



NATIONAL GIRLS COLLABORATIVE PROJECT

Idea Brief

Advancing the Agenda in Gender
Equity for Science, Technology,
Engineering and Mathematics

This Idea Brief is available online at www.ngcproject.org/events/

The National Girls Collaborative Project is partnering with Education Development Center, Inc. (EDC) to provide capacity-building topical webcasts that assist girl-serving organizations. We are pleased to join the Collaborative in our joint mission to inform and encourage girls to pursue careers in science, technology, engineering, and mathematics.

EDC assists NGCP by providing expertise on research-based strategies, assisting with online events, and producing summary publications from joint EDC/NGCP events. This Idea Brief is the first in a series of such publications that will summarize key points presented in topical webcasts. They will also list relevant resources, link to the webcast archives, and provide dates for upcoming capacity-building webcasts.

This Idea Brief highlights key learnings from the September 12, 2007 webcast, "Good Assessment=Success: Developing Assessment Based Outreach Activities." Barbara Bogue, M.Sc., and Rose Marra, Ph.D. – co-founders of the AWE Project (Assessing Women and Men in Engineering Project) – presented information on how to implement a successful program assessment.

Good Assessment=Success

Proceedings from September 2007 Webcast

The Importance of Assessment

Assessment is a critical tool for developing and implementing effective outreach activities and curricula. To do it well requires time and resources (expertise and money) – things that many coordinators of outreach activities are short on. In response to this problem, the speakers founded the AWE Project (NSF HDR # 0120642, 0607081) which was created to provide user-friendly, tested, and validated survey instruments and assessment tools.

Barbara and Rose shared a real-life example of a program assessment that taught them some valuable lessons. They described a week-long residential camp designed to encourage high school junior and senior girls to pursue engineering (and, in particular, to apply to the host institution's engineering program). The immediate pre-and post-survey results indicated that the program was successful. On the pre-survey, 40 of the 42 girls indicated no interest in engineering. On the post-

survey, all 42 indicated they were interested in pursuing engineering as a career. Additionally, 13 of the 15 seniors said they planned to apply to the institution sponsoring the camp. The six student leaders all said they were happy with the leadership opportunities provided. All participants enjoyed the experience and gave it high marks.

Assessment In Action

An evaluation of the program, however, yielded some interesting results. While the camp was a success in terms of enjoyment, an assessment uncovered the following:

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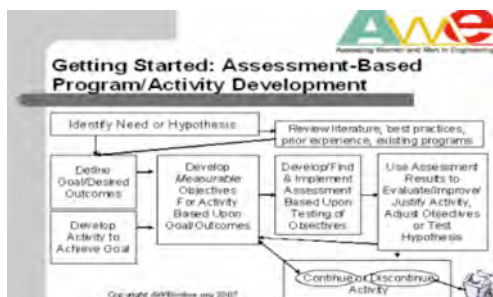
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- * The camp was costly—\$1500 per girl
- * Staff was over-extended with the time it took to plan and run the camp
- * 73% of time was spent eating, sleeping and logistics; only 10% of the time was spent on dedicated engineering activities; 17% of which was on engineering-related activities (group work, computers, tours)
- * Only 2 of the 15 seniors applied to the school's engineering program

This assessment allowed the planners to alter the program for the future. They changed the program to a day camp, and devoted 90 percent of the time to engineering activities. The changes resulted in a more focused program that was cost-efficient, time-efficient, and – most important – based on achieving activity objectives.

What is Assessment?

Assessment is a process of gathering data to determine how an individual's performance, or how a product or program, has met its intended objectives. The underlying question for assessment is; "How does a participant, program or activity perform relative to stated objectives." Assessment-driven programs and activities focus on developing measurable objectives that support a larger mission or goals. Data are then collected to provide information about whether or not those objectives are achieved. Rose and Barbara discussed the concept of assessment-driven program development in the form of the following diagram:



An important thing to note about the diagram is that it is a continuous improvement loop that demonstrates how to create assessment-based programs and activities.

Implementation

The first step is to do a **needs assessment**. Use simple observation (i.e., we need more girls in science) supported by investigation into relevant research and existing literature. The latter includes identifying similar programs and strategies applicable to your goal and objectives. Once you have identified a need, form a hypothesis. Finally, use the results of your needs assessment to **define or hone your goal** and **identify activities** designed to achieve the goal and objectives.

Next, **develop measurable objectives** for the activities based on your goal and desired outcomes. Use the objectives to develop new or identify existing assessment instruments that will measure whether you reach those objectives. When borrowing existing instruments, be sure to request permission from the author(s), credit them, and ask them

TIP: Gather Assessment data that enables improvement in meeting objectives and goals -- not simply whether participants enjoyed activities.

on which objectives the survey questions were based. This is crucial information: If the objectives don't match yours, then the survey is not appropriate for your activity. Implementing an assessment each time you offer an activity allows you to identify changes in the external environment ("confounding variables") that may affect how an activity is meeting program goals. Throughout this process, use the assessment data you've collected

to continuously improve the activity and to report on program outcomes. If you find that an activity does not meet your objectives, it can be changed or discontinued.

Use your data to improve goal and objectives, test hypotheses, and justify activities to funders or supervisors. **Adjust your activities or programs based on what the data are telling you.** "This process creates the continuous improvement loop that is the basis of good assessment," noted Barbara.

Types of Assessment Data

The AWE Project focuses on developing instruments that gather quantitative – or number based – data because they are "resource smart," and are easier to analyze when resources are limited. They can also be very effective at measuring outcomes. Qualitative data, in contrast, derive from methods that gather "word based" information from open-ended survey questions, observations, focus groups, and interviews.

Barbara and Rose note that the AWE surveys also include summative and formative data. Summative data provide insight into the overall impact of the activity, including whether it achieved the intended objectives; while formative data provide information that leads to activity improvement. Using both maximizes the usability of assessment instruments for practitioners, providing insight into what the "big picture looks like," as well as what can be changed immediately or in the next iteration.

Use your data to improve goal and objectives, test hypotheses, and justify activities to funders or supervisors. Adjust your activities or programs based on what the data are telling you. *"This process creates the continuous improvement loop that is the basis of good assessment."*

Defining the Goal and Objectives

Once you have identified a need, the next step is to define goals and objectives that address that need. The objectives are the "working tools" that assist you in staying on-track to achieve overall program goals.

NEEDS ----> GOALS ----> OBJECTIVES ---->

For example, if your identified need is "recruit more women into engineering," the goal may include creating activities that "provide girls opportunities to meet women engineers" or "show girls how engineering relates to real-life." The objectives supporting the goal could then be to "increase interest in engineering among girls who have not previously shown an interest" or "increase the number of girls taking engineering-related coursework."

Objectives should always be **measurable**. To measure the objective of "promoting interest in engineering among girls who have not previously shown such interest," use surveys that asks participants what their level of interest in engineering is before (pre-survey) and after an event (post-survey). (Asking participants to fill out a post-survey several months after the event provides a more accurate measure of behavior change than asking them to do so as they leave the event.) To measure whether girls are taking more engineering-related coursework, track participant course choices and/or retention in engineering-related courses over a specific period of time. You can also ask girls to report whether they have enrolled in engineering-related coursework in a post-survey.

Time and money are the greatest obstacles to undertaking effective assessment. To maximize your efforts, make sure that your assessment activities match your goals and objec-

tives. Be creative in allocating resources. For example, you may be able to borrow items from an already-created survey—just make sure that the questions apply to your objectives!

TIP: To implement successful programs, always align goal, objectives, evidence, and measures.

Using and Understanding Your Data

Rose and Barbara stressed that to get the most out of your data, you need to analyze it and use it. If you are collecting data after activities, send frequent reminders to elicit as high a response rate as possible. Include sufficient time for data analysis and dissemination activities in your planning and timeline. If you need additional help understanding your data, reach out to colleagues.

The implementation team of the engineering camp (described above) used the assessment results to revamp the camp, changing it to a day camp that better achieves the activity objectives. It now serves more girls, costs less money to run (now \$142 per participant), results in more enrollments in engineering at the college level, and allocates most of the available time to engineering activities.

All information is good information! Even unexpected or disappointing findings are valuable and can be used to hone program activities and generate new areas of inquiry. Many worry about presenting "poor" results to funders or supervisors. Do this in a positive way by describing how you will use these data results to improve activities. The program staff of the engineering camp used their "bad" data to explain to funders why a shift to a day camp structure would better meet the objectives stated in the original proposal. The result was increased funding for the following year!

When you have completed your assessment, remember to disseminate results as widely as possible. Options include writing papers, presenting at conferences, soliciting attention from media outlets, and sending results to other researchers. The NGCP can assist you with disseminating your results.

Feb 13 Webcast: "Reaching out to Underserved Populations in STEM."

April 9 Webcast: "Using the Data: How to Plan, Develop, and Use Program Evaluation to Build a Better Program."

May 14 Webcast: "You Can Make a Difference: How to Plan Role Model Visits and Field Trips to Inspire Girls in STEM."

To register for these events, please visit NGCP's Web site: www.ngcproject.org

Selected Q & A

After their presentation, Barbara and Rose answered some questions posed by listeners:

Q: Does every parent have to sign a release form in order to use data from assessments?

A: Yes. A few people will not want to participate in the assessment, and they can opt out of that. It should be made clear to them that their children can still participate in the program activities.

Q: Regarding Pre- and Post- data—what if participants show high agreement on questions designed to determine whether the objectives have been met in the pre-test? Is it possible to show any gains if the change is slight?

A: If students are scoring high on a pre-test, it may mean that you need to re-assess your goals and objectives. Or, you may need to revise questions to get at data that will demonstrate impact better.

Q: How does one address attribution to project efforts when multiple factors are involved?

A: If activities take place during a limited time period, it is easier to measure. One thing you can do is to also collect data from participants about other activities they are involved in. Pre- and post- surveys can address this. You may also need to refocus your questions. If you're not sure you can determine attribution, be open to the possibility of assessing the impact of several initiatives. ❁

About NGCP

The National Girls Collaborative Project brings together organizations throughout the United States and Puerto Rico that are committed to informing and encouraging girls to pursue careers in science, technology, engineering, and mathematics (STEM).



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Resources

<http://www.engr.psu.edu/awe/> The Assessing Women in Engineering Project is working with SWE and NGCP on updating assessment instruments and resources during the Winter of 2008.

<http://www.SWE.org> The Society of Women Engineers offers an annual literature review, research and statistics.

<http://www.iwitts.org> The National Institute for Women in Trades, Technology & Science offers a wide variety of resources compiled by the Institute.

This IdeaBrief can be found online at: http://www.ngcp.org/events/webcast_archive.html

