6. DATA COLLECTION AND ANALYSIS

There are two main types of data collection, qualitative and quantitative. Put simply, quantitative refers to figures and numbers, while qualitative refers to feelings and experiences. It is recommended that a mixed-methods evaluation is considered for projects, combining both qualitative and quantitative methodologies to produce a complete picture of the results of the project. In addition, it is useful to consider incorporating triangulation into your project's evaluation.

Triangulation helps to validate the data collected by cross verification from more than two sources. It tests the consistency of findings obtained through different instruments, and increases the chance to control, or at least to assess, some of the threats or multiple causes influencing your results. Both quantitative and qualitative data can contribute to a programme evaluation. The balance between the two is likely to be determined by your objectives for the evaluation and your budget.

WHAT METHODS OR TOOLS CAN BE USED TO EVALUATE?

Once you know what you want to evaluate, there are lots of different methods and models that can be drawn upon. The more you think about the purpose and scope of your evaluation, the more you will be drawn towards particular methods of evaluation.

Here are some of the most common evaluation techniques:

- **interviews (e.g., structured, semi-structured, face-to-face, telephone);**
- **surveys (e.g., online, postal);**
- **poster exercises or activities (e.g., graffiti walls, posing questions on posters at an event, stickers on charts);**
- **postcards;**
- **observations;**
- **self-reflection tools (reports, case studies);**
- **focus groups;**
- **meetings or workshops; and,**
- **diaries (e.g., video, log books).**

You should not restrict yourself to this list – if thinking about your project aims and the focus of the evaluation has given you ideas for evaluation methods, don't be afraid to experiment with them. You will find more details of data collection tools below.

QUANTITATIVE DATA

This provides measurements, for example of how many people attended the event and what they thought of it. The same questions should be used throughout the evaluation and responses gathered from a representative sample. Often, all participants are asked to fill in a questionnaire (sometimes before and after if knowledge change is being measured).

QUALITATIVE DATA

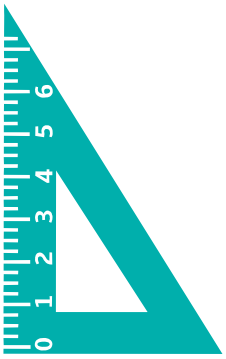
Qualitative approaches help you understand 'why' rather than 'how many'. As such, they are invaluable for understanding a complex situation or developing an initial understanding of an area prior to developing a structured questionnaire. These data explore the participants' experience in more depth than quantitative data. Methods vary, from the inclusion of open questions on a survey to interviews. Sampling should include a cross-section of participants. Qualitative methods are open ended. They are especially valuable at the formative stage of evaluation, when programmes are pilot testing proposed procedures, activities and materials. They allow the evaluator unlimited scope to probe the feelings, beliefs and impressions of the people participating in the evaluation, and to do so without prejudicing participants with the evaluator's own opinions.

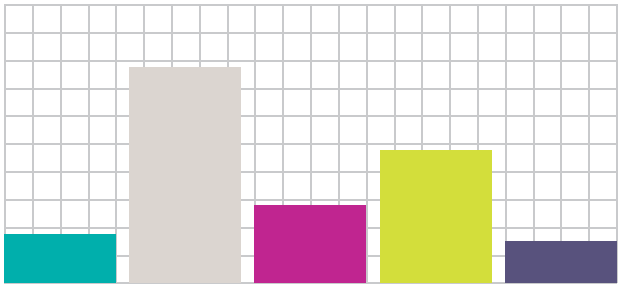
Here are some examples of qualitative data collection methods:

1. Personal interviews

In-depth personal interviews with broad, open-ended questions are especially useful when the evaluator wants to understand either: 1) the strengths or weaknesses of a new or modified programme before it is in effect; or, 2) the cause of a problem should one develop after the programme is in effect. Relatively unstructured personal interviews with members of the target population allow interviewees to express their point of view about a programme's good and bad points without being

6. DATA COLLECTION AND ANALYSIS





prejudiced by the evaluator's own beliefs. Open-ended questions allow interviewees to focus on points of importance to them, points that may not have occurred to the evaluator. Personal interviews are particularly important when the target population differs in age, ethnicity, culture, or social background from programme staff, and when the programme staff has a different professional background from those directing the programme.
The interviewer's objective is to have as much of the conversation as possible generated spontaneously by the interviewee. For this reason, interviewers must avoid questions that can be answered briefly.
Personal interviews are the most appropriate form of qualitative evaluation when the subject is sensitive, when people are likely to be inhibited speaking about the topic in front of strangers, or when bringing a group of people together is difficult (e.g., in rural areas).
Personal interviews should be audiotaped and transcribed verbatim. Most commonly, evaluators analyse the results of personal interviews by looking through the transcripts for insightful comments and common themes. They then give a written report to programme management. Thus, the interviewees' words become the evaluation data, with direct quotes serving as useful supporting evidence of the evaluators' assessments.

2. Focus groups

Focus groups serve much the same function as personal interviews. The main difference is that, with focus groups, the questions are asked of groups. Ideally, these groups comprise four to eight people who are likely to regard each other as equals. A feeling of equality allows all members of the group to express their opinions freely. Focus groups have an advantage over individual interviews because the comments of one participant can stimulate the thoughts and ideas of another. You must conduct several focus groups because different combinations of people yield different perspectives. The more views expressed, the more likely you are to develop a good understanding of whatever situation you are investigating.
As with personal interviews, focus-group discussions should be audiotaped and transcribed verbatim. The evaluator looks for insightful comments and common threads both within groups and across groups, and uses direct quotes as the evaluation data. Also as with personal interviews, evaluators analyse the data and prepare a written report for programme management. Many of the same questions may be used for personal interviews and for focus groups.

3. Participant observation

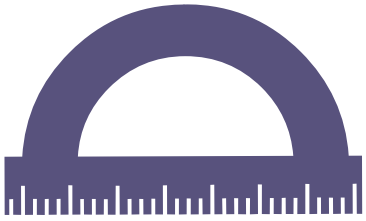
Evaluation by participant observation involves having members of the evaluation team participate (as far as possible) in the event being observed, look at events from the perspective of a participant, and make notes about their experiences and observations. Aspects to observe include physical barriers for participants, smoothness of programme operation, areas of success, and areas of weakness. Observers should be unobtrusive and ensure that their activities do not disrupt the programme. They should be alert, trained in observational methods, and aware of the type of observations of greatest importance to the programme evaluation.

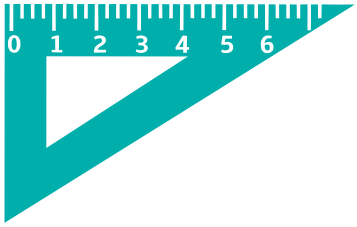
Participant observation is particularly valuable for several reasons:

- **the parties involved in a project may not realise the effect of their actions or words on other people, or they may not be fully aware of their own reactions to particular situations;**
- **unlike personal interviews or focus groups, participant observation can produce information from people who have difficulty verbalising their opinions and feelings; and,**
- **problems of which participants are unaware can come to light.**

A major disadvantage of participant observation is that it is time consuming for the evaluator.

6. DATA COLLECTION AND ANALYSIS





4. Observational data

Exploring how people participate in an event can provide very valuable data. Did they participate in all events/activities? Were some aspects more popular than others? How did people interact with your website or display? A clear idea of what you are looking for is important when structuring observational data.

5. Project team records

Keeping an evaluation journal allows the programme team to explore and reflect on the process of developing and delivering the project.

DATA ANALYSIS

Once you have gathered all your data, it is time to analyse it. It is important to consider your data analysis throughout all elements of your evaluation, specifically when designing your data collection methods, so as to ensure that you can analyse it appropriately. It is useful when analysing your data to compare and contrast it to existing project evaluation reports, either by yours or another organisation, so as to put the results in context. It is also useful to look at population representative statistics of STEM public engagement, for example the Programme for International Student Assessment (PISA) survey (http://www.oecd.org/pisa/aboutpisa/).

The Centres for Disease Control and Prevention have developed a useful set of guidelines on evaluation data analysis, which you can access here: http://www.cdc.gov/healthyyouth/evaluation/data.htm.