INTERACTIVE USER'S GUIDE FOR

# EVALUATING LEARNING OUTCOMES FROM CITIZEN SCIENCE

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*Originally developed by the Program Development and Evaluation group at the Cornell Lab of Ornithology*


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**Recommended citation:** Phillips, T. B., Faulkner, H., Ferguson, M., Minarchek, M., Porticella, N., and Bonney, R. 2017. *Interactive User's Guide for Evaluating Learning Outcomes in Citizen Science.* Ithaca, NY: Cornell Lab of Ornithology.




This document is based upon work supported by the National Science Foundation under Grant No. 1010744: DEVISE (Developing, Validating, and Implementing Situated Evaluation Instruments). Any opinions, findings, and conclusions or recommendations expressed in these materials are those of the authors and do not necessarily reflect the views of the National Science Foundation.


The Cornell Lab of Ornithology is a nonprofit membership institution whose mission is to interpret and conserve the earth's biological diversity through research, education, and citizen science focused on birds.

The Cornell Lab of Ornithology

# NAVIGATING THIS INTERACTIVE DOCUMENT

This document is a shortened version of the User's Guide for Evaluating Learning Outcomes from Citizen Science by the same authors. It contains interactive elements designed to make your reading experience more engaging. Scroll to move to the next page, and note the interactive icons below:

If you see this symbol, hover or rollover the text next to it to activate interactive items

If you see a star, hover or rollover with your mouse to show extra evaluator tips.

PRINT

On some pages, you will see an option to print documents in the upper right hand corner - this will open the print dialog and is set to print only the specified page.

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Clicking this button will bring you back to the table of contents. One can be found on every page.

BACKGROUND

PHASE 1: PLAN YOUR EVALUATION

PHASE 2: IMPLEMENT YOUR EVALUATION

PHASE 3: SHARE YOUR EVALUATION

APPENDICES

# BACKGROUND

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## WHAT IS THE PURPOSE OF THIS GUIDE?

...to guide practitioners interested in evaluating outcomes from their citizen-science projects.

This guide incorporates many perspectives and focuses mainly on **summative evaluations**, particularly on **individual learning outcomes**: including those that are:

- **COGNITIVE**
- **AFFECTIVE**
- **BEHAVIORAL**

Although citizen science has extended to nearly every scientific discipline, **every evaluation will be unique to its project.**

## CITIZEN SCIENCE CAN BE...

**CONTRIBUTORY**
SCIENTIST - DRIVEN

**COLLABORATIVE**
PARTNERSHIP

**CO-CREATED**
COMMUNITY - DRIVEN

Most citizen science projects operate in similar structure and strive to meet a common set of goals related to either **research, conservation, education** or a combination of these. Thus, even different types of citizen science projects can share many common outcomes, particularly for **participant learning.**

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**CITIZEN SCIENCE:**
*a.k.a. Public Participation in Scientific Research (PPSR)*

*the engagement of volunteers and scientists in collaborative research to generate new science-based knowledge.*

# BACKGROUND

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## EVALUATION 101

Evaluation is the systematic collection of data to determine strengths and weaknesses of programs, policies, or products, in order to improve their overall effectiveness.

## WHY EVALUATE?

Evaluation can happen for any number of purposes, but some of the major reasons that organizations or projects undertake evaluation include:

- Determining program strengths and weaknesses
- Gathering evidence of success
- Sustaining or obtaining additional funding
- Understanding audience needs

## WHO IS INVOLVED?

Evaluation is often made up of a diverse group of people who are involved in your project. Knowing who your stakeholders are and agreeing on the purpose of the evaluation is essential before you begin.

## WHEN TO EVALUATE

Evaluation can happen at any time in a project's life cycle, but for best results, it should be considered through the entire life of a project – before, during, and after.

## TYPES OF EVALUATION

Understanding the type of evaluation that you are undertaking is fundamental to the rest of the planning and implementation process.

| | |
|---|---|
| Front-End Evaluation | ...occurs during the defining phase of a project to obtain baseline information about an audience. |
| Formative Evaluation | ...occurs during project development; provides direction for improving implementation and operation. |
| Summative Evaluation* | ...occurs once a project has been established; used to describe a project's outcomes, effectiveness, or value. |

*This guide will focus mainly on Summative Evaluation.

# BACKGROUND

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## ETHICS

Following a tumultuous time in history (1950s-1990s) when ethical standards for conducting research on human subjects was neglected, contemporary social and medical research now operates under set of standards aimed at protecting human rights. Conducting evaluation means repecting the security, dignity, and self-worth of respondents, program participants, clients, and other evaluation stakeholders. Any evaluation involving people should attempt to follow these five basic ethical standards:

### Voluntary participation

Requires that people agree to participate in research without any coercion.

### Informed consent

Tells potential participants about the procedures and risks involved in the research and ensures that they give their consent to participate.

### Explaining risks of harm

Ensures that participants are not placed in a situation where they risk being harmed physically or mentally.

### Confidentiality

Assures participants that their information will not be made available to anyone who is not directly involved in the study.

### Anonymity

Guarantees privacy, ensuring that even the researchers cannot identify individuals in the study. In many types of evaluation, anonymity can be difficult to achieve.

FOR MORE INFORMATION ON ETHICS IN EVALUATION, SEE
"WHAT IS AN IRB?"

## A NOTE ABOUT CULTURAL COMPETENCE IN EVALUATION

*Evaluators interact with a broad range of people from many political, religious, ethnic, language, and racial groups and need special qualities to conduct culturally competent work. In order to conduct a culturally responsive evaluation, you should be conscious of how it might be attentive to issues of culture and context. Find ways to make this a part of your planning. For example, you might do this by ensuring that partners or advisors from the community are included to help inform the evaluation process and implementation.*

# BACKGROUND

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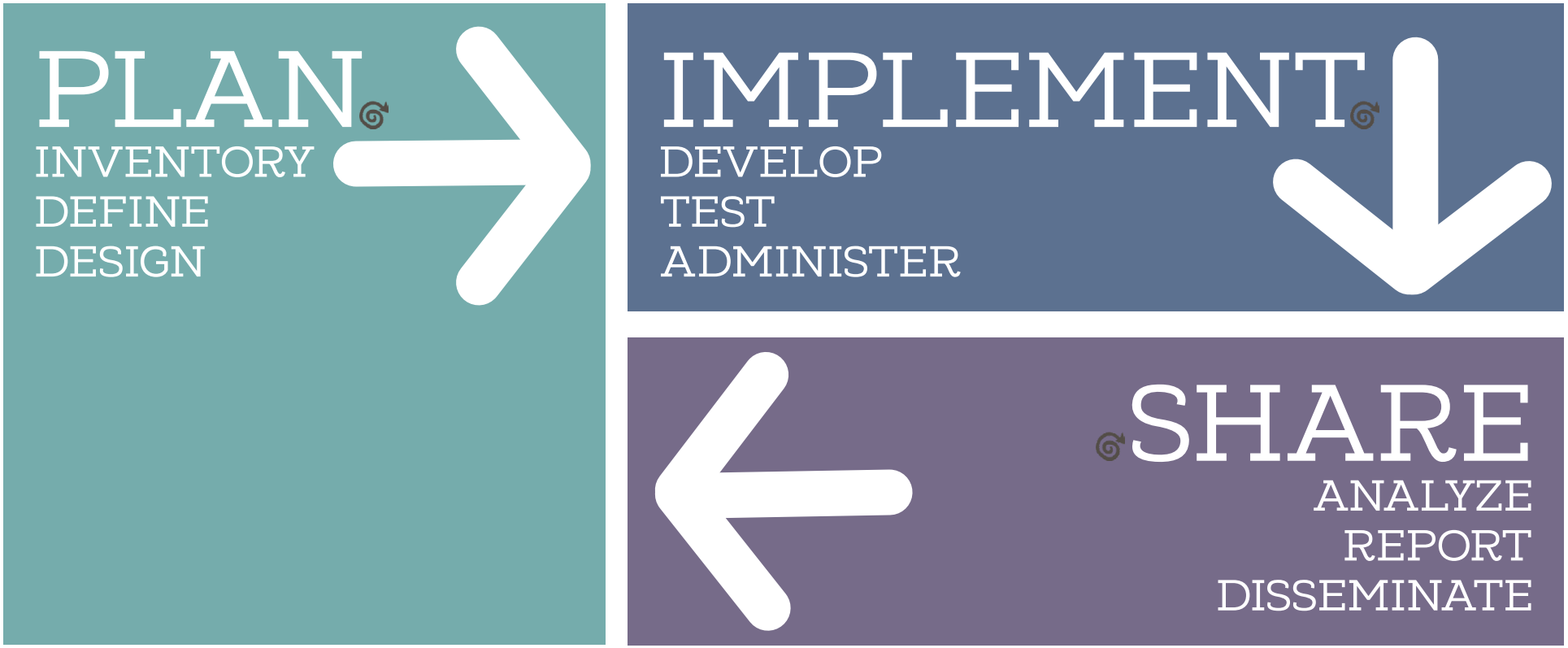
## HOW TO USE THIS GUIDE

Designing and implementing a quality evaluation does not have to be complex. Throughout this guide, we provide practical advice to increase practitioner comfort and confidence in carrying out evaluations within the context of citizen science. The guide also provides an **evaluation framework** (🌀) that we hope will be widely adopted by citizen science practitioners to facilitate comparisons of individual learning outcomes across projects.




The **Appendix** (🌀) section contains resources, templates, and worksheets that can be modifed for your own use, including a matrix of learning outcomes and indicators for citizen science.

# PHASE 1: PLAN

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## INVENTORY

### DESCRIBE THE PROJECT TO BE EVALUATED AND ITS AUDIENCE

You may want to include things such as:

- Description
- Project Staff
- Funding Sources
- Intended Audience
- Partners
- Deliverables
- Additional Details
- Additional Stakeholders
- Organizational Structure

### ARTICULATE GOALS AND TARGETED OUTCOMES OF THE PROJECT.

Goals are usually **broad** and **abstract**, but vague goals are hard to measure. Using goals to develop **targeted outcomes** will help determine if the goals are met. Outcomes are more **specific**, and refer to **concrete** and **measureable** statements.

OUTCOMES SHOULD....

- ...be aligned to the experience the participant will have.
- ...include information about the setting/conditions.
- ...include a description of the desired behavior.
- ...be SMART:

**S** Specific
**M** Measurable
**A** Attainable
**R** Relevant
**T** Time-bound

There are three types of outcomes: **Programmatic, Community-based,** and **Individual Learning** outcomes.

THIS GUIDE WILL FOCUS ON:
**Individual Learning Outcomes (ILOs)**

In determining what outcomes might be most relevant to citizen-science projects, researchers at the Cornell Lab of Ornithology used survey data as well as the LSIE document and NSF set to create a **framework** for measuring ILOs that are common among citizen-science projects.

Outcome categories from LSIE and NSF are described here.

Project developers and evaluators must work closely to determine the most relevant outcomes for individual projects. Articulating broad goals and measurable outcomes will provide a road map for your overall project evaluation. See **Appendix A** for examples of various learning outcomes commonly used in citizen science.

# PHASE 1: PLAN

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## ROLL OVER PIE SLICES FOR DEFINITIONS

Not all projects should try to achieve every outcome here:

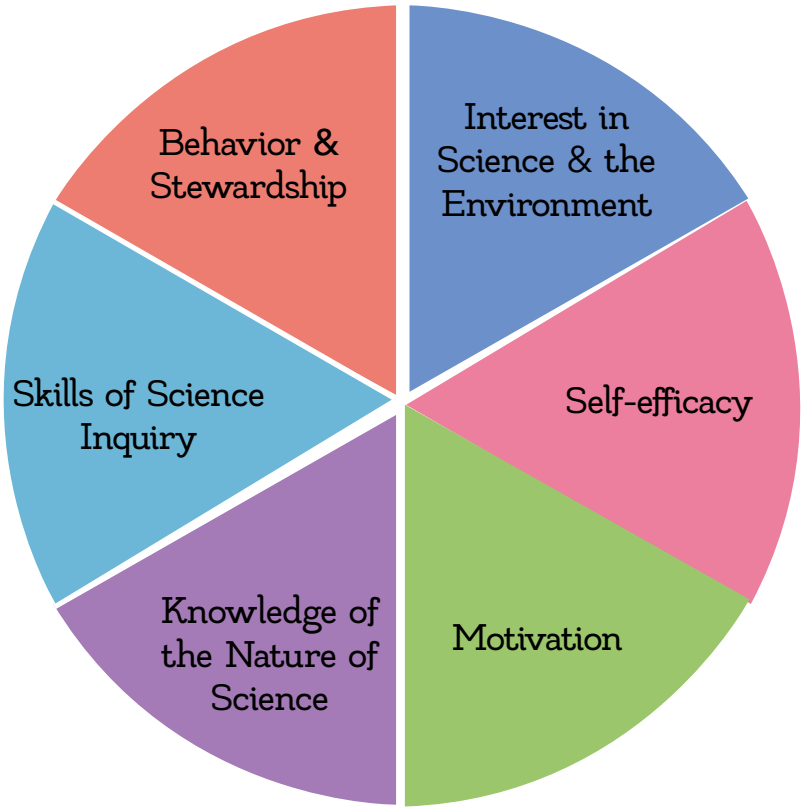


*FIGURE 1: A guiding framework for evaluating individual learning outcomes from citizen-science projects.*

# PHASE 1: PLAN

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## DESCRIBE THE PROJECT TO BE EVALUATED AND ITS AUDIENCE

You can now draft a preliminary logic model to share with relevant stakeholders who may be affected by the evaluation, such as funders, program staff, and volunteers.

## LOGIC MODELS

Logic models are **graphical representations** of projects that show the relationships between each project component and the expected outcomes.

### LOGIC MODELS...

- ...help to articulate objectives and strategies.
- ...focus attention on key interventions and intended outcomes.
- ...are usually presented as inputs, activities, outputs, outcomes, and impacts.

| | |
|---|---|
| **INPUTS** | Resources dedicated or consumed by a project; typically includes things like funding agencies, scientists, staff, volunteers, and technology infrastructure. |
| **ACTIVITIES** | Ways the project uses the inputs; focused on tasks that directly relate to the participants; the activities of volunteers typically tend to revolve around data collection, but may vary widely. Any trainings for participants should be included here. |
| **OUTPUTS** | The direct products of the stated activities and demonstrate immediate results of activities; easy to quantify and focus on things done by participants. |
| **OUTCOMES** | The changes in behavior that a project is intended to produce as a result of project participation; are more difficult to quantify than outputs; often described as short-, medium-, or long-term. |
| **IMPACTS** | Long-term outcomes that are broad in scope; aimed at expanding knowledge and capacity for a particular field of study and meant to provide benefits to society; difficult to measure; are of particular interest to funding agencies. |

**This table** (🌀) provides examples of a program logic model, though your project will likely have different, and fewer examples. See **Appendix B** for a Logic Model template (adapted from University of Wisconsin Extension, 2005). For more information on developing a logic model, see **W. K. Kellogg Foundation (1998 and 2004).**

You may also find it helpful to articulate your Theory of Change- More information can be found **here (🌀)**.

# PHASE 1: PLAN

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## DEFINE

The next step in planning your evaluation is working with stakeholders to define what exactly will be evaluated, determine key evaluation questions, and lay out the evaluation timeline, budget, and limitations.

### STATE THE PURPOSE OF THE EVALUATION

Try not to evaluate every aspect of the program. Instead, focus on one or two main reasons:

- Gauge participant learning
- Identify project strengths and weaknesses
- Promote a project more broadly
- Obtain additional funding or support
- Clarify program purpose or theory
- Increase organizational capacity building
- Reflect on project history
- Provide recommendations to improve project functioning

Once you decide on the main purpose, discuss it with significant stakeholders and then document **what is** and **what is not** going to be evaluated.

### DEVELOP AND PRIORITIZE KEY QUESTIONS THAT YOU HOPE WILL BE ANSWERED AS A RESULT OF THE EVALUATION

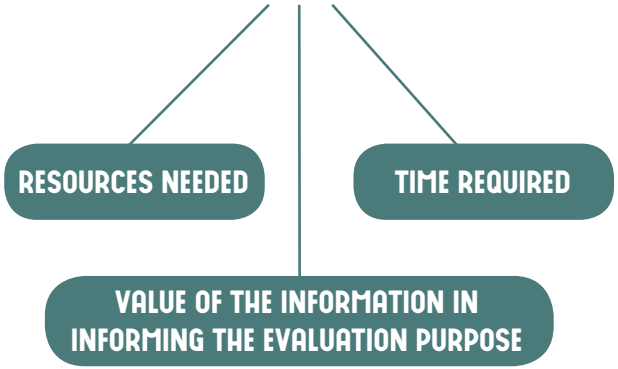
**Defining and refining your evaluation questions** is perhaps the most critical aspect of planning your evaluation because it hones in on what to evaluate. Evaluation questions should be **broad** enough to frame the overall evaluation, yet **specific** enough to focus the evaluation.

You will likely come up with many questions for which you would like answers, but it is important to remember that not all questions can be answered given allotted time and resources, nor will they have the same importance to all stakeholders.

Ensure that the questions are:

- Answerable
- Appropriate for the various stages of evaluation
- Aligned to the desired outcomes
- Providing important information for stakeholders

In addition to these criteria, you should also prioritize the questions by considering the following aspects:




At the end of this process you should feel comfortable knowing that the questions you focus on will demonstrate measurability, relevance, and feasibility, while setting the stage for the rest of the evaluation.

# PHASE 1: PLAN

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## DETERMINE THE INDICATORS FOR EACH INTENDED OUTCOME

With goals, outcomes, and evaluation questions articulated, the next task is developing quality **indicators**. Indicators provide specific types of information that let you know that an outcome has been achieved.

Effective indicators **align directly to outcomes** and are:

- **CLEAR**
- **MEASURABLE**
- **UNBIASED**
- **SENSITIVE TO CHANGE**

While indicators are measureable, they do not always need to be quantifiable. They can be qualitative and descriptive.

## EXAMPLE:

**GOAL**

Participation in citizen science will result in development of science inquiry skills.

**SHORT-TERM OUTCOME**

Within three months of joining the project, at least half of participants will be able to successfully collect and submit data.

**INDICATOR**

The number of new participants that submit data and show increased confidence in being able to collect data.

When developing indicators, it is important to consider the type of program or activity, the duration of the program, and the logistics of administering the measurement instrument.

## CONSTRUCT A TIMELINE FOR THE EVALUATION

Develop an estimated timeline that provides anticipated start and end dates for completing key tasks and meeting established milestones. These are often presented in calendar format.

Although all timelines inevitably change, having the timeline be as accurate as possible early in the evaluation will help avoid frustration later because of initial unrealistic expectations.

## CONSTRUCT A ROUGH BUDGET

Estimate how much the evaluation will cost. This can vary greatly depending on the complexity of the evaluation.

Obviously larger, more complex evaluations will cost more than those that are smaller in scope. Include costs related to salaries, travel, consultants, printing, mailing, copying, telephoning, and any necessary software or equipment.

# PHASE 1: PLAN

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## DESIGN

The last part of the planning phase is designing the plan for data collection. The goal is to create a data collection strategy that identifies procedures that are feasible, cost-effective, and viable to keep the project focused and on schedule.

### DETERMINE YOUR STUDY DESIGN

The design should reflect:

- The types of questions you need answered
- The reason for conducting the evaluation
- The amount of resources you can commit to the evaluation
- The information stakeholders hope to learn
- The methods that best address the evaluation question

Different study designs are better suited for different types of evaluation questions. Researchers usually consider evaluation designs to be either:

**QUANTITATIVE** — Results can be analyzed numerically (ex. surveys).

**OR**

**QUALITATIVE** — Results must be interpreted by the researcher (ex. interviews).

If you are comfortable, you can combine these approaches to achieve **mixed-methods designs**. Combining these quantitative and qualitative methods can increase the **validity** of your results by triangulating the findings **(Creswell, 2003)**.

In deciding on a study design, consider the following questions:

How well do you know your topic? You may need to conduct a literature review to understand the topic and determine how past evaluations have been designed.

What approach to research are you most comfortable with (i.e., qualitative, quantitative, mixed)?

Can you dedicate enough time, resources, and staff expertise to the evaluation? If not, you may need to consider hiring an external evaluator.

Who are the stakeholders and what do they hope to learn from the evaluation?

# PHASE 1: PLAN

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## FOR EACH OUTCOME, DETERMINE THE POPULATION TO SAMPLE FROM AND THE APPROPRIATE SAMPLE SIZE

The sample is a representative subset of the larger group or population. A representative sample will help minimize sampling bias and error.

### SIMPLE RANDOM SAMPLE

Each member of the population has an equal chance of selection- this is a preferred method.

### STRATIFIED SAMPLE

Used when you have more than one subset of the population you need to include.

### CONVENIENCE SAMPLE

Used when your study is not aiming to generalize the whole population- here you can include those who are easy to contact.

### PURPOSEFUL SAMPLE

Emphasizes extreme cases or those that provide maximum variation.

The procedure for determining sample size (the number of people you need for your study) can be complicated, but if you are comfortable with a **95% confidence interval and 5% margin of error,** the table below provides a general rule of thumb for determining sample size from a given population.

| POPULATION | SAMPLE |
|---|---|
| 50 OR LESS | 50 OR LESS |
| 500 | ~200 |
| 1,000 | ~280 |
| 10,000 | ~370 |
| U. S. POPULATION | ~400 |

Visit: www.research-advisors.com for a table of suggested sample sizes if you are seeking a different confidence internal or margin of error.

For example, if your citizen science project has approximately 1,000 participants, your population would be 1,000 and your sample size would be approximately 280. If your population is the entire U. S., your sample size only needs to be about 400 to provide accurate generalizations.

## DRAFT THE DATA COLLECTION STRATEGY

For each targeted outcome, identify the **data collection methods** to be used, the **sample for collection** (i.e., before, during, or after the project/intervention), and the **source of the data**.

Common data collection methods are presented below; many of these methods are often used in combination.

- Surveys
- Professional critique/ expert review
- Interviews
- Portfolio reviews
- Focus groups
- Content analysis
- Observations
- Examine email/list serve messages
- Journals
- Case study analysis
- Tests/quizzes
- Literature review
- Concept maps
- Simulations
- Tracking & timing
- Web analytics
- Creative expression

Descriptions and a comparison of strengths and weaknesses of these data collection methods are presented in **Appendix D.** Once you have completed the previous steps of the design phase, compile all of the information into a table such as the one shown in **Appendix E.**

# PHASE 2: IMPLEMENT

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## DEVELOP

The previous section described how to plan an evaluation. This section explains how to use the plan to guide implementation of your evaluation. The goal of the implementation phase is to collect credible data that will increase the accuracy and utility of the evaluation.

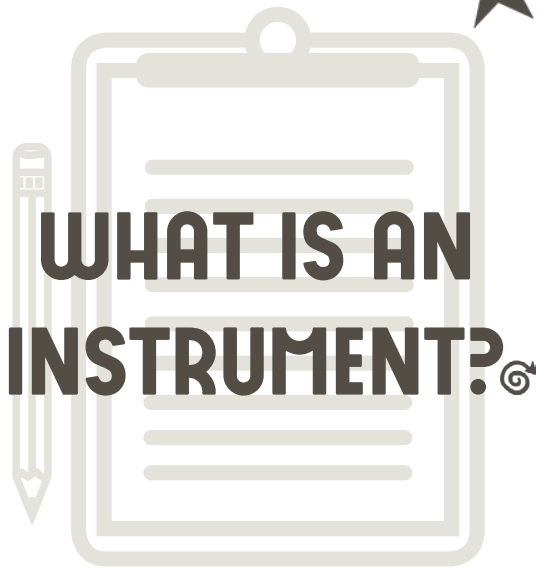
### CHOOSE YOUR INSTRUMENT

**Instruments** can include:

- Protocols for interviews, observation, or focus groups
- Surveys and questionnaires (if you use this, use existing measures whenever possible)
- Tests and quizzes

If it does not fit your exact needs, you may need to modify it slightly. If you do modify an instrument, check with the developers to make sure that your changes do not affect its **validity** and **reliability**.

Sometimes it is necessary to develop original instruments to measure outcomes of your intended audience. The most important part of instrument development is to clearly define what you want to measure, often called a **"construct"** or an idea containing various conceptual elements.



### WHAT IS AN INSTRUMENT?

See page 10 for examples of learning constructs relevant to citizen science. You may also need to review the literature to determine how the construct you're interested in measuring has been studied.

### FOLLOW BEST PRACTICES FOR SURVEY DEVELOPMENT

- **CREATE A DRAFT**
- **SHARE IT WITH YOUR COLLEAGUES**
  OR WITH INDIVIDUAL CONSIDERED TO BE EXPERTS IN THE CONSTRUCT
- **SEEK THEIR FEEDBACK**
  ON RELEVANCE, LANGUAGE, CLARITY AND REDUNDANCY
- **MAKE ANY CHANGES/REVISIONS**

Keep the instrument as brief as possible and collect only the data that you are certain will be analyzed and used. See **Appendix F** for guidance on developing a quality survey.

Whatever instrument you use, be sure to include demographic items that describe your population. Examples of demographic items can be found in **Appendix G**.

# PHASE 2: IMPLEMENT

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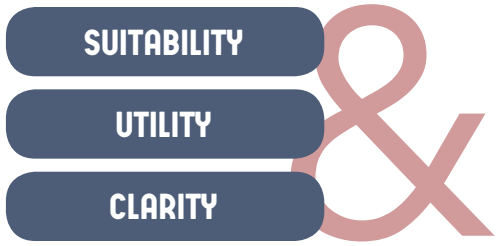
## FIELD TEST

Testing instruments before data collection begins will help to minimize measurement error and in turn increase the credibility of your results.

### FIELD TEST DRAFT INSTRUMENTS AND REFINE AS NEEDED BASED ON TEST RESULTS

If you are using an instrument that has not been tested previously, it is important that you field test it on at least **8 - 10 individuals** who are similar to your intended population. The goal here is to test the instrument in relevance to your audience.

Think about its...




It is also a good idea to gather feedback on the instrument's wording and length. Field tests can be done as:

IN-PERSON INTERVIEWS

OVER THE PHONE

ONLINE

Use the insightful feedback that this field test will likely provide to revise the instrument in preparation for a wider audience.

### CREATE A DATA MANAGEMENT PLAN

Before data collection begins, create a data management plan to document the following:

- What is the source of the data?
- Who will be collecting the data?
- Where will the data be stored and archived?
- Who will be in charge of data analysis?
- Who else will have access to the data?
- Any changes made to instruments, questions, evaluation design, or procedures.

Whether or not you have an IRB approval in place, you must take steps to safeguard the confidentiality of data in all of its forms. Consider the following:

✓ **ARE DATA EFFECTIVELY AND ETHICALLY MAINTAINED?**

✓ **DOCUMENT THE PROTOCOLS FOR MAINTAINING CONFIDENTIALITY AND ANONYMITY OF ALL SUBJECTS**

✓ **DETERMINE INTELLECTUAL PROPERTY RIGHTS:**

- Who owns the data?
- Who can access the data?
- Who can publish the data?

# PHASE 2: IMPLEMENT

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## ADMINISTER

Whether you are administering a survey or a series of interviews, observations, or focus groups, this is where all of your hard work begins to pay off by collecting **credible evidence** about your project.

### RECRUIT PARTICIPANTS

Give yourself plenty of time to recruit participants and plan on recruiting more than you need, with the expectation that many will not agree to participate. Consider what the best medium will be for collecting your data:

- **ONLINE SURVEY TOOL**
- **PHONE**
- **IN PERSON**
- **(E)MAIL CAMPAIGN**

Before you collect your data, your participants will need to understand:

- The purpose of the evaluation
- The time required
- Any potential risks
- Any potential benefits
- How the data will be used
- Who to contact for more information
- How confidentiality will be protected

If you are...

#### COLLECTING PERSONAL INFORMATION

Have participants read and sign a consent form tailored to your study (see **Appendix C** for a sample form).

#### WORKING WITH CHILDREN

Be sure to have parents and/or guardians consent to their participation.

#### PART OF AN INSTITUTION WITH AN IRB

If your institution has an Institutional Review Board you will likely need to obtain its approval before initiating your study.

### ADMINISTER FINAL INSTRUMENTS AND COLLECT DATA

Once data collection begins, keep a detailed electronic spreadsheet that tracks all of your data collection efforts, including:

- Instrument name
- Creation date
- Administration date
- Initital sample size
- Final sample size
- Overall response rate
- Any changes made to the document

It is also a good idea to periodically monitor the data being collected. **Check your data early** to help answer the following important questions:

- Are you reaching your intended audience or are some groups under or overrepresented?
- Are the data providing the kind of useful information you intended? Do they help answer your initial evaluation questions?
- Are the data being collected in a way that can be analyzed?
- Are you collecting the right amount of data?

# PHASE 3: SHARE

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## ANALYZE

Data analysis can take many different forms depending on the project need, audience, and how the information will be used.


### MAKE A COPY OF THE ORIGINAL DATA



Before any data analysis takes place, copy and rename a working data file. Be sure to keep the original, raw data untouched. Document the description and location of the file, and any changes to the working data file.

### WORKING WITH QUANTITATIVE DATA

### CLEAN AND TRANSFORM THE DATA

Check for errors. Some answers may be ouside of the acceptable range, and some will be missing- exclude responses if they are missing data from most questions. After, **transform** the data.

EXAMPLE

### CREATE A CODEBOOK FOR ORGANIZING ALL OF YOUR DATA

Convert the information to an electronic database. Develop a **codebook** and determine the type of data for each variable.

SEE A SAMPLE CODEBOOK

### SUMMARIZE THE DATA USING DESCRIPTIVE STATISTICS

Provide a basic summary of the properties of your data with descriptive statistics:

SUM · MEAN · MEDIAN
MODE · RANGE · PERCENTILE
STANDARD DEVIATION
STANDARD ERROR · SKEWNESS

This summary will give you a basic understanding of your data, whether it's normal (parametric) or non-parametric, and can inform the type of test for more sophisticated inferential statistics, which allow you to determine relationships betwewen variables and whether that relationship is significant.

### INTERPRET YOUR DATA

Assign meaning to the data collected and determine conclusions, significance and its implications. Relate these back to your initial questions and reason for evaluation.

# PHASE 3: SHARE

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## ANALYZE

### WORKING WITH QUALITATIVE DATA



Generally, qualitative data is gathered from interviews and discussions, open-ended questions and written comments on surveys, through observation, and from written documents such as diaries, journals, and news articles. There are many ways to analyze and interpret qualitative data and your approach will depend on:

- Questions you want to answer
- Goals for the individuals who will use the data
- Resources that you have available

You may also need to use a few different types of analysis depending on the types of data that you collect.

### DETERMINE THE ANALYSIS PROCEDURE

Base this on the type of data you have. Consider the qualitative approach used:

- GROUNDED THEORY
- PHENOMENOLOGICAL
- ETHNOGRAPHY
- BIOGRAPHY
- CASE STUDIES

etc.

...to determine the type of analysis to conduct:

- QUALITATIVE
- THEMATIC ANALYSIS
- CONTENT ANALYSIS
- SUMMARIES
- SCENARIOS

### EMPLOY DATA REDUCTION TECHNIQUES

Data reduction is necessary to transform unstructured audio or visual data into a useful data source for answering evaluation questions. Data reduction can occue through a process of reading documents, creating intial codes, focused coding, and data re-organization.

A common technique is:

CODING YOUR DATA

### INTERPRET YOUR DATA

Use what you developed during the data reduction process to explain the findings of your evaluation. How you interpret your data will depend on the goal of your evaluation, how you wish to present your findings, and your intended audience.

You can use diagrams, flow charts, graphs, quotes, etc. to depict these findings.

# PHASE 3: SHARE

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## ANALYZE

### WORKING WITH MIXED-METHODS DATA

In mixed methods datasets, analysis of data will vary depending on the relationship between the quantitative and qualitative data.

### COMPARE AND CONTRAST QUALITATIVE AND QUANTITATIVE DATA

When appropriate, identify corroborating and contradictory results by contrasting **qualitative** and **quantitative** data.

If both types of variables measure a similar construct, the two sets of data can be compared to detect nuances in how respondents may have interpreted each type of question. Particularly illustrative examples can also be selected from the qualitative data set and reported alongside quantitative summaries of the same or closely related construct.

### SYNTHESIZE MIXED METHODS DATA

qualitative + quantitative

TO SYNTHESIZE MIXED METHODS DATA...

- Use qualitative data to illustrate and elaborate quantitative findings
- Embed quantitative data into the qualitative narrative

In some cases, such as with open-ended additions to categorical question types (e.g., "select one of the following" or "check all that apply"), qualitative responses will need to be coded, added, or integrated into the preexisting response categories and analyzed alongside and in the same manner as those preexisting categories.

### ANALYZE SEPARATELY

A third common scenario involves quantitative and qualitative data sets that are independent of each other and are thus analyzed separately. This is most common when measuring constructs that lend themselves to only one type of method. For instance, questions about the meaning that respondents attribute to an activity can often be captured only through interviews or open-ended essay-type questions which can then be summarized as case studies or coded and analyzed as a qualitative narrative.

# PHASE 3: SHARE

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## REPORT

Once data have been analyzed and synthesized, an evaluation report should be completed so that stakeholders are aware of the evaluation process and its findings. Below are the major sections to include within an evaluation report; your report should be attentive to the audience for whom it is intended.

### EXECUTIVE SUMMARY

It's important to include this in your report, as it is the one piece people are most likely to read.

- A brief overview and the purpose of the program, findings and recommendations
- Description of activities, setting, and audience served, and evaluation purpose

### PROGRAM DESCRIPTION

Provide...

- Brief history of the program and how it relates to the mission, existing research or organizational structure
- Describe goals and intended outcomes, project activities, setting, target audience, historical milestones

### EVALUATION METHODOLOGY

Include...

- Type of information collected
- Rationale for collection, how information was collected and from whom
- Description of tools, their development and how they were intended to answer evaluation questions
- How samples were chosen
- The study design used
- Report who collected the information
- Any limitations of the design (access to information, appropriate tools, challenges, or changes to the methodology)

### FINDINGS AND RESULTS

Repeat the intended program outcomes and present appropriate qualitative or quantitative data. Shared findings must be clearly written, honest, concise and complete. Describe reasons for missing data, if necessary, and use charts, graphs, and tables to graphically illustrate your findings.

### DISCUSSION AND INTERPRETATION

Determine what the results say. Describe outcomes that were and were not met and why, determine if limitations contributed to the results and discuss unintended outcomes and how they might be incorporated in the future. Compare reults to similar programs and use this space to reflect on the overall process.

### RECOMMENDATIONS

Determine if there are changes required of the program to meet identified outcomes.

### REFERENCES

Reference all cited work

### APPENDICES

Include these items as appendices:

- Data collection instruments and protocols
- Data collection plans
- Report of findings from specific instruments, interim reports
- Summary of costs for various evaluation activities
- Consent forms
- Resumes of evaluation staff and consultants

# PHASE 3: SHARE

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## DISSEMINATE AND INFORM

Remember that this is a learning opportunity to understand what worked and what didn't. Although no one want to highlight negative results, refrain from reporting only on positive findings. Including what did not work adds credibility to your efforts and helps inform the practice of other practitioners. Make it a point to get your report disseminated in both traditional and non-traditional venues.

### SHARE WITH STAKEHOLDERS

After the report has been written, share it with key stakeholders before disseminating it more broadly

### CONSIDER PUBLISHING

What have you learned as a result of this evaluation? There may be key findings tht could be of value to others working within the citizen-science realm. Your paper could potentially be rewritten as a paper for peer review. POSSIBLE JOURNALS

### CONSIDER NON-TRADITIONAL OPTIONS

Many other options exist for disseminating your work. If your goal is to showcase your program far and wide, consider these ideas:

- Upload the report to informalscience.org and citizenscience.org
- Upload your report on your own organization's webste
- Publish results or part of your results in a local newspaper
- Air your results on a local radio station
- Summarize the report as an easy-to-read flyer and post it in visible places at your organization, local businesses, community centers, and libraries.

### INFORM YOUR PROGRAM

With your evaluation complete, you can now make important decisions about your program based on sound evidence.

With buy-in from key staff and stakeholders, it is critcal to review the evaluation findings and determine what, if any, modifications to the program should be implemented. Your teams should prioritize the recommendations based on:

- What is feasible given time and resources
- What is most critical
- What is likely to be supported by stakeholders

Develop a working timeline for implementing and monitoring key recommendations with enough time alotted for feedback on the changes.

The evaluation report may also highlight some unintended outcomes. These should be discussed at length with the project team as they can result in a shift or a new emphasis for your program that you had not considered before.

# APPENDICES

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Click to jump to each page:

# APPENDIX A: SAMPLE GOALS, OUTCOMES, AND INDICATORS FOR CITIZEN-SCIENCE PROJECTS

*Content has been included and modified with the consent of the projects listed here. Colors are representative of the framework on page 8.*

| EDUCATIONAL GOALS | POTENTIAL OUTCOMES | POTENTIAL INDICATORS | PROJECT NAME |
|---|---|---|---|
| Increase interest in science activities such as monitoring rare plant species. | Participants gain interest in plant conservation and management. | Increase in the number of monitoring hours logged by participants. | Plants of Concern |
| Increase awareness of environmental topics such as marine habitat preservation. | Monitoring of sites will raise individual awareness of surrounding marine habitat. | Volunteers express increased interest in protecting local marine habitats following participation. | Shorekeeper's Guide |
| Increase efficacy of volunteers to promote wetland conservation and land stewardship. | Volunteers engage in public awareness of water quality issues and take part in local stewardship practices. | Participants use data collected to create and share reports on wetland health to local community. | Watershed Land Trust Adopt-A-Wetland Program |
| Empower participants to feel part of the scientific process. | Participation results in increased confidence to successfully collect and submit data. | Participants report improved confidence in their ability to contribute to science, increased reports of "self as scientist." | The Great Backyard Bird Count |
| Increase motivation by local people to understand and monitor their water resources. | Participants are empowered to understand and engage in science activities and environmental action. | Participants express intention to use information in the database to engage in dialogue with local resource management organizations. | Community Science Institute |
| Increase motivation for learning about the effects of invasive species across the USA. | Participation results in greater intrinsic motivation for learning about specific science topics - such as the spread of invasive species. | Participants report greater personal relevance to learning about invasive species. | National Institute of Invasive Species Science |
| Increase knowledge of scientific/ environmental topics. | Participants gain an understanding of firefly biology and habitat. | Participants demonstrate their increased knowledge using online identification tools and exercises. | Firefly Watch |
| Increase knowledge about the nature of science and science processes. | Participants will demonstrate increased knowledge in two specific areas of scientific problem solving. | Participants complete essay responses for problems regarding causation and correlation. | Spotting the Weedy Invasives |
| Improve data collection skills. | Participants will be trained to monitor local water quality and collect data. | Participants complete a field training session, and demonstrate gains in sample collection/testing skills. | URI Watershed Watch |
| Provide an authentic science learning environment to impart science inquiry skills. | Participants will practice rigorous collection and analysis of data across upland, freshwater, and coastal ecosystems, practicing scientific processes and protocols using the same field equipment as scientists. | Participants showcase their data and multimedia "meaning-making" projects via interactive website and public discussion. | Vital Signs |
| Change participant behavior with regard to the spread of invasive species. | Participants will take part in at least one targeted behavior such as actively removing invasive species from their homes and/or neighborhoods. | Participants will report a change in their behavior regarding invasive species (4 target areas: eco mgmt, persuasion, policy/legal means, and consumer choices). | Spotting the Weedy Invasives |
| Encourage participants to engage in community coalitions. | Build a network of informed citizen advocates for management and protection of natural resources. | Evidence of active community networks built through participation in group monitoring events. | Water Action Volunteers |

# APPENDIX B: LOGIC MODEL WORKSHEET

**LOGIC MODEL FOR:** _____

| **PROJECT DESCRIPTION & GOALS:** | | | | | |
|---|---|---|---|---|---|
| **INPUTS** | **ACTIVITIES** | **OUTPUTS** | **OUTCOMES - IMPACT** | | |
| | | | **SHORT TERM** | **MEDIUM TERM** | **LONG TERM** |
| What we invest: | What they do: | What the deliverables are: | What the short term results are (1-3 years): | What the medium term results are (4-7 years): | What the long term results are (8-10 years): |
| **ASSUMPTIONS ABOUT YOUR MODEL:** | | | **EXTERNAL FACTORS AFFECTING YOUR PROJECT:** | | |

# APPENDIX C: PARTICIPANT CONSENT FORM TEMPLATE

You are invited to participate in a research study regarding [brief project description] and conducted through [*institution and partners*]. Please read this form carefully and ask any questions you may have before agreeing to be in the study. You will be given a copy of this form to keep for your records.

**Purpose:** The purpose of this study is [*describe the nature and purpose of the study in a few sentences*].

**Procedures:** If you agree to be in this study, you will be asked to [*explanation of what the participant is being asked to do*] regarding [*state the topic*]. This should take approximately [*approximate time commitment*].

**Risks and Benefits:** We do not anticipate any specific risks resulting from this study [*or acknowledge unpredictable risks if appropriate*]. The study will not have any direct benefits for you, [*or describe any benefits or incentives*] but your participation will help us learn more about [*describe any potential benefits for the researcher*].

**Voluntary Nature of Participation:** Your decision whether or not to participate will not affect your current or future relations with [*institution administering the study*]. If you decide to participate, you are free to withdraw at any time without affecting those relationships. You may decline to answer any questions that you do not feel comfortable answering.

**Confidentiality:** This research will not include any information that will make it possible to identify you. All data collected from [*describe data collection procedure, i.e., survey, interview, etc.*] will be kept in a locked file. Only the researcher will have access to this file. This consent form will be stored in a locked file separately from the data and will be destroyed at the end of the study.

**Contacts and Questions:** The researcher conducting this study is [*researcher name*]. If you have questions later, you may contact him/her at [*researcher contact information*].

If you have any questions or concerns regarding your rights as a subject in this study, you may contact the [*institution IRB name]* at [*contact information for Internal Review Board*].

**Statement of Consent:** I have been given information about this research study and its risks and benefits and have had the opportunity to ask questions and have them answered to my satisfaction. I consent to participate in this study.

**Signature** _____ **Date** _____

# APPENDIX D: COMPARISON OF DATA COLLECTION METHODS

| METHOD | DESCRIPTION | STRENGTHS | WEAKNESSES |
|---|---|---|---|
| Survey | Data are usually collected through questionnaires, although sometimes researchers directly interview subjects. Surveys can use qualitative (e.g. ask open-ended questions) or quantitative (e.g., use forced-choice questions) measures. | Surveys can be used to collect a wide range of information and are a great starting point to dive deeper into an issue. They can be inexpensive and easy to administer, and provide anonymity. They also provide a source of generalizable statistical data. Surveys can be administered via telephone, through email, and in person. | If not developed properly, surveys can be laden with multiple sources of error. Often, surveys only scan the surface of an issue. Sampling and statistical expertise may be necessary. |
| Interviews | Interviews involve direct discussion between the researcher and the participant. Interviews can be informal or structured. | Interviews are comprehensive and adaptable. They provide in-depth detail and unique insights about a topic. Interviews can be held via telephone, through email, and in person. | Interviews lack statistical rigor and may have limited generalizability. They can be time-consuming, costly, and difficult to analyze. Interviewer bias is a concern. |
| Focus groups | In a focus group, people are asked about their perceptions, opinions, beliefs, and attitudes regarding some topic. Focus groups usually take place in an interactive group setting, typically in person. | Provide an in-depth discussion of concepts and allow the researcher to understand concerns in a local context. The researcher can observe group interactions and notice the dynamics between numerous people within a community. | Others can influence opinions in the group and participants may not be representative of the population. Some participants may be reluctant to speak, while others may dominate conversation. Analysis can be challenging. |
| Observations | Observational research techniques involve the researcher or researchers making observations of a situation, event, or activity and taking notes or recordings of their observations. | Allows for a unique insight into contexts, relationships, and behaviors previously unknown to the researcher that may be crucial for the interpretation of other data. | It is difficult to record data and the quality of the data depends on the diligence of the researcher. Observations can be time-consuming and interpretation of behaviors may be difficult. Evaluator must be present to make observations. |
| Tracking and timing | Refers to following and recording visitor behavior, including where visitors go, what they do, and how long they spend at each exhibit in an exhibition. Similar to web analytics for websites. | The researcher can get a better understanding of popularity trends and the exhibits or projects that visitors tend to favor. | Does not provide feedback on the exhibit or allow the researcher to gauge the visitor's perceptions or beliefs regarding the exhibition. |
| Concept maps | Concept maps include a linking of ideas and hierarchies in a visual, graphic representation. May include word links or directional arrows to map many ideas. | Can be generated online or in-person simultaneously by numerous people. Concept maps provide a permanent record of individual understanding at a particular time, which will show changes in understanding over time. | Researchers must learn how to use and teach the technique and participants must be taught how to construct them, which can be time-consuming. Analysis and interpretation can be challenging. |
| Card sorts | Concepts of interest are identified and then written onto cards. Participants sort the cards into groupings and then name the categories. The results are later analyzed to reveal patterns. | Participants create categories that are meaningful to them. This technique works well when similarities between items make them difficult to divide clearly into categories and no existing taxonomy has been established. Card sort is low-tech and can be inexpensive to accomplish. Can be done in person or online. | May provide fairly consistent results between participants, or may vary widely. Analysis of the data can be difficult and time-consuming, particularly if there is little consistency between participants. Participants may not consider what the content is about and may just sort by surface characteristics such as document types. |
| Drawings | Participants draw a picture of something, which is then analyzed by the evaluator. | Drawings allow the participant to communicate their beliefs and perceptions in ways they can't through verbal means. | Lack statistical rigor and can be difficult to analyze for the researcher. Drawings can only be administered when the evaluator is present. |
| Web analytics | Web analytics looks at the use of a website or parts of a website to find which sections are visited most often. | Useful for understanding and optimizing web usage and understanding trends in those that visit your website. | Doesn't provide information on why visitors make certain choices online. Limited utility for most summative evaluations. |

# APPENDIX D: COMPARISON OF DATA COLLECTION METHODS (CONTINUED)

| METHOD | DESCRIPTION | STRENGTHS | WEAKNESSES |
|---|---|---|---|
| Professional critique | Critique or critical review of a project or exhibition by someone other than the evaluator. | Improvement may be more obvious to someone with special expertise or to someone who looks at it with a fresh eye. It subjects ideas to the scrutiny of others who are experts in the field. | The professional offering the critique can only be an expert in a limited area and may offer poor advice if reviewing a project outside of their area of expertise. |
| Content analysis | Using already existing documents as a data source. Documents may include reports, statistics, manuscripts, notes, artifacts, and other written, oral, or visual materials. | Low cost, allows for a large sample size, and provides access to historical information that may be difficult or impossible to research through personal contact. | Record keepers may not preserve all pertinent materials but rather selectively save those that are non-controversial or problematic. Documents must be present to examine. |
| Conversation analysis | Recording conversations for analysis. There may also be observations, but conversation analysis only counts if the conversation is recorded and later examined. | Ideal for use with people speaking different languages. Conversations can be archived, transcribed, and analyzed at a later date. Conversations can be recorded in person, over the phone, or online with permission of the participant. | Data can be taken out of context and harm the participant. Issues may be oversimplified when taken out of context. |
| Journals/logs | A personal recording of ideas, thoughts, or activities over a time span revealing the perspective of the writer. Includes blogs, diaries, written reflections, and logs. | Journals provide feedback on a specific topic or line of thought on a particular day. Data can provide an understanding of thought evolution over time. Can be examined in person or via the Internet. | May be narrowly restricted to a specific question asked and therefore may focus on a small part of the material covered on a single day. May require determination and consistency from the participant in order to maintain a stream of events. |
| Portfolio reviews | A collection of a participant's documents or samples of work that encompass the scope and breadth of the activity being evaluated. | Portfolio reviews show graphically the current level of the participant's knowledge/skills, where their current ideas are coming from, and how they arrived at their current level. | Portfolio reviews are labor and time intensive to analyze and interpret and usually require the use of rubrics for analysis. Documents must be present to examine. |
| Photographic/video data | The use of video or photographic equipment to capture images or record activities. | Ideal for use with people speaking different languages; can be archived, transcribed, and analyzed at a later date. Provide a visual record of an event or situation. Photos and video can be collected in person or online. | Visual quality depends on the skill of the researcher. Data can be taken out of context and harm the participant, and may oversimplify issues. |
| Literature review | A review of the critical points of current knowledge including the theoretical and methodological contributions to a particular topic. | Provides an overview of the particular subject and allows the researcher to determine what information is already available. | Sources may not be current and the review may not be focused or complete enough on a particular aspect of a topic. Can be time-consuming. |
| Case study analysis | In-depth investigation of an individual, group, or event. May be descriptive or explanatory. | Case studies can provide a great deal of information about a person or situation and invoke innovation, creativity, and context in situations. | Can be difficult to generalize to general phenomenon or populations because of inherent subjectivity. Can be time-consuming to coordinate. |
| Examine email/list serve messages | Use of content analysis to analyze email, list serve data, and messages. | Participants in different locations can share ideas. Ideal for sensitive or vulnerable groups requiring anonymity. A low-cost method allowing researchers to examine data from anywhere. | Participants require technical knowledge and access to computers and Internet. |
| Tests/quizzes | Tests include the use of standards to assess skills, knowledge level, or performance. | Provides insight into what the test taker knows and does not know and how their learning can be strengthened. Results are easy to quantify and compare across groups. Tests can be administered online, via phone, through mail, or in person. | Tests focus on surface learning and memorization, not on the understanding of principles and relationships. Language and vocabulary can introduce cultural biases. |
| Creative expression | The use of art forms to represent participant's thoughts or feelings through stories, dance, painting, music, and other art forms. | Allows participants freedom in expressing their feelings and emotions. Non-verbal techniques may be particularly effective when dealing with sensitive and vulnerable topics and participants. | Lacks statistical rigor and can be difficult to analyze for the researcher. |

# APPENDIX E: DATA COLLECTION STRATEGY

| | INTENDED OUTCOME | EVALUATION QUESTIONS | INDICATORS | STUDY DESIGN | TIMELINE, PERSONNEL |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

# APPENDIX F: CHECKLIST FOR DEVELOPING SURVEYS

Adapted from Project STAR (http://www.projectstar.org/star/Instrument_Dev/)

**Name/Group Number:**_____ **Circle:** First Draft Second Draft Final Survey

**1. Instrument Title**
- ❑ Clear and concise words that reflect the survey's content are used.
- ❑ Program name/type of program is stated, if appropriate.
- ❑ Type of instrument (survey) is indicated.

**2. Introductory Statement/Directions**
- ❑ Survey's purpose is stated.
- ❑ Information about how the data will be used is included.
- ❑ Level of confidentiality is stated.
- ❑ General directions on how to complete the survey are stated (e.g., when,where, and how to return the survey).
- ❑ Amount of time needed to complete the survey is stated.
- ❑ Specific directions for completing each section of the survey are stated as needed.
- ❑ Respondent is thanked for completing the survey.

**3. Demographics (if applicable)**
- ❑ Questions that ask respondent for relevant information about him/herself and his/her background are included (e.g., name, grade, age, teacher's name, organization/agency, gender, ethnicity).
- ❑ Length of respondents' participation in the program is asked, if appropriate.
- ❑ Date of survey completion is noted.

**4. Questions**
- ❑ Language that respondents understand is used (i.e., avoid jargon).
- ❑ Questions are not "double-barreled" (e.g., "Has your child's interest in school and homework habits improved?").
- ❑ Questions do not contain double negatives.
- ❑ Questions are not leading, value-laden, or biased.
- ❑ Questions are short, clear, complete, and specific.
- ❑ Response format is appropriate to questions asked.
- ❑ Questions collectively provide the information you intended to collect and the information you need.

**5. Format**
- ❑ Questions are grouped into coherent categories by themes or types of questions or responses.
- ❑ Question and answer options are on the same page.
- ❑ Font is legible and big enough to be read easily.
- ❑ The instrument is attractive but not too "busy."
- ❑ Icons or graphics are used as clarifiers, if appropriate (e.g., Place a check in the appropriate box.)
- ❑ There is enough space between the questions.
- ❑ There is enough space for respondents to complete open-ended questions.
- ❑ There is space for additional comments or suggestions.

If developing an original survey:

**6. Pilot Testing**
- ❑ Survey is clearly labeled as a "DRAFT."
- ❑ Respondents understood the directions, including the tasks required and the answer format.
- ❑ Respondents understood the wording of the questions.
- ❑ Respondents understood the terms and concepts included in the questions.
- ❑ Respondents interpreted the questions as you intended.
- ❑ Respondents were willing and able to complete the survey.
- ❑ Additional feedback:

# APPENDIX G: BASIC DEMOGRAPHIC QUESTIONS

We would like to know a little more about you so that we can be sure we have reached a broad mix of people. Please answer these few questions about yourself.

**1. In what year were you born?** _____

**2. Are you a: MALE or FEMALE?** (please circle one)

**3. Which of the following groups do you MOST identify with?**

- ❑ African-American, Black
- ❑ American Indian, Native American, or Alaskan Native
- ❑ Asian, Asian-American
- ❑ Caribbean Islander
- ❑ Latino or Hispanic
- ❑ Middle Eastern or Arab
- ❑ Native Hawaiian or Other Pacific Islander
- ❑ White, Caucasian, European American
- ❑ Multi-racial (please specify)
- ❑ Decline to answer

**4. What is the highest level of education you have completed?** (check one)

- ❑ Preschool/Kindergarten
- ❑ Elementary/Primary School
- ❑ Middle/Junior High School
- ❑ High/Secondary School
- ❑ Some College (less than four years)
- ❑ College Degree (Bachelor)
- ❑ Post-Graduate Degree (Master/PhD)

**5. What is your combined annual household income?** (Choose one response below.)

- ❑ Less than $30,000
- ❑ $30,000 – $49,999
- ❑ $50,000 – $69,999
- ❑ $70,000 – $89,999
- ❑ $90,000 – or more
- ❑ Prefer not to respond

# APPENDIX H: EVALUATION PLAN WORKSHEET

**PHASE 1: PLANNING—INVENTORY**

A. Describe the project to be evaluated and its audience.

B. Articulate the goals and intended outcomes of the project.

C. Describe the program logic model in terms of inputs-activities-outputs-outcomes-impacts. (See Appendix B for Logic Model Template)

Inputs:

Activities:

Outputs:

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

Short-term Outcomes:

Medium-term Outcomes:

Long-term Outcomes/Impacts:

D. Determine if approval by your organization's Internal Review Board (IRB) is necessary for conducting an evaluation.

- ❑ Yes
- ❑ No

**PHASE 1: PLANNING—DEFINE**

A. State the purpose of the evaluation and what you hope to learn as a result of it.

B. Who are the stakeholders? What do they want to learn from the evaluation and how will the findings be used?

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

C. Develop and prioritize key questions that you hope will be answered as a result of the evaluation.

| QUESTIONS | REQUIRED RESOURCES | TIME REQUIRED | VALUE OF THE INFORMATION | PRIORITY |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

D. Determine the indicators for the outcomes you intend to measure.

Outcome 1: _____

_____

Outcome 2: _____

_____

Outcome 3: _____

_____

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

E. Construct a timeline for the evaluation. (Include major milestones.)

| MILESTONE | STAFF INVOLVED | DUE DATE | MILESTONE | STAFF INVOLVED | DUE DATE |
|---|---|---|---|---|---|
| Hold initial meetings with stakeholders | | | Share instruments with stakeholders, refine if needed | | |
| Identify key people | | | Pilot draft instruments (if applicable) | | |
| Obtain IRB approval | | | Refine instruments (if applicable) | | |
| Draft scope of work and budget outline | | | Begin pre/post data collection | | |
| Refine Goals, Outcomes, Indicators | | | Gather & clean (pre/post) data | | |
| Develop Logic Model, Theory of Change | | | Analyze (pre/post) data | | |
| Develop and prioritize evaluation questions | | | Review other pertinent data sources | | |
| Determine indicators | | | Discuss preliminary findings with stakeholders | | |
| Develop study design and data collection strategy | | | Draft and disseminate final report | | |
| Deliver draft evaluation plan to stakeholders, refine if needed | | | Secure data according to data management plan | | |
| Obtain existing or develop draft instruments | | | Implement evaluation findings | | |

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

F. Construct a rough budget for the evaluation

| | TIME ESTIMATE | COST ESTIMATE |
|---|---|---|
| Staff salary and benefits | | |
| Consultants, experts | | |
| Travel | | |
| Postage/Phone | | |
| Printing/Duplication | | |
| Supplies and equipment | | |

**PHASE 1: PLANNING—DESIGN**

A. Determine your overall study design (see a table of strengths and weaknesses of various study designs on page 14 by hovering over "Creswell 2003").

❑ Quantitative

❑ Qualitative

❑ Mixed Methods

B. For each outcome you intend to measure, determine the population to sample from and the appropriate sample size (see www://research-advisors.com for a table of suggested sample sizes).

- Population of interest:_____
- Acceptable confidence interval: _____
- Acceptable margin of error:_____
- Sample size needed:_____

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

C. Draft the Data Collection Strategy. For each outcome, include information about the indicator, data collection methods to be used, the source of the data, the sample size needed, and the timeline for data collection.

| INDICATOR | DATA COLLECTION METHOD | SOURCE OF DATA | SAMPLE SIZE | TIMELINE |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**PHASE 2: IMPLEMENT—DEVELOP**

A. Articulate the construct of interest and develop draft instruments, if necessary, or document sources for other original work.

Define constructs of interest:

Cite possible existing sources of instruments:

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

B. Describe the attributes of the instruments and the rationale for selection.

C. Review Appendix F (Checklist for Developing Surveys, if necessary)

**PHASE 2: IMPLEMENT—TEST**

A. Pilot and/or field test draft instruments and refine as needed based on test results:

| INSTRUMENT NAME | PILOT OR FIELD TEST? | AUDIENCE | SAMPLE SIZE | DATE ADMINISTERED | RESULTS |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

B. Document any changes to the instrument based on pilot and field tests:

**PHASE 2: IMPLEMENT—ADMINISTER**

A. Describe participant recruitment efforts.

B. Document your data collection efforts:

| DATA COLLECTION METHOD | AUDIENCE | SAMPLE SIZE | DATE ADMINISTERED | RESULTS |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# APPENDIX H: EVALUATION PLAN WORKSHEET (CONT'D)

**PHASE 3: SHARE—ANALYZE AND INTERPRET**

Make a copy of the original raw data and a working file of the data.

Master file name: _____

Master file location: _____

Working file name: _____

Working file location: _____

QUANTITATIVE DATA (NUMERICALLY-BASED DATA)

- ❑ A. Create a codebook for organizing all your data
- ❑ B. Determine software to use and types of statistical procedures to employ
- ❑ C. Summarize the data using descriptive statistics

QUALITATIVE DATA (TEXT AND IMAGE-BASED DATA)

- ❑ D. Determine the procedure for data analysis
- ❑ E. Determine what type of software to use
- ❑ F. Employ data reduction techniques

MIXED METHODS DATA

- ❑ G. Compare and contrast qualitative and quantitative data
- ❑ H. Synthesize mixed methods data
- ❑ I. Analyze separately

**PHASE 3: SHARE—REPORT**

- ❑ A. Executive Summary
- ❑ B. Program Description
- ❑ C. Evaluation Methodology
- ❑ D. Findings and Results
- ❑ E. Discussion/Interpretation
- ❑ F. Recommendations
- ❑ G. References
- ❑ H. Appendices

**PHASE 3: SHARE—DISSEMINATE**

- ❑ A. Share with stakeholders
- ❑ B. Consider publishing
- ❑ C. Inform your program

# APPENDIX I: GLOSSARY OF TERMS

**Activities**—Tasks described in a logic model that use inputs (resources) and directly relate to outputs and outcomes.

**Bias**—Systematic errors that can negatively influence research results such as measurement or sampling-related errors.

**Coding**—A procedure to transform raw data into a form that can facilitate data analysis; used often to categorize text-based, qualitative data into common themes, concepts, or phrases.

**Construct**—A psychological attribute or latent variable that cannot be measured directly, such as happiness or interest, but only through a set of measurable indicator variables.

**Convenience sample**—A sample acquired based on who is available or where they are located.

**Data management plan**—A document that outlines the processes for collecting, storing, and analyzing data.

**Descriptive statistics**—Methods used to describe basic features of a particular set of data including the mean, median, mode, range, and standard deviation.

**Evaluation**—The systematic collection of information to determine strengths and weaknesses of programs, projects, and products so as to improve their overall effectiveness.

**Executive summary**—A very brief overview and description of a longer report, such as a final report. The executive summary typically describes the program structure, purpose, and results.

**Formative evaluation**—A type of evaluation that occurs during project development and provides direction for improving implementation and operation. Findings may result in changes to project structure and/or implementation (also called process or implementation evaluation).

**Front-end evaluation**—A type of evaluation that occurs during the defining phase of a project to obtain baseline information about an audience. Findings help to inform project goals and objectives that can be aligned with audience needs/interests (also called needs or feasibility assessment).

**Generalizability**—The extent to which research results from a sample can be applied to the larger population, sometimes referred to as "ecological validity."

**Goals**—Broad and abstract statements describing a desired result, e.g., "appreciation for science" or "increase interest in technology."

**Impacts**—Long-term outcomes that are broad in scope, aimed at expanding knowledge and capacity for a particular field of study, and meant to provide benefits to society.

**Indicators**—Specific criteria for measuring success. Indicators should articulate how you will define and measure success in reaching your outcomes.

**Individual learning outcomes (ILOs)**—Measurable changes to project participants, including "cognitive outcomes" (the things people know), "affective outcomes" (how people feel), and "behavioral outcomes" (what people do).

**Inferential statistics**—Methods of analysis that allow researchers to make inferences and test hypotheses about relationships in a sample that are likely to occur in a population.

**Informed consent**—A procedure for obtaining permission for voluntary participation in a research study, usually by way of a signed form that clearly describes the study and its risks and benefits.

**Inputs**—Resources dedicated to or consumed by a project; typically things like funding agencies, scientists, staff, volunteers, and technology infrastructure.

**Institutional Review Board (IRB)**—A committee charged with protecting the rights and welfare of people involved in research. Associated with biomedical service, but behavioral and survey research also fall under the category of research involving human subjects.

**Instrument**—In evaluation research, a tool used to collect and organize information either through self reports or observation. Examples include survey questionnaires, behavioral rating scales, tests, checklists and inventories, psychometric instruments, and rating scales.

# APPENDIX I: GLOSSARY OF TERMS (CONT'D)

**Likert-type scale**—Used to ascribe quantitative value to qualitative data, this is a type of psychometric response scale commonly used in surveys to obtain a participant's preferences or degree of agreement with a statement or set of statements.

**Logic model**—A graphical representation of a project that shows the relationships between each project component and the expected outcomes; helps to articulate programmatic objectives and strategies; and focuses attention on key interventions and intended outcomes. Usually presented as inputs, activities, outputs, outcomes, and impacts.

**Outcomes**—The changes that a project is intended to produce in individuals, groups, or communities as a result of participation. Targeted and more specific than goals, outcomes refer to concrete and measurable statements and are used to determine if goals were met.

**Outputs**—Direct products, or by-products, of the stated activities that demonstrate immediate results of activities. Easy to quantify and focus on things done by participants.

**Population**—The entire target group under consideration that has specified criteria or properties. Entire populations are often impossible to study, so most researchers draw a sample from the population at large.

**PPSR**—(Public Participation in Scientific Research) Scientific investigation that engages the general public in asking questions, developing research projects, collecting/analyzing data, and presenting findings.

**Purposeful sample**—A type of sampling method that does not rely on randomness or representativeness, aimed at obtaining information from a specific group.

**Qualitative data**—Non-numerical data collected in the form of text and images.

**Quantitative data**—Information that is collected in numerical form and can be analyzed using statistical methods.

**Questionnaire**—A type of data collection instrument presented as part of a useful set of questions in a survey.

**Reliability**—Describes the overall consistency of a measure or instrument; reliability is high if similar results are produced across time and across similar groups.

**Sample**—The subset of a larger group or population that is considered representative of the population.

**Sampling**—The process of selecting a subgroup that represents the population from which it is drawn. Sampling varieties where there is an equal probability for selection include: simple random sampling, systematic sampling, and cluster sampling. Non-probability sampling techniques include: convenience sampling, quota sampling, and snowball sampling.

**Scale**—In survey research, a set of questions that attempt to measure different levels of a single construct (or in the case of subscales, multiple related constructs) within a population.

**Stakeholders**—Persons or organizations with an interest in the project; e.g. funding sources and employers.

**Stratified sample**—A sample that illustrates particular characteristics of a subgroup; can be random or purposeful.

**Summative evaluations**—A type of evaluation that occurs once a project has been established. Used to describe project value, outcomes, and to determine effectiveness. Findings help to determine if the project's stated goals and target outcomes have been accomplished (also known as outcome or impact evaluation).

**Survey**—A methodological process that involves sample design, data collection, and data analysis and interpretation that is aimed at gathering systematic information about a defined population, typically through interviews or questionnaires.

**Theory of Change**—A technique for outlining how project activities will lead to desired outcomes by formulating "if…then" statements. Theory of Change should describe the target population, desired results, activities, context, and assumptions.

**Validity**—The extent to which a concept, conclusion, or measurement is well-founded and corresponds accurately to the real world; i.e., an instrument correctly measures what it is supposed to. There are many types of validity including face, content, criterion-related, construct, internal, and external validity.

# APPENDIX J: REFERENCES

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# APPENDIX K: ADDITIONAL RESOURCES FOR USE IN PLANNING AND CONDUCTING PROJECT EVALUATION

(Click on each title to navigate to the link)

## CHECKLISTS, GLOSSARIES, TIPS, AND WORKSHEETS

Evaluation Design Checklists *(Western Michigan University)* - https://www.wmich.edu/evaluation/checklists

Study Design and Data Collection Worksheet *(CAISE, see page 3)* - http://web1.sph.emory.edu/DTTAC/planningFundamentals/docs/Mod5-6.EvaluationPlanWorksheets.pdf

Research and Evaluation Glossary *(Colorado State University)* - https://writing.colostate.edu/guides/guide.cfm?guideid=90

Quick Tips for Evaluation *(University of Wisconsin (UW) Cooperative Extension - scroll down for tips)* - https://fyi.uwex.edu/programdevelopment/guides-hints/

## CULTURALLY RESPONSIVE EVALUATION

Navigating the Complexities of Research on Human Subjects in Informal Settings *(informalscience.org)* - http://informalscience.org/perspectives/blog/navigating-the-complexities-of-research-on-human-subjects

Tips for Culturally Sensitive Evaluation *(UW Cooperative Extension)* - https://fyi.uwex.edu/programdevelopment/inclusive-excellence/

## DATA ANALYSIS AND INTERPRETATION

Analyzing Qualitative Data *(UW Cooperative Extension)* - https://fyi.uwex.edu/programdevelopment/files/2016/04/Tipsheet20.pdf

Using Excel for Analyzing Survey Data *(UW Cooperative Extension)* - https://learningstore.uwex.edu/assets/pdfs/G3658-14.pdf

Analyzing Retrospective Pre Data *(UW Cooperative Extension)* - https://fyi.uwex.edu/programdevelopment/files/2016/04/Tipsheet30.pdf

## DATA COLLECTION AND METHODS

Data Collection Overview *(NOAA "Designing Education Projects," 2nd ed. 2009, see page 57)* - http://www.oesd.noaa.gov/leadership/DEP_Manual_2ndEdt_Final.pdf

Methods for Collecting Information Tip Sheet *(UW Cooperative Extension)* - https://fyi.uwex.edu/programdevelopment/files/2016/04/Tipsheet8.pdf

Guide to Sampling *(UW Cooperative Extension)* - http://learningstore.uwex.edu/assets/pdfs/G3658-3.pdf

# APPENDIX K: ADDITIONAL RESOURCES FOR USE IN PLANNING AND CONDUCTING PROJECT EVALUATION (CONT'D)

## ETHICS

American Evaluation Association Guiding Principles for Evaluators *(AEA)* - http://www.eval.org/p/cm/ld/fid=51

Ethics in Research *(Research Methods Knowledge Base)* - http://www.socialresearchmethods.net/kb/ethics.php

Does Evaluation Require IRB? *(Oregon State University)* - http://oregonstate.edu/research/irb/does-evaluation-require-irb-review

## EVALUATION REPORTING

Writing an Evaluation Report *(University of Illinois at Chicago)* - https://uofi.app.box.com/s/ksuq8n05u33zawbqn7ci3q464rm7i8bu

Quality Criteria for Reports *(Online Evaluation Resource Library)* - http://oerl.sri.com/reports/reportscrit.html

Evaluation Report Template *(South Australian Community Health Research Unit)* - http://som.flinders.edu.au/FUSA/SACHRU/PDF/EvalReportTemplate.pdf

## GENERAL EVALUATION GUIDANCE

The PI Guide to Managing Evaluation *(CAISE)* - http://www.informalscience.org/evaluation/pi-guide

The 2010 User-Friendly Handbook for Project Evaluation *(NSF)* - http://www.informalscience.org/2010-user-friendly-handbook-project-evaluation

Planning a Program Evaluation *(UW Cooperative Extension)* - http://learningstore.uwex.edu/Assets/pdfs/G3658-01.pdf

## LOGIC MODELS

Logic Model Worksheets *(UW Cooperative Extension)* - http://www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html

## STUDY DESIGN

Study Designs for Program Evaluation *(Project STAR)* - http://www.pacenterofexcellence.pitt.edu/documents/Study_Designs_for_Evaluation.pdf

Evaluation Designs Common in Measuring Outcomes *(UW Cooperative Extension)* - https://fyi.uwex.edu/programdevelopment/files/2016/04/Tipsheet36.pdf

# APPENDIX K: ADDITIONAL RESOURCES FOR USE IN PLANNING AND CONDUCTING PROJECT EVALUATION (CONT'D)

National Science Foundation Framework for Evaluating Impacts of ISE Projects *(NSF)* - http://informalscience.org/documents/Eval_Framework.pdf

## SURVEY DESIGN

Questionnaire Design *(UW Cooperative Extension)* - http://learningstore.uwex.edu/assets/pdfs/G3658-2.pdf

Collecting Survey Data *(UW Cooperative Extension)* - http://learningstore.uwex.edu/assets/pdfs/G3658-10.pdf

Best Practices for Survey Research *(Ithaca College - immediate download)* - http://www.ithaca.edu/ir/icsrc/docs/bestprac.pdf

**Visit www.citizenscience.org/evaluation for tools to measure learning outcomes from citizen science projects.**