, such as open-ended survey questions, personal diaries, and outreach records

Descriptive information is then organized into major themes, categories, and case examples through content analysis and other methods.

Qualitative research is a good method to use for understanding the meaning of a program and its outcomes based on the participants' own words instead of predefined responses. Using qualitative methods will help gain a better and perhaps more genuine understanding about participants' opinions or behaviors.

According to Dignan, 1992 #13, p.166], qualitative information is not commonly accepted as primary evaluation evidence by evaluation sponsors. Rather, it is supplementary information to explain why the quantitatively measured effects occur. However, in a 1989 evaluation by the National Library of Medicine (NLM), researchers used qualitative data as the primary descriptive information, with quantitative data as a supplement. NLM used the Critical Incident Technique (CIT) in which 552 users of MEDLINE responded to a highly structured set of open-ended questions via telephone interviews. The purpose of the study was to develop a detailed understanding of the impact of MEDLINE-derived information – in what ways it is used, and with what effect. The interview technique provided a detailed understanding of user motivation and behavior, which can be determined only very generally if using traditional survey methodology with quantitative techniques (pre-defined response categories).

Quantitative techniques in the CIT study included pre-coded responses to characterize interviewees on such variables as specialty, work setting, community size, and the nature and extent of MEDLINE searching experience. [Siegel, 1991 #33] Thus, the CIT study shows how qualitative methods can be usefully combined with quantitative techniques, offering ways to better understand the needs, opinions, or experiences of study participants.

The credibility of qualitative methods depends on the methodological skill, sensitivity, and training of the evaluator. As with quantitative methods, achieving valid and reliable measures involves systematic and

rigorous techniques. For a thorough and easy to use discussion about qualitative methods, see How to Use Qualitative Methods in Evaluation by Michael Quinn Patton (1987) [Patton, 1978 #1].

How Much Evaluation is Feasible?

A number of factors may affect the feasibility of an evaluation, including:

- Costs
- Staffing
- Timing
- Political or ethical considerations.

A good baseline rule is that five percent or more of a program's budget should be allotted to program evaluation activities [Reisman, 1994 #45, p.20]. Different evaluation designs require different levels of resources, as seen in Figure 15.

Reisman describes the key implementation factors that influence the amount of resources involved, including:

- Number of participants
- Frequency of data collection
- Length of time for which data will be collected
- Number of data collection instruments involved
- Availability of existing sources of data
- Availability of staff with data analysis skills or access to computers and statistical consultants
- Ease of administering data collection instruments
- Willingness of outreach participants to contribute to the evaluation.

Decisions related to selecting an evaluation design should consider implementation factors, as well as timing and staffing requirements. Political or cultural considerations of your targeted audience are also important (see page X for further discussion of cultural factors in data collection).

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See Appendix I for filled in example

ACCOUNTABILITY

Will I be accountable for documenting what occurred as the program happened? If so, what is most important to document?

a. Briefly, describe the program's goals and objectives (*Ask evaluation stakeholders to verify or modify)*

_____
_____
_____

b. What do you see as the most important results or outcomes of the program? (*Ask evaluation stakeholders to verify or modify)*

_____
_____
_____

c. How will the program be implemented? Describe the resources, activities, services, and administrative arrangements that compose the program.

_____
_____
_____

Accountability measures: Obtain periodic updates on characteristics of the program (context, activities, and best practices) that will most determine its success. (*Determine in advance what the report questions will include. Ask evaluation stakeholders to verify or modify)*

Context: tangible features of the outreach program and its site

- _____
- _____
- _____
- _____

Activities: how the program is being implemented

- _____
- _____
- _____

Best practices: what is being done to leverage success?

- _____
- _____
- _____
- _____

PROGRAM IMPROVEMENT

Will there be an opportunity to make adjustments to the activities and strategies targeted at program objectives? If so, how can progress toward objectives be tracked? *Ask yourself and your staff*:

a. What are the outcomes listed in each objective?

_____
_____
_____

b. What indicators will provide measurable evidence of those outcomes?

_____
_____
_____

c. How can those indicators be tracked?

_____
_____
_____

d. What variables can be measured to show whether the theory-based strategies are working? (Review objectives and strategies identified in the implementation plan outline developed in Stage 3 - see Appendix C1 for an example).

_____
_____
_____

REPLICATION

Is the outreach program considered a pilot project, or is it likely to be replicated at another site? If so, what types of information would be most useful to track for eventual documentation? Check off the types of information to track from the following list, and ask relevant stakeholders to add other data you may want to collect:

- ❑ Where exactly has the outreach program been implemented and what was done?
- ❑ How many and what sorts of people participated in the outreach? (e.g. age, sex, health profession)
- ❑ What are the characteristics of their information needs? (e.g. type of practice, types and purposes of information needed, frequency of information need, sources used, etc.)
- ❑ What are the socioeconomic characteristics of the setting?
- ❑ What does (do) the outreach site(s) look like?
- ❑ What are the programs' greatest successes? What facilitated each one?

- What are the programs' biggest challenges (frustrations, barriers, or disappointments)?
- What sociopolitical factors may have impacted the outreach?
- What were the outreach costs in staff time, materials, equipment, and facilities?
- Other questions?

Stage 4: **- Toolkit-Planning and Conducting an Evaluation**

Planning

- Review the program goals and objectives.
- Meet with the stakeholders to determine what general questions should be answered.
- Determine whether the evaluation questions reflect the goals and objectives of the program.
- Determine whether the evaluation questions of various groups are considered, such as your program administrators, trainers, participants, and the funding source.
- Determine whether the necessary resources are available to conduct the evaluation; budget for additional costs.
- Hire an evaluator, if needed.
- Develop the evaluation design.
- Determine when the evaluation will be conducted; develop a time line.

Data Collection

- Decide how the information will be collected: survey, records and documents, telephone interview, personal interview, observation.
- Determine who will collect the data.
- Plan and administer a pilot test.
- Review results of the pilot test to refine the data collection instrument or the collection procedures.
- Determine who will be included in the evaluation-for example, all program participants, or a random sample of participants.
- Conduct the data collection.

Data Analysis

- Determine how the data will be analyzed.
- Determine who will analyze the data.
- Conduct the analysis, and allow for several interpretations of the data.

Reporting

- Determine who will receive the results.
- Choose who will report the findings.
- Determine how (in what form) the results will be disseminated.
- Discuss how the findings of the process evaluation will affect the program.
- Decide when the results of the summative evaluation will be made available.
- Disseminate the findings.

Application

- Determine how the results can be implemented.

Stage 5: Gathering Data and Assessing Results

Thus far, Stages 1-4 have described program planning considerations both for development and implementation of outreach activities and for evaluating what is accomplished and what can be improved. Assessment of actual implementation and outcomes, called process and summative evaluation, provides accountability and helps inform program decisions or improvements. Stage 4 addressed several considerations for planning how process and summative evaluation will be conducted, including:

- Determining evaluation objectives
- Determining more specifically priorities for what should be discovered, tested, or verified
- Selecting the evaluation design appropriate to those priorities

In Stage 5, evaluation planning continues with consideration about what evidence will be measured or observed and how to best measure or observe it. This chapter will address methods of collecting data and analyzing results.

What Does Evaluation Measure?
The basic question answered by measurement and analysis is how data collected from the program compares with program evaluation criteria.

What are "program evaluation criteria"? They are the criteria that determine answers for evaluation objectives and questions posed by you and your stakeholders.

Thus, criteria that evaluation might measure, depending on what you want from the evaluation (as discussed in Stage 4), include:

- outreach objectives --their careful construction in Stage 2 will facilitate decisions about measurement (process and summative evaluation)
- characteristics of the outreach process considered important for reaching success (process evaluation)
- information about implementation of the program that is important for program replication (process evaluation)
- assumptions about cause and effect of strategies—relationship between independent and dependent variables (summative evaluation)
- outcomes not already measured in outreach objectives (summative evaluation)

In planning for data collection, think broadly about the evaluation criteria to be measured that correspond to what you and your stakeholders want to find out from the evaluation results. Figure 16 present ways to measure example outcomes that may be part of your evaluation criteria (depending on the outreach objectives you have developed).

Figure 16 Selected Evaluation Criteria

Type of Indicator	*Example Means of Obtaining Data*
Awareness	• Written instruments (e.g. true-false items, completion items • Proxy measure (e.g. number of pamphlets picked up)
Knowledge	• Written/oral test (e.g. completion items, multiple-choice items, true-false items)
Attitudes	• Written instrument (e.g. Likert scale items, cumulative scale items, value scale items, forced choice items)
Behavior	• Self-report written instrument (e.g., completion items, short-answer essay items, multiple-choice items, true-false items) • Observation (obtrusive and unobtrusive) • Proxy measures (e.g. number of people who accessed a website, number of requests received for materials)
Skills	• Observation (obtrusive and unobtrusive) • Skills test (e.g. able to retrieve specific type of clinical research)

The next section of this chapter will describe the instruments and tools for various methods of data collection. To help with decisionmaking about what criteria is measured and what methods will be used, complete Workforms provided in Stage 5 Tool Kit. For completed workform samples, please refer to Appendices J1 and J2.

Methods of Data Collection

There are a variety of data collection methods for obtaining measurements. [McKenzie, 1997 #47] provides a thorough description of several, covered briefly in the following section.

Written questionnaires, telephone interviews, and face-to-face interviews are methods of collecting data from respondents. Respondents are the individuals who supply this information, so the measures are called "self-report."

Since respondents are asked to recall and report information accurately, results are influenced by the person's ability to remember information ("When were you last on the Internet?") and report it honestly ("I use PubMed daily"). Offering anonymity is helpful in gaining honest answers.

Surveys are instruments that present information to a respondent in writing or pictures requiring a written response – a check, circle, word, sentence, or several sentences. Surveys can be conducted by mail, in person, by telephone, or electronically.

Survey research is one of the most common methods used in outreach evaluation, e.g.:

- for a community or audience profile
- for pre-and and post-tests in a process evaluation to determine progress or improve quality
- for followup questions queried *after* an outreach activity to determine what has happened as a result of outreach participation

Interviews are conducted between two (or more) persons in which a respondent answers questions posed by an interviewer. The questions may be predetermined, but the interviewer is free to pursue interesting responses. Focus group interviews take advantage of small group dynamics (usually eight to twelve

individuals). The open ended nature of interviews or focus groups allows participants to provide answers in their own words and allows researchers to better understand issues from the perspective of the audience.

Observations require that one or more observers devote attention to the behavior of an individual or group in a natural setting. Protocols about who or what to observe, when and how long, and the method of recording the information (e.g., a questionnaire or tally sheet) can guide observers. Or, an observer may simply record an account of events that occurred within the prescribed time period, without following a guide for what to observe, for how long, etc.

Records are systematic accounts of regular occurrences consisting of such things as sign-in sheets, interlibrary loan tallies, document service requests, computer log files, etc.

Meetings are a good source of information for the formative planning stages of a program. For example, a meeting with contacts of the targeted audience and outreach staff will be helpful for effective planning of the implementation and evaluation. The meeting structure can be flexible to avoid limiting the scope of the information gained. Possible biases may occur if those involved feel they need to give "acceptable" responses rather than discussing actual concerns.

When deciding which data collection methods you will use, Figure 17 summarizes some advantages and disadvantages of various methods [King, 1987 #46].

Figure 17 - **Methods for Collecting Data**		
	Advantages	**Disadvantages**
Questionnaire	• Provide answers to a variety of questions • Can be answered anonymously • Allows time before responding • Can be administered to many people, at distant sites, simultaneously • Impose uniformity by asking all respondents the same thing	• Are not as flexible as interviews • People can often express themselves better orally than in writing • Getting people to complete questionnaires can be difficult • Good questions take time to develop and test
Interview	• Can be used for non-native speakers or those who might have difficulty with the working of written questions • Permit flexibility and allow the interviewer to pursue unanticipated lines of inquiry • Appropriate to get in-depth information for sensitive topics	• Is time consuming • Sometimes the interviewer can unduly influence the responses of the interviewee • Limits sample size
Observation	• Can be valuable if self-report measures may not be accurate • Can be seen as a report of what actually took place presented by a disinterested outsider(s)	• Presence of observers may alter what takes place • Time to develop the instrument and train observers • Time to conduct sufficient numbers of observations • There are usually scheduling problems • Limits sample size
Records	• Often viewed as being objective and therefore credible • Sets down events at the time of occurrence, rather than in retrospect • Can be unobtrusive • Can have a low impact on staff time and resources if records are already kept for purposes other than the evaluation	• May give incomplete data • The process of examining them and extracting relevant information can be time-consuming • There may be ethical or legal constraints in examining certain records • If records are kept only for the purpose of evaluation, may be seen by staff as burdensome
Meetings	• Good for formative evaluation • Can be low cost • Permit flexibility	• Possible bias if participants feel unable to be candid

Adopted from *How to Assess Program Implementation*, by J.A. King, L. L. Morris, and C.T. Fitz-Gibbon, 1987, Newbury Park, Sage Publication

Quality of Data Collection
Criteria to guide your data collection decisions include *reliability*, *validity*, and *cultural appropriateness.*

Reliability is a measure of the consistency of the data collection instrument. A reliable instrument gives the same (or nearly the same) result every time. In *test-retest reliability*, the survey should produce the same results if the same person completed it twice. *Interrater reliabilty* comes into play when information is collected by observers or raters. There should be consistency or agreement about measurement between observers. For example, two observers should give similar scores when rating search skill competence of class participants.

Validity refers to whether the instrument accurately measures what was intended. A valid instrument increases the chance that you are measuring what you want to measure, thus ruling out other possible explanations for the results.

For example, an issue of validity might be whether you think a follow-up questionnaire can accurately and completely reflect the impact of outreach on professional activities and decision making. Researchers might get an incomplete picture of the impact that outreach makes if relying only on survey questions that force diverse opinions and experiences into predetermined response categories. A richer understanding of the impact of outreach might be revealed through interviews or focus groups.

However, there are ways to construct a questionnaire to help assure that questions are as valid and reliable as possible, as listed in Figure 18.

Figure 18

Developing a Data Collection Instrument

1. Determine the purpose and objectives of the proposed instrument.
2. Develop instrument specifications.
3. Review existing instruments.
4. Develop new instrument items.
5. Develop directions for administration and examples of how to complete items.
6. Establish procedures used for scoring the instrument.
7. Conduct a preliminary review of the instrument with colleagues.
8. Revise the instrument based on review.
9. Pilot test the instrument with twenty to fifty subjects.
10. Conduct item analysis, reliability, and validity studies.
11. Provide instrument specifications and pilot study data to a panel of experts for review.
12. Revise the instrument based on comments from the panel of experts.
13. Conduct a second pilot test.
14. Conduct item analysis, reliability, and validity studies.
15. Provide instrument specifications and pilot study data to a panel of experts for a second review.
16. Make final changes.
17. Determine cut scores (for criterion-referenced tests or screening tests)
18. Produce the final instrument for evaluation study

For a thorough description of *instrumentation*, the technical term for selecting or developing measuring devices, readers are referred to [Isaac, 1995 #63]. For example, Isaac describes tests for item analysis and reliability, as well as various types of validity, including content, construct, and criterion-related.

For a less rigorous way to determine consistency and accuracy, Reisman et al (1994, pp. 68-69) describes how to pilot test a research instrument. The pilot test will answer questions such as:

- Are certain words or questions redundant or misleading?
- Are the questions culturally or otherwise appropriate for the intended respondents?
- Will the data be useable for meaningful analysis?
- Are the procedures for collecting the data clear to anyone who will do so?
- How consistent is the information obtained by the survey?
- How accurate is the information obtained by the survey?

Reisman suggests putting the instrument through a trial run with six to ten people who are similar to those likely to respond or be interviewed. Analyze the feedback from your test group to determine if questions are clear and understandable. Do people interpret the questions as intended? Are the response choices in your questions adequate and sufficient?

For example, if you know attitudes or behaviors of the test groups, are their responses consistent with their attitudes and behaviors. Select some pilot test respondents who you perceive to be uncertain about using computers to find answers to health information questions. Select a few others who you perceive to be enthusiastic about the effectiveness of using computers for health information needs. Determine whether the questionnaire or interview responses distinguish between the enthusiastic and the resistant.

Cultural appropriateness

The cultural perspectives of your targeted audience should be considered in the selection as well as approach to data collection strategies. An excellent source on this topic is *Cultural Competence for Evaluators: A Guide for Alcohol and Other Drug Abuse Prevention Practitioners Working with Ethnic/Racial Communities.* (1992) Washington D.C.: U.S. Department of Health and Human Services [Orlandi, 1992 #50].

Members of "over-researched" ethnic minority groups, such as American Indians/Alaska Natives and African Americans, tend to be skeptical or mistrustful of the evaluation process. Their experience has been that social scientists enter their communities and collect data, but frequently fail to share their findings or take visible and beneficial action. In Hispanic communities, evaluators are viewed with suspicion as outsiders who conduct sterile research only to justify the shutdown of needed projects or services [Orlandi, 1992 #50].

The challenge for the researcher is to build confidence in the purpose and benefits of the research results for the community. Try to involve respected community members and leaders in evaluation planning (e.g. to review a questionnaire and data collection strategy). Ask their cooperation in helping you to recruit participation. You can also directly involve members of the community in data collection efforts, such as interviews. Be sure to share your findings, if possible as early as the draft stage, for their review and comment.

Data analysis
Once you have gathered the data from the surveys, interviews, or other methods, the next steps involve conducting the analysis, drawing conclusions, and preparing a report or presentation. It is important to consider how to do the analysis in the evaluation planning stage.

The total time for conducting an evaluation includes the planning process, data collection, data analysis, and presentation of the results. Data analysis and presentation are the components that make the whole process worthwhile, and sufficient time should be allotted, even if this means limiting the evaluation goals and reducing the number of data collection methods.

Coding
Data collected from your evaluation must be compiled, coded, and entered into a spreadsheet or other data analysis program for analysis. *Coding* means that numbers are assigned to responses. The following example shows numbers assigned (coded) for responses to a closed-ended question:

Example:
I am able to use PubMed to avoid falling behind current medical knowledge.

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Coding is typically used to analyze close-ended questions that have predetermined response categories: You can also code open-ended questions, but it can be difficult and time consuming because the answers will vary according to each individual response. You must read answers item by item for "naturally" occurring categories found in commonly mentioned themes. The responses are then coded according to these various categories.

Quality control
Data entry must be checked for errors before proceeding. Obvious errors will be detected by scanning the entire data file (e.g. you might see a "9" when the highest possible code is a "7"). Also, ask someone who did not enter the data to compare 10% of the raw data (e.g. the surveys) with the computer data file. If there are a number of errors, all the data should be reexamined.

For the most rigorous quality control, the same data should be entered twice by different people and compared. If the compared files appear to be identical, there is greater assurance that the data were entered consistently.

Types of Analyses
The type of data analysis will vary depending on the type of data collected. Qualitative methods of data collection may include observations, interviews, focus groups, and analytic insights or interpretations that occurred during the data collection. This descriptive text is recorded and analyzed for themes. Careful reading and summarization of the data can be sufficient for general evaluation purposes (Marshall, 1995).

There is software available for in-depth analysis of qualitative data, such as ATLAS/ti and NUD*IST. These software packages work with textual documents, such as transcripts of interviews or focus groups, and facilitate coding, search and retrieval, and theory building. NUD*IST is best known in its Macintosh version, while ATLAS/ti is most user friendly in DOS.

Quantitative methods of data collection use hard data (e.g. numbers of outreach participants, total Website hits) or pre-coordinated responses on questionnaires that can be coded and entered into a statistical analysis program such as SAS or SPSS. Spreadsheet programs (e.g. Excel) can also be used to display quantitative data, although statistical analysis is limited.

However, it is possible to manipulate the data and produce various tables, such as frequencies, or cross tabulate the data so that relationships can be examined (e.g attitude changes in physicians vs. nurses).

Statistical techniques that summarize and describe characteristics of a group or make comparisons of characteristics between groups are *descriptive* statistics. If generalizations are inferred about a population based on a sample, you use *inferential* statistics.

To analyze your results, you assess the effects of your "independent variable" (the intervention) on your "dependent variables" (outcome measures). Typically, the dependent variables will be measured on your posttest survey and will include things like attitudes, intentions to act a certain way, reports of behaviors, etc.

If you were using an experimental or quasi-experimental design, the effects of an independent variable on a dependent variable would be compared between two or more groups. The independent variable (e.g. endorsement, support, and participation by opinion leaders) would only be used in the experimental group, but the dependent variable (e.g. perception of efficacy) would be assessed in both. If there are significant differences in the dependent variables between each group, you can be more confident that the independent variable made a difference.

Other dependent variables can be assessed without input from the subject. For example, you could tally how many log-ins or how much time individuals or groups spent on the computer. Then, you would determine the mean of the number of log-ins or the number of minutes spent on the computer by group. Finally, you would compare these means for significant differences, using the t-test or F-test.

T-tests

The **t-test** is a test to see if there is a statistically significant difference between the mean scores of two groups [Fitz-Gibbon, 1987 #64]. For example, the two groups might be the intervention group and the control group, with the comparison being the difference in mean scores on the variable self-efficacy. To apply a t-test to the difference between the mean scores of each group, use a statistical software program, such as SPSS, that will compute a formula to obtain the difference between the mean scores, or a t-value. The program will show **t-test** results, which designates whether the t-value (difference between the mean scores) is larger than would be expected if the differences were due to chance. In other words, the t-test indicates whether the scores in the intervention group were significantly different from the control group.

The t-test is particularly useful for analysis when sample sizes are small, though it is best to have at least twenty cases to compare. An **F-test** does the same for three or more groups.

T-tests can be used on paired samples or independent samples. In paired samples, the changes are being compared in the same individual from one point to the next (e.g. changes in attitude due to outreach participation). In independent samples, two or more separate groups are measured, which is useful for comparing a group of outreach participants with another comparison group.

Univariate analysis

For some types of evaluation, descriptive data are all that is needed to describe participants, such as their background characteristics, attitudes, knowledge, and behavior. Commonly, descriptive data analyzes

one variable, and is called *univariate analysis.* Descriptions are provided in terms of percentages and measures of central tendency, i.e., mean, median, and mode.

Mean – arithmetic average of all scores

Median – midpoint of all scores

Mode – the most frequently occurring score

Other examples of descriptive data are frequency or summary counts, such as the number of participants in a class.

Evaluation questions that focus on testing a hypothesis about relationships between variables require more elaborate techniques, known as *bivariate* and *multivariate* analysis.

Bivariate analysis
McKenzie, p. 255 (1997) presents the following definitions of statistical techniques used in bivariate analyses.

Correlation is used in bivariate data analysis to establish a relationship between two variables. Correlation is expressed as a value between +1 (positive correlation) and –1 (negative correlation), with 0 indicating no relationship between the variables. Correlation only indicates a relationship; this technique does not establish cause and effect.

Inferential data analyses – uses statistical tests to draw tentative conclusions about the relationship between variables. Conclusions are drawn in the form of probability statements, not absolute proof. The evaluation question is stated in the form of hypotheses. **Null hypothesis** – holds that there is no observed difference between the variables. The **alternative hypothesis** says that there is a difference between the variables. For example, a null hypothesis states that there is no difference between the experimental and control groups in knowledge about computers. The alternative hypothesis states that there is a difference.

Analysis of variance (ANOVA) – a statistical test used to compare the difference in means of two or more groups. ANOVA does not prove that there is a difference between groups; it only allows you to reject or retain the null hypothesis, then make inferences about the population.

Chi square – a statistical technique to test hypotheses about frequencies in various categories. This technique uses categories that can be distinguished from one another but are not hierarchical. Chi square could be used to analyze attitudes toward computers between physicians in three different specialties.

Multivariate analyses determines the relationships between more than two variables. One type of multivariate statistic is **multiple regression**, used to make a prediction from several variables. For example, Gorman (1995) used multiple regression to analyze 12 factors expected to motivate information seeking by physicians and determined that two were significant predictors.

Activities, Best Practices, Theory-based Strategies	What will be measured?	How will we measure it?

Objectives	What outcome will we measure?	How will we measure it?

Stage 6: Utilizing and Reporting the Results

Once you have completed the data analysis phase, the results must be interpreted and shared. You may have data that can help improve your outreach program and you also may use what you learn to:

- Justify your outreach program with management or funding source
- Provide evidence of need for additional funds or resources
- Increase understanding of and support for outreach activities among your targeted audience community
- Encourage ongoing partnerships or cooperative ventures with partner organizations

A formal report should include a summary of the programs' implementation and effects. The evaluation tasks you identified in your evaluation plan should be discussed (or other questions discussed if appropriate). Taking the time to write the report will help you:

- consider everything that happened in the course of the evaluation
- critically analyze the results
- think about any changes you should make as a result of the evaluation.

In the process evaluation phase, findings that assess ongoing activities for the purposes of fine tuning and quality improvement may be less formally communicated – perhaps in conversations or discussions with outreach or site staff. Face-to-face meetings provide staff with a forum for active involvement in outreach planning and evaluation, for discussion, clarification, and detailed elaboration of the evaluation's findings as well as the opportunity for making suggestions about upcoming evaluation activities.

There should be a schedule for interim reports (whether oral or written) to allow for continual feedback on ways that outreach activities can be yet more appropriate, effective, and appealing for participants.

Making the most of your evaluation means taking the time to apply what you have learned. The following steps to revise a program are adopted from [Arkin, 1992 #65]:

Reassess goals and objectives
- Has anything changed with your target audience or your organization's mission to require revisions in the original goals and objectives?
- Are some objectives not being met? Why?
- Are there strategies or activities that did not succeed? Why?

Identify effective activities or strategies
- What objectives have been met as a result of successful activities?
- Should these activities be expanded because they appear to work well?
- Or, are the objectives considered successful and completed?

Compare costs and results of different activities
- What were the relative costs (including staff time) and results of different aspects of your program?
- Are there some activities that appear to work as well but cost less than others?

Depending on the focus and use of your evaluation, those interested in results will be outreach staff, the funding sponsor, the community targeted by the outreach program, and other library outreach professionals.

High quality and useful reports or presentations about the results of your evaluation will help you get the most mileage from your evaluation investment. Let sponsors and other primary users of the evaluation read the report in draft form so they can indicate where clarification is needed or point out places where misunderstandings have occurred.

The following tips about report preparation and structure are adopted from Reisman et al (1994):

Report preparation

1. Allow Adequate Time. When creating the timeline for your evaluation process, be sure to allow adequate time to prepare the report. If quality is compromised, readers may have doubts about the credibility of your findings.

2. Know Your Audience(s). Target your report to the audience and the information they are most interested in. For example, the type and level of detail of interest to a community leader will be different than information of interest to your colleagues. You may need to prepare more than one report to accommodate various audiences.

3. Remove Hurdles. Depending on your audience and findings, you may need to consider those with stakes in a program's success or failure. One way to help deflate concerns or preconceived ideas is simply to acknowledge that they exist. A few lines in your opening section about your awareness of people's concerns or perceptions can go a long way toward reducing defensive postures.

Report structure

Although you will decide on the level of detail and content according to your audience, the typical evaluation report is likely to include the following sections:

1. **Executive Summary.** A one to four-page version that summarizes the key points. Bear in mind that some people will read *only* the executive summary, so include the most essential information on the purpose of the evaluation, key findings, and any resulting recommendations. Also, executive summaries are often photocopied from reports, so include identifying information (contact person, address, telephone number, and date).
2. **Purpose.** Explain why you conducted the evaluation – what are the broad questions the evaluation is trying to answer? Who requested or initiated the evaluation?
3. **Background** – Provide readers with adequate background information about your outreach program's structure, history, and goals. What do they need to know in order to understand the evaluation?
4. **Methodology** – Explain your evaluation design, including what data collection tools and sampling methods you used. (Include as attachments copies of data collection instruments you used).
5. **Summary of Results** – Give a summary conclusion about the key questions the evaluation set out to answer.
6. **Principal Findings** – Provide more detail on the findings that support your summary conclusions. Include charts or tables to illustrate your findings.
7. **Considerations or Recommendations** Depending on the purpose of your evaluation, it may be appropriate to include a section that discusses the implications of the findings – what actions might be warranted if the program is succeeding or failing? Not all evaluation reports include this information; you should make clear at the outset of your evaluation project whether yours will include this information and to whom it will be directed.

8. **Attachments** – Information that is important, but too cumbersome or long for the main report can be placed in the appendices, such as:
    - **Profile of respondents**. A description of the numbers and characteristics of respondents for your various data collection tools. For example, if you conducted a survey, you should include the number of respondents and a profile of demographic or other relevant data you collected about them.
    - **Copies of data collection tools**. Survey instruments, focus group questions, and interview guides are helpful to include.
    - **Detailed results**. You may have detailed write-ups of focus group results, interviews, and survey results that you want to attach to the report. Be sure to consider confidentiality issues– readers should not be able to identify specific respondents.
    - **Testimonials**

Dissemination of Results

You can probably identify several audience(s) who will be interested in the results of your evaluation, such as your funding agency, targeted community, staff, and professional colleagues. Distributing a printed report is one appropriate method for disseminating results, but look for other publishing, presentation, or promotion opportunities, such as through professional meetings and activities, websites, listservs, or in print or electronic journals.

For example, the Outreach Special Interest Group of the Medical Library Association sponsors the Outreach Librarians Discussion List. You can announce results of your evaluation and generate further discussion among colleagues who have similar goals and challenges. Subscribe to the list by sending an email "subscribe Outlib-L," in the body of the message to OUTLIB-L-request@LSV.UKY.EDU. Or, the Research Section MLA sponsors contribute paper and poster sessions at the MLA annual meeting to facilitate the dissemination of relevant research results within the MLA membership.

If you want to publish results in a journal article format, potential publications include the *Bulletin of the Medical Library Association* or the *MLA News*. In addition, consider publishing or presentation opportunities in other fields such as health education or health communications, especially if your strategies and research draw from health education or health communication theories. Or, consider public health journals if you conduct a public health outreach program.