Outcomes Assessment Resources

National Science Foundation (NSF) Grant Program
Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics (TUES)
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Preface

One of the important project features outlined in the TUES program solicitation (NSF 10-544) is project evaluation. NSF states:

All projects, regardless of the scope or main program component they address, should have an evaluation plan that includes both a strategy for monitoring the project as it evolves to provide feedback to guide these efforts (formative evaluation) and a strategy for evaluating the effectiveness of the project in achieving its goals and for identifying positive and negative findings when the project is completed (summative evaluation). The complexity of the evaluation will depend on the project, and these efforts should be led by knowledgeable individuals who look objectively at the project’s progress and outcomes.

This document was prepared as a reference to help principal investigators and project evaluators achieve the above objective.

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Evaluation and Assessment Basics

-NSF TUES Programs-

Extracted from:

*Overview of Evaluation and Assessment*

*Research Proposals*

*FOR NSF TUES Programs*

Presented by

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March 10, 2010
Importance of Evaluation

- Why do Evaluation?
  - Gather information to help improve the project
  - Provides new insight or new information; the unintended consequences
    - This could lead to further funding opportunities
  - Provides information for communicating to a variety of stakeholders
    - Tell a story
    - Prove their worth
  - Comply with funder accountability

- Government Performance Results Act of 1993
  - Findings
    - (1) waste and inefficiency in Federal programs undermine the confidence of the American people in the Government and reduces the Federal Government’s ability to address adequately vital public needs;
    - (2) Federal managers are seriously disadvantaged in their efforts to improve program efficiency and effectiveness, because of insufficient articulation of program goals and inadequate information on program performance; and
    - (3) congressional policymaking, spending decisions and program oversight are seriously handicapped by insufficient attention to program performance and results.
  - Focused on results or impact of federal investments

- NSF focuses on four strategic outcomes
  - Discovery: Foster research that will advance the frontiers of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering.
  - Learning: Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens.
- **Research Infrastructure**: Build the nation’s research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools.

- **Stewardship**: Support excellence in science and engineering research and education through a capable and responsive organization.

- NSF funded projects will be asked to provide data on their accomplishments in these areas, as relevant.

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### Importance of Evaluation

- Inherent relationship between evaluation and program implementation.
- Evaluation is part of the project from the beginning
- Project development/evaluation cycle

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### Project Planning/Modification

- Needs assessment and collection of baseline data

### Project Implementation

### Project Evaluation

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**Expectations for Assessment and Evaluation** *(From NSF TUES Program Proposal Template)*

- **Expected Measurable Outcomes**: Projects should have goals and objectives that have been translated into a set of expected measurable outcomes that can be monitored using quantitative or qualitative approaches or both. These outcomes should be used to track progress, guide the project, and evaluate its ultimate success. Expected measurable outcomes should pay particular attention to student learning, contributions to the knowledge base, and community building.
• **Project Evaluation:** All projects, regardless of the phase or main component of the cyclic model they represent, should have an evaluation plan that includes both a strategy for monitoring the project as it evolves to provide feedback to guide these efforts (formative evaluation) and a strategy for evaluating the effectiveness of the project in achieving its goals and for identifying positive and negative findings when the project is completed (summative evaluation). These efforts should be based on the project’s specific expected measurable outcomes defined in the proposal and should rely on an appropriate mix of qualitative and quantitative approaches in measuring the outcomes.

**Elements of an Evaluation Plan**

• **Types of Evaluation**

• **Formative evaluation** details a plan to evaluate the project during the completion of the project; it helps to identify the changes or modifications that are needed along the way. A formative evaluation is designed to assess initial and ongoing project activities:
  - Focuses on improving a program or project
  - Identifies improvements, modifications, and management needs of the project
  - Judges the value of a project during the implementation of the project
  - Can be completed more than once

• **Summative evaluation** details a plan to evaluate the extent to which you accomplished the goals or objectives of the project; it helps to identify the changes or modifications that are needed for the next iteration of the project. A summative evaluation assesses the quality and impact of a project:
  - Occurs after the completion of the project
  - Evaluates the outcomes or accomplishments of the project –measures success of goals
  - Judges the value of a project after it has been fully implemented
  - Suggests what changes need to be made to the program
The terms **evaluation** and **assessment** are often used interchangeably with respect to documenting the outcomes of a grant funded project. However, though evaluation and assessment are related, they are not identical.

- **Assessment** refers specifically to the measurement of student learning outcomes—-that is, what students know, can do, or value as a result of their educational experiences.

- **Evaluation** is a broader concept which describes not only program outcomes, but program inputs (resources and activities) as well. When a grant-funded project is intended to sustain or improve student learning, then assessment of student learning outcomes may be one component of project evaluation.

### Evaluation Plan Characteristics

- A strong grant project evaluation plan includes the following:
  - A clear statement of the intended outcomes of the project
  - The evidence that will indicate the extent to which the outcomes are being achieved
  - How and from whom the evidence will be collected
  - How and by whom the evidence will be analyzed
  - How and to whom the results will be reported
○ How by whom the information will be used
○ Clear connection to the NSF general strategic outcomes

**Evaluation Review**

The key questions that reviewers will try to answer related to the evaluation plan.

1. How will you manage the project to ensure success?
2. How will you know if you succeed?

**Elements of an Evaluation Plan**

- A strong grant project evaluation plan includes the following:
  ○ Clear connection to the NSF general strategic outcomes

  - **Discovery**: Foster research that will advance the frontiers of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering.

  - **Learning**: Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens.

  - **Research Infrastructure**: Build the nation’s research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools.

  - **Stewardship**: Support excellence in science and engineering research and education through a capable and responsive organization.
### Evaluation Plan Format

<table>
<thead>
<tr>
<th>Research Questions or Program Goals</th>
<th>Objectives or Learning Outcomes</th>
<th>Assessment Opportunity</th>
<th>Timeline (when assessed)</th>
<th>Assessment Method</th>
<th>Benchmark (standard or target)</th>
<th>Evaluator Type</th>
<th>Use of Results and Dissemination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad statements of what you want to achieve.</td>
<td>Align with program goals or questions - knowledge, skills, attitudes, habits of mind that students take with them from the learning experience. How will students be different because of a learning experience?</td>
<td>Identify the course or experience and assignment or activity</td>
<td>Annually, semester, pre-course, post-course, etc.</td>
<td>List the type of instrument name of scoring guide or rubric, or portfolio</td>
<td>Indicates performance standard (e.g., percentage of students who earn at least a minimally acceptable score.)</td>
<td>Type of evaluator (e.g., faculty, external reviewer)</td>
<td>Describe how the results will be used and shared (e.g., department, advisory board)</td>
</tr>
</tbody>
</table>

### External Evaluators

- Why an external evaluator?
  - Required by the program
  - Unbiased opinion
  - If optional, it is preferred but not necessary.
  - Depends on budget limitations

- Who can be an external evaluator?
  - May be defined by solicitation
  - Can be person outside of the organization
  - Can also be person outside of department
  - Can also be person in the department but not involved with the project
• External Evaluator Qualifications
  ○ Will have some knowledge of the funding requirements and goals
  ○ Preferably some technical knowledge
  ○ Experience with evaluating similar projects

• Locating an External Evaluator
  ○ Program Officers at the funding agency may have preferences and may recommend.
  ○ Other projects funded via the same program
  ○ RIT faculty with experience; possibly in the psychology or sociology departments.
  ○ Listservs and online databases

**Describing the Evaluation Plan in a Grant Proposal**

• Well-written evaluation procedures increase your chances of being successful

• Be concise and clear, remember page limits.

• Don’t treat the evaluation section offhandedly or fail to give it the careful attention it deserves.
  ○ Reviewers understand that designing the evaluation is part of the planning process, so statements regarding a “plan that you will design once the project is funded” is a signal that you haven’t thought your program through.

• Use it as an opportunity to create a blueprint that will keep you focused and on task.

• Use tables to demonstrate relationships between goals, outcomes and activities. Be sure to include:
  ○ Goals
  ○ Activities to meet goals
  ○ Outcomes for each activity
  ○ Method of evaluation
  ○ Frequency
  ○ Person Responsible

• Describe how the results will be used and how they will be disseminated.
Introduction

The NSF 2002 User-Friendly Handbook for Project Evaluation (Online Evaluation Resource #1) states that “[e]very proposed evaluation should start with a conceptual model to which the design is applied” (p. 16). Conceptual models provide visibility and understanding regarding a project’s structure, relationship of key elements and expected outcomes. It provides a framework to assure that identified project outcomes are linked to the key project elements. A type of conceptual model is a “logic model”. A logic model is a simple illustration of the thoughts behind a project and it highlights how outcomes will be measured. Online Evaluation Resources #1 and #7 address the use of logic models for project evaluation. The logic model template presented is offered as an example. See Online Resources #1 and #7 for additional examples.

The logic Model

Application

• Often required for federal, state and foundation grants
• Often represented graphically with a narrative within the grant for elaboration

Description

• Narrative or graphical depictions of processes in real life that communicate the underlying assumptions upon which an activity is expected to lead to a specific result
• Illustrate a sequence of cause-and effect relationships— a systems approach to communicate the path toward a desired result
• Logic models link the problem (situation) to the intervention (inputs and outputs), and the impact (outcome) and the measures of those outcomes.

Purpose*

The logic model is a versatile tool that can support many management activities, such as:

Program Planning: The logic model is a valuable tool for program planning and development. The logic model structure helps you think through your program strategy—to help clarify where you are and where you want to be.

Program Management: Because it "connects the dots" between resources, activities, and outcomes, a logic model can be the basis for developing a more detailed management plan. Using data collection and
an evaluation plan, the logic model helps you track and monitor operations to better manage results. It can serve as the foundation for creating budgets and work plans.

**Communication:** A well-built logic model is a powerful communications tool. It can show stakeholders at a glance what a program is doing (activities) and what it is achieving (outcomes), emphasizing the link between the two.

**Consensus-Building:** Developing a logic model builds common understanding and promotes buy-in among both internal and external stakeholders about what a program is, how it works, and what it is trying to achieve.

**Fundraising:** A sound logic model demonstrates to funders that you have purposefully identified what your program will do, what it hopes to achieve, and what resources you will need to accomplish your work. It can also help structure and streamline grant writing.

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**Logic Model Template**

<table>
<thead>
<tr>
<th>Logic Model Template (McCawley, 1997)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUTS</strong></td>
</tr>
<tr>
<td>What we invest</td>
</tr>
<tr>
<td><strong>ACTIVITIES</strong></td>
</tr>
<tr>
<td><strong>SHORT TERM</strong></td>
</tr>
<tr>
<td>What the short term results are</td>
</tr>
<tr>
<td><strong>OUTCOME MEASURES</strong></td>
</tr>
</tbody>
</table>

**External Influences, Environment, Related Programs**
Logic Model Template Elements

Situation

• A statement of the problem
• A description of who is affected by the problem
• Who else is interested in the problem?

Inputs

• Human resources
• Fiscal resources
• Facilities and equipment
• Knowledge base for the program
• Involvement of collaborators

Outputs

• Activities-Things accomplished
• Participants-People reached

Outcomes

Short-term

• Short-term outcomes are those that are the most direct result of a program’s activities and outputs.
• They are generally achievable in one year.
• They are typically not ends in themselves, but are necessary steps toward desired ends (intermediate or long-term outcomes or goals).
• Short-term outcomes represent changes in: AWARENESS, KNOWLEDGE, SKILLS, MOTIVATION, and ATTITUDE.

Short-term Outcome Assessment

• Quantitative— descriptive or inferential statistical measures, Likert scales, etc.
• Qualitative— interviews, focus groups, written responses, case studies, etc.
• Mixed Method—a combination of quantitative and qualitative measures

Medium-term

• Intermediate outcomes are those outcomes that link a program’s short-term outcomes to long-term outcomes.

• Medium-Term outcomes represent changes in: PRACTICES, BEHAVIORS, POLICIES, TECHNOLOGIES, and STRATEGIES.

Long-term

• Long-term outcomes are those that result from the achievement of your short- and intermediate-term outcomes, and often take a longer time to achieve.

• They are also generally outcomes over which your program has a less direct influence.

• Often long-term outcomes will occur beyond the timeframe you identified for your logic model.

External Influences

• Who are important partners/collaborators for the program?

• Which part(s) of the issue can this project realistically influence?

• What other needs must be met in order to address this issue?
Online Evaluation Resources

Grant Evaluation


   **Project Evaluation** (National Science Foundation)
   
   This publication titled *2002 User Friendly Handbook for Project Evaluation* is an 84 page NSF handbook for evaluating educational programs. It is a basic guide aimed at individuals needing a better understanding of what evaluations can do and how to perform an evaluation. The handbook is divided into four sections: evaluation definition and types of evaluation, steps in performing an evaluation, overview of quantitative and qualitative data collection methods, and strategies that address culturally responsive evaluation. Emphasis is placed on the use of conceptual models as the basis for evaluation design to assure linkage of project outcomes to project structure.


   **Online Evaluation Resource Library**
   
   The Online evaluation resource Library (OERL) focuses on the design, implementation, documentation, and review of project evaluations. Examples of evaluation plans, instruments, and reports for NSF projects are available for use by principal investigators and project evaluators. An array of project evaluation supporting materials is also available.


   **How to Evaluate Foundation Programs** (The Saint Paul Foundation)
   
   This publication is a 70 page handbook centered on how to conduct a project evaluation. The content focuses on the technical dimensions of evaluation. Page iii categorizes the contents as follows: “how to plan for evaluation; developing a questionnaire; the use of observations; the use of focus groups; how to use evaluation information for program planning; how to develop evaluation plans that are culturally specific; and how to choose an evaluator”.

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   **Sample Grant Evaluation Report** (Council on Foundations)
   
   The Council of Foundations presents a sample of their post-grant evaluation report in template form. Its structure is a topical, step by step guide for completion.

   
   **Grant Writing Resources** (Tucson-Pima Library)
   
   This site offers information for the preparation of grant requests. Specifically, grants for nonprofit organizations, community organizations, individuals, and small businesses are addressed.

6. http://www.wkkf.org/%7E/media/10BF675E6D0C4340AE8B038F5080CBFC.ashx
   
   **W.K Kellogg Foundation Evaluation Handbook** (W.K. Kellogg Foundation)
   
   The handbook is a 110 page instruction manual for planning, implementing, and conducting a project evaluation. Guidelines are also included for communicating evaluation results to stakeholders and using the results for continuous project improvement. A section is devoted to outcomes evaluation describing processes for defining outcomes; and the use of logic models to link outcomes to project activities, processes, and assumptions. Example logic models are included.

   
   **Outcomes in IMLS Grants to Libraries and Museums** (Institute of Museum and Library Services)
   
   The Institute of Museum and Library Services (IMLS) provides a composite of information regarding outcomes based evaluation for grants.
Assessment Tools


   **Field Tested Learning Assessment Guide (FLAG)**

   FLAG is a searchable database of discipline-specific instruments for assessment and evaluation. The “tools” can be sorted by discipline or by technique. FLAG focuses on the disciplines of science, mathematics, engineering, and technology.


   **Hints for Designing Effective Questionnaires**

   *Hints for Designing Effective Questionnaires* is an article by Robert B. Fray of Virginia Polytechnical Institute. It is provided by Practical Assessment, Research & Evaluation a peer-reviewed electronic journal (ISSN 1531-7714). The theme of the paper is to present tips for designing quality questionnaires and avoiding common mistakes.


   **Survey Research**

   This site provides a information describing survey research as an area of assessment and measurement. Types of surveys are discussed, advantages and disadvantages of various survey methods are highlighted, and tips on constructing the survey are presented.


   **User-Friendly Handbook for Mixed Method Evaluations**

   This is a nine chapter text-type, how-to, publication for conducting mixed method (qualitative and quantitative) research to evaluate project outcomes. A sample hypothetical NSF project evaluation plan is presented along with its evaluation design. Common qualitative methods (observations, interviews, focus groups, case studies, etc.) are discussed and presented. Sample instruments are included. The analysis of qualitative data and processes used are presented. A separate part of the document focuses on the designing and reporting of mixed method evaluations. Twenty exhibits are offered to support the text.

**SALG – Student Assessment of Their Learning Gains**

This website is a free course evaluation resource that can be used by college and university instructors to gather learning-based feedback from students. Survey instruments can be created to measure students’ learning progress and to measure students’ knowledge baseline.
BIBLIOGRAPHY of ADDITIONAL EVALUATION RESOURCES


Kellogg Foundation Handbook (Online Evaluation Resource #6)
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