SEVEN STEPS TO GETTING WHAT YOU WANT

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AWE—exportable surveys and assessment tools for STEM activities and classrooms

AWEonline.org
Slide Set Overview

- Introduction to the NGCP AWE Collaboration
- Workshop Objectives
- Introductions
- Case Study
- Discussion of AWE Assessment Approach
  - Foundation for developing and delivering programming

AWEonline.org

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Workshop Format

- **DO** ask questions or offer examples from your own experience during the workshop.
- Will be break-outs so you can apply what you are learning.
What is AWE?

AWE Project offers:

- Tested and validated surveys you can USE.
  - K-16 outreach activities
  - College Level: Mentoring, Leaving/Persisting, climate and self-efficacy
- Capacity building—”how to”—tools (workshops, webcasts, supporting website)
- Practical tools (data entry, online surveys, etc.)
SWE AWE Goal

- Make Assessment Easier to Do
  Caveat: Assessment still takes time and effort

- The payoff is big
  - Find out if your activity or initiative works
  - Make it better
  - Build credibility for your activity
    - Funders like—and often require—assessment/evaluation
  - Add value for volunteers
AWE & NGCP

- National Girls Collaborative Project works to strengthen capacity of girl-serving STEM organizations across U.S. www.ngcproject.org
- NGCP partners with AWE to bring resources and training to girl-serving STEM organizations in evaluation and assessment
  - NGCP Web site
  - Materials for Regional Collaborative Forums
  - Webcasts
Workshop Objectives

- Learn to Apply 7 Steps to Effective Design and implement effective design
- Learn about AWE surveys and other tools
Getting What You Want:  
A Case Study  
Making Assessment Work for You
Welcome to the camp that looks good....

- 1-week residential engineering camp with an objective of recruiting high school girls who didn’t plan to be engineers
  - 42 high school girls participated

- Research-based
  - Emphasizes interdisciplinary engineering
    - Captures non-identifying cohort
    - Attracts women
  - Emphasis on hands on projects and role models
Looks Very Good . . .

Post-Event Survey results:

- Participants had fun
  - POST: All 42 were very enthusiastic about the event

- Plans of participants entering to study at hosting university
  - PRE: 40 of 42 saying they did NOT plan to study engineering
  - POST: 40 of 42 said they wanted to be engineers
  - POST: All 12 senior participants planned to apply
But “failed”…

- Tracking participants revealed that only 2 participants applied
  - As opposed to all of the seniors who said they would

- Cost analysis
  - Camp was expensive: about $1400 per girl

- Time analysis
  - Little time was spent on engineering activities: Only 27%!
Time Analysis Leads to More Targeted Programming

Original Camp Time Analysis:
27% of time spent on engineering/engineering related activities

REVISED Camp Time Analysis:
90% on engineering

73% of time on non-engineering related activities

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Lessons Learned Re: Assessment

- Kids having fun is a **poor success indicator**
- Poor data or half the data can lead to **wrong** overall evaluation & decision making
- Adding **additional data** can lead to more accurate assessment of program
What is Assessment?
And Why Bother?

Effective assessment = effective activities
What is Assessment?

- Gathering data to determine the extent to which your activity has met the goal and objectives you define
- Measure effectiveness by gathering data in a broad variety of ways:
  - Surveys, observation, level of participation (how many, gender, ethnicity), time and resource analysis, volunteer and parent feedback, etc.

Assessment is the Foundation of Effective Program Development and Delivery
Why Assess?

- Know whether your activities are doing what you want them to
- Use resources (both money and people) more efficiently
- Create credibility for your activities
- All of which lead to increased funding opportunities

Gathering and sharing assessment data is important to NGCP
AWE’S SEVEN STEPS TO GETTING WHAT YOU WANT

From Building Your Foundation to Telling Your Story
Typical Practice?

And the end of the story!

6. Collect Data
5. Explore Resources
4. Identify Activities

Missing! The Foundation
Common Approach to Assessment

Happy Face survey

Typical Happy Face Survey

Did you enjoy this activity?

Talks are boring; I like action

Closed Feedback Loop

Missing: What have others done?

Improvements in delivery of activity

Yes, but…

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Avoid Happy Face Questions: Make Your Survey Work for You

- Objective: Change girls’ attitudes about computers

- Happy Face Question:
  - Did you have fun learning to use the computer?

- Objective-based Example:
  - Do you plan to take a computer course next year?
  - What did you learn?

- Formative Example
  - Were the handouts for this activity effective?
  - What would you do to improve this activity?
1. Build a Sound Foundation: Goal

The goal is aspirational: It is what you want to achieve overall.

1. Identify Overarching Goal
2. Build a Sound Foundation: Objective

Objectives are specific statements of what you want to achieve. Objectives must be *measureable*. Objectives identify how to achieve the overarching goal.

1. Identify Overarching Goal
3. Plan Data Collection

Data collected should directly relate to objectives. Collect data to measure whether you achieve your objectives.
Objective: Role models will lead hands-on activities to demonstrate what engineers do so that girls make the connection between the role model and engineering careers as measured by participant responses to specific questions on pre- and post-surveys.

Goal: Inspire girls to become engineers.
Breakout: What would you do?

- **Goal:** Introduce girls to computer science through a hands-on software development activity

- **Questions:**
  - What do you want to know about how the activity worked?
  - How will you determine (measure) whether the activity worked? (metrics/outcomes)
Surveys That Address Objectives = Activities that Meet Objectives
Surveys That Address Objectives = Activities that Meet Objectives

- Improvements in CONTENT & DELIVERY
  - Use to Make Change
  - Opps! Objective not met
  - A: They sit at computers

- Survey Measures Objective
e.g. Introduce Computer Science as active/varied
  - Great Knowledge Based Project with Defined Objectives
  - Q: What do computer scientists do?
  - Opps! Objective not met

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Step 2:
Objective Examples: Ineffective

- Unproductive Objectives:
  - This camp will provide a challenging experience for girls.
    - How will I measure this? How is it related to my defined goal of attracting girls to STEM?
  - Girls will fabricate and launch a rocket.
    - Why? What do I want them to learn through this exercise? How is it related to my defined goal of attracting girls to STEM?
Objective Examples: Effective

- Productive (Measurable) Objective
  - Girls will learn what aerospace engineers do through hands-on experiments, as measured by:
    - Pre- and post-survey questions asking girls:
      - What they know about what aerospace engineers do in the workplace.
      - What impact rocket-making can have on society.
Going Back to Case Objectives

☐ Introduce girls not identifying engineering to engineering
  ☐ Expected Outcome: High percentage of uncommitted girls who become interested
  ☐ Measures: Surveys, 6 month focus groups

☐ Recruit girls to host institution
  ☐ Expected Outcome: Girls apply to Penn State
  ☐ Measures: Survey, admissions database

☐ Provide leadership experience for upper level women
  ☐ Expected Outcome: Increased commitment to engineering
  ☐ Measures: Survey, tracking for retention
Step 3: Plan Data Collection

- Consider all aspects, early and often!
- Select methods and tools for collection
Explore Variety of Measures

- Supplement surveys with other data
  - Understand more about survey data
  - Get at difficult issues
  - When surveys aren’t practical

- Example:
  - Head Counts
  - AWE Peer Observation Tool
  - Interviews & focus groups:
    - Survey results identify problem (e.g. girls report lower satisfaction with an event than boys), set up interviews or focus groups to help find out why
  - Observation, time and cost analysis, etc.
Solicit Data You Can or Will Use

☐ Check your surveys and other tools to remove:
  ☐ Data you won’t use
  ☐ Data that you won’t be able to use because of time or capacity restrictions
  ☐ Data that does not directly address your objectives or formative information that will help you improve your activity

☐ Concise surveys:
  ☐ Save organizer, activity, and participant time
AWE Offers Surveys You Can Use

- Pre-College Instruments
  - Grades 2-12
    - Spanish versions available for Elementary level surveys
  - Engineering, Science, Computers
  - Pre, Immediate Post, 3 to 6 Month Post
  - Available as paper downloads and on line via Survey Monkey (requires own account)

- Observation Form for Peer Observers

- AWE Tool Implementation Guide
Surveys That Address Objectives = Activities that Meet Objectives

Use to Make Change

Opps! Objective not met

Additional data from interviews, observation, time & cost, etc.

Great Knowledge Based Project with Defined Objectives

Survey Measures Objective
e.g. Introduce Computer Science as active/varied

Q: What do computer scientists do?
A: They sit at computers

Improvements in CONTENT & DELIVERY

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1. Identify Overarching Goal

2. Define Measureable Objectives

3. Plan Data Collection

4. Identify Activity

5. Explore Resources

6. Collect Data

7. Use!

STEPS 4-5: BUILD ON YOUR FOUNDATION

Choose Activity, Explore Resources
Build a Sound Structure

**Explore Resources:** Seek out and use best practices on proven activities and research about gender differences in spatial skills, etc.

**Identify Activity:** Choose a hands on aerospace activity to increase girls’ understanding of engineering and hands-on/spatial skills ability

Note: If you have chosen an activity before laying the foundation, go back and identify your goal and what objectives that activity will achieve.
Step 5: Explore External Resources

Find and use additional information to **magnify** the impact of your activity

- Review proven, best practices
  - Contact other outreach practitioners to find out what they do and how they do it
  - Get familiar with relevant research and literature
Know the Research & Resources: Explore Rich Resources

Research:

□ Applying Research to Practice (ARP) Resources

□ AWEonline.org (free downloads); lulu.com (book form)

□ AAUW “Why so Few?”
  □ AAUW.org

□ Pink Brain, Blue Brain by Lise Elliot (book)

Practice:

□ NGCProject.org

□ AWEonline.org

□ WEPAN Knowledge Center (WEPANkc.org)

□ ASPIRE.swe.org

□ Serving Up Science and Engineering (book-lulu.com)
Overview: Minority Retention

By: Kelly A. Rodgers, Ph.D., University of Texas at San Antonio

May and Chubin (2003) pointed to seven key factors that contribute to the success and consequent retention of minority students pursuing undergraduate and graduate degrees in STEM: pre-college preparation, recruitment programs, admissions policies, financial assistance, academic intervention programs, and graduate school preparation and admission. Arguably, these factors, while important in STEM specifically, may be deemed crucial elements for minority students in general, regardless of academic major. In fact, the literature on minority student retention as a whole has promoted each of these factors in some form or another (e.g., Fenske, Porter, & DuBrook, 2000; Rivera-Mosquera et al., 2005; Swall, Reid, & Perna, 2003). It is important to note, however, that retention concerns have not had a blanket effect across all STEM fields and ethnic groups. For example, fields like biology and chemistry achieved and in some cases, exceeded relative gender equality in degrees conferred. In 2006, women received 59.7 percent of the bachelor's degrees awarded in biological and agricultural sciences, and 4 percent of those awarded in physical sciences. A few fields like chemistry and physics, however, have yet to show consistent gains for women, with 19.5 percent of bachelor's degrees awarded in engineering (National Science Foundation, 2008).

In general, graduation rates are not proportionate to the general population across all ethnic groups. In 2004, Asian students represented approximately 11.8 percent of bachelor's degrees awarded in engineering, despite representing only 3.7 percent of the United States population. Conversely, African American, Hispanic, and Native American students garnered 5 percent, 6.9 percent and .5 percent of engineering degrees while representing 12 percent, 11.5 percent and .7 percent, respectively, of the U.S. population (National Science Foundation, 2008). Thus, it is important to be sensitive to cultural practices and beliefs that may contribute to students' potential to be retained in STEM programs. For example, the overrepresentation of Asian students in STEM fields might be explained as the result of their collectivistic, family-oriented culture, where in excelling in a chosen program of study, regardless of the cost, ultimately serves a group goal by portraying the family in a positive way. For African American and Hispanic students, negative views of their cultural backgrounds or family settings may interfere with students' abilities.

When gender is an issue, the support given to women and Hispanic is often a concern in science and engineering. The aim of this paper is to show the processes and the evidence from particular research on college student retention is given, with special attention given to the applicability of that literature to women in science.

Figure 1: Retention Model (adapted from Bean & Eaton, 2000; Rodgers & Summers, 2008).

<table>
<thead>
<tr>
<th>Entry characteristics</th>
<th>Environmental triggers</th>
<th>Antecedents</th>
<th>Psychological processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student background characteristics</td>
<td>Skills, Cultural norms, Year motivation</td>
<td>Social &amp; Academic Interactions</td>
<td>Commitment to the institution</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Mastery experiences</td>
<td>Risk-taking</td>
<td>Social support</td>
</tr>
<tr>
<td>Motivation, Importance of degree</td>
<td>Value placed on degree completion</td>
<td>Retention</td>
<td></td>
</tr>
</tbody>
</table>

References

http://www.egr.psu.edu/awewww/teacherassessment/2literature/Dick_TeacherAssessment.pdf

Using Research to Achieve Objectives: Two Examples

Objective: After event, girls will decide to enroll in higher level math courses.

Research: **Gender Differences in Math Performance** reports that girls are already taking higher level math

Result: **Change focus of objective** to convince girls to apply math skills studying STEM disciplines
Example 2; Spatial skills are not innate and can be improved with training*.

One of the largest and most persistent gender gaps in cognitive skills is found in the area of mental rotation, where boys consistently outperform girls.

- Use handheld models.
- Provide spatial skills training.

From AAUW “Why So Few”, 2010
Breakout: Created Objectives, Measures & Activity for Spatial Skills

☐ Goal: Increase number of girls ready to participate in STEM

☐ Objective: ????

☐ Activities: ????

☐ As measured by: ????
Surveys That Address Objectives = Activities that Meet Objectives

AAUW, AWE CASEE ARPs, reports, best practices, WKC, etc.

Use to Make Change

Opps! Objective not met

Great Knowledge Based Project with Defined Objectives

Improvements in CONTENT & DELIVERY

Survey Measures Objective
e.g. Introduce Computer Science as active/varied

Q: What do computer scientists do?
A: They sit at computers

Additional data from interviews, observation, time & cost, etc.

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1. Identify Overarching Goal
2. Define Measureable Objectives
3. Plan Data Collection
4. Identify Activity
5. Explore Resources
6. Collect Data
7. Use!

STEPS 6 & 7: TELL THE STORY

With Results
Tell the Story, With Results

**Use!** Analyze the data and use to:
- Continuously improve activity
- Motivate volunteers and participants
- Deploy resources effectively
- Attract sponsors/funders

**Collect the Data:** Create plan to collect data; review tools to ensure targeted questions/findings
Step 6: Collect Data

☐ Plan implementation

☐ At the Event:
  ■ Plan time in agenda to complete surveys and other tools

☐ Online:
  ■ Prepare emails/snail mail to announce where and how to take surveys

Tip: Many outreach veterans offer prizes for survey completion or make completion a requirement for gifts
Step 7: Use Results

- Understand whether you achieve objectives
  - Use all your data sources (e.g. surveys, whether participants take AP Math, etc.) to test/measure whether activities do what you want them to
  - Example: Kids think computer scientists only sit there;
  - Emphasize creativity and team aspect of career

- Change structure of activity
  - Example: Time analysis reveals too little time spent on objectives
  - Reorganize activity to leverage time and resources better
Step 7: Use Results II

- Attract funders and volunteers
  - Use data to showcase your activity; convince funders that you are worth funding
    - Example: All girls attending demonstrate improved attitude toward STEM careers
    - Example: Activity/event regularly generates substantial waiting list
  - Use data to demonstrate your professionalism to funders
    - Example: Explain how undesired outcome leads to renovation and desired outcomes
    - Example: You have data that validates your expenditure of resources!
Say Good-bye to These Old Friends!

- Just-in-time approach
  - Last minute survey preparation
  - Failure to allocate time in schedule for participants to take survey

- Using “found” survey that doesn’t fits your activity objectives

- Measuring only “fun” and “enjoyment”
Re-Cap: 7 Steps to Getting What You Want

1. Identify Overarching Goal
2. Define Measurable Objectives
3. Plan Data Collection
4. Identify Activity
5. Explore Resources
6. Collect Data
7. Use!
ONLINE RESOURCES

Making Assessment Work for You
FREE Tool Access at AWEonline.org

- AWEonline.org
- Quick, free, one time registration
- Site is accessible from NGCP
ACESS Through NGCP

http://www.NGCProject.org

Home ➔ About ➔ AWE
AWE Surveys, ARPs and Other Tools

SWE AWE Product List
Assessing Women & Men in Engineering
Developing Exportable Tools for Success
NSF HRD 0120542, 0607081, 0010224, 0734072

SWE AWE Surveys and Support Materials
(Available in paper and online versions)
• Diversity Activity Surveys
  • Longitudinal Assessment of Engineering Self Efficacy (LASEE)
  • Undergraduate Mentor & Mentee Surveys (Pre & Post)
  • Undergraduate PDQ (Pretty Dam Quick) Leadership & Participant Surveys (Pre & Post)
• Retention Surveys
  • Students Persisting in Engineering Survey
  • Students Leaving Engineering Survey
• Classroom Environment Surveys (AWISE) (online version only)
  • Faculty & Student Background Surveys
  • Faculty Inventory of Classroom Activities
  • Classroom Activities & Outcomes Survey
• Recruiting/Acceptance Survey
  • College Choice Survey (in collaboration with University of Texas–Austin)
• Pre-College Recruiting Surveys (versions available for Engineering, Science, & Computer Science)
  • High School Self-Efficacy (in collaboration with FREE Project)
  • Middle & High School Activity Surveys (revision in collaboration with National Grid Collaborative Project)
    • Pre-, Immediate Post, 3 to 6 Month Post
  • Core surveys address demographics, self-efficacy, confidence, career awareness, interest and attitudes to STEM careers
  • Additional questions assess sense of community, hands-on activities/projects, perspectives and activity quality, recruiting to a STEM career and/or institution
• Lower & Upper Elementary School Surveys (in Spanish and English versions)
  • Lower Elementary Surveys (Grades 2), pre & post
  • Upper Elementary Surveys (Grades 3-5), pre & post
• Elementary Caregiver/Parent Surveys, pre & post (English & Spanish Versions)

Outreach Peer Observer Form
Pre-College Survey Implementer’s Guide
Data Management and Collection Tools
Excel data entry templates for pre-college outreach

SWE AWE Product List, October 2010

Applying Research to Practice—AWE-CASEE ARP Resources
Easy-to-use research findings that help you identify research findings that increase activity success. Collaborative project of AWE and the National Academy of Engineering Center for Advancement of Scholarship on Engineering Education—CASEE. Proposals for additional topics are welcome. See: http://www.ornl.edu/AWE/AARP.aspx

• Attribution Theory
• Career Development Theory for Women in Engineering*
• Changing Problem-Solving in Engineering*
• Cooperative Learning*
• Family influence on Engineering Students*
• Gender Differences in Math Performance and Science Achievement
• Girls’ Experience in the Classroom: Is it different? Does it matter?
• Mentoring Making It Work
• Motivational Factors in STEM: Interest and Academic Self-Concept: identifying what keeps students motivated to persist in STEM
• Questions in the Classroom: Good questions make good learning*
• Retention of Underrepresented College Students in STEM: Traditional Paths, Psychological Aspects, and Directions for Moving Forward
• Self-Efficacy: Does she think she can? And how important is that?
• Self-Authorship: How do we define ourselves within our culture and experience?
• Sense of Community: It’s important for girls and women to feel like they belong.*
• Stereotype Threat: Causes, Effects, & Remedies: Do stereotypes hold us back?
• Talent Crisis in Science & Engineering
• The Application of Title IX to Science and Engineering
• The Use of Questions in the Classroom*
• Visual Spatial Skills: Is seeing (3-dimensionally), succeeding?

AWE-CASEE ARP Resources in press or development:
• Family and Cultural Influence of Women of Color in Engineering
• Recruiting and Retention of Women from Community Colleges for Increasing Diversity
• The Male and Female Brain: Similarities and Differences
• Visual Spatial Skills
• Diversity, Inclusion, and Cultural Awareness for Classroom and Outreach Education
• Female Interest in Mathematics
• Gender and Communication Style
• Participation in STEM Higher Education by Persons with Disabilities
• STEM-related Databases and How to Use them

*Original AWE Literature Overviews or CASEE Change Sheets

AWE Assessment Webcasts
(for links to podcasts and information on workshops go to AWEonline.org.)
• Adapting and Using Tools from the Assessing Women and Men in Engineering (AWE) Project: STEM Equity Pipeline
• Assessing Effectiveness: Do Your Program Activities Make a Difference? STEM Equity Pipeline
• Good Assessment + Success: Developing Assessment Based Outreach, National Girls Collaborative Project
• Assessment as a Capacity Building Tool to Develop Systematically Planned and Implemented Activities* WEPAN

For more about SWE AWE visit www.AWEonline.org or contact us at awe@ornl.edu

SWE AWE Product List, October 2010

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AWE Elementary Surveys

- Lower & Upper Elementary
  - Pre, Immediate Post, 3 to 6 Month Post*
  - Engineering, Science, Computer
  - English and Spanish

- Adult (Caretaker) Surveys

*6 month post not available for Lower Elementary
Elementary Caretaker & Spanish Surveys

**Name of Activity**
Pre-Activity Survey for Family Members or Caregivers
< Date of Activity>

Welcome to <name of activity>.
Thank you for taking the time to fill out this survey, which will take about 10 minutes to complete. If you have questions about the survey, ask any of the people at the xxx.

***FOR PRE-MAILED SURVEY ONLY
Please return this survey to the address below by <date>.
Name & Institutional Address

1. To what extent is the child you care for:

<table>
<thead>
<tr>
<th></th>
<th>Don't Know</th>
<th>Not at all</th>
<th>A little</th>
<th>Somewhat</th>
<th>Very</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good at math</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good at science</td>
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<tr>
<td>Creative</td>
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<tr>
<td>Good at solving problems or puzzles</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interested in science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interested in math</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interested in how things work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Please check any of the following phrases that describe your child:
- [ ] Has attended other science, math, or engineering activity
- [ ] Visits Web sites about science, math or engineering
- [ ] Reads about science, math, or engineering
- [ ] Watches TV shows or movies about science, math, or engineering (e.g. Science Guy, NOVA Mythbusters, etc.)

**Nombre de la actividad**
Actividad previa a la encuesta para niveles inferiores de escuelas primarias
<Fecha de la actividad>

1. Por favor, conteste con si ☑ o no ☒. (☐Significa que no está seguro.)

<table>
<thead>
<tr>
<th></th>
<th>☑</th>
<th>☒</th>
<th>☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Yo soy bueno para las ciencias.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Yo soy bueno para las matemáticas.</td>
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</tr>
<tr>
<td>c. Yo soy bueno para la ingeniería.</td>
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<tr>
<td>d. Me gusta saber cómo funcionan las cosas.</td>
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<td></td>
</tr>
<tr>
<td>e. Yo soy creativo.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. ¿Qué cree que los ingenieros o científicos pueden hacer o inventar para mejorar su vida y la de su familia (cosas buenas o cosas malas)? Haga un dibujo con un título o haga una lista en el espacio debajo.
Elementary Surveys Measure Change in Attitude/Awareness

4. Please mark how much you agree or disagree with each statement.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I would enjoy being a scientist.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I would enjoy being an engineer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>I would like a job where I could invent things</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4.</td>
<td>I would like to design machines that could help people walk.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5.</td>
<td>I would enjoy a job helping to make new models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>I would like a job that lets me design cars.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>I would enjoy a job helping to protect the environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Scientists help make people's lives better.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Engineers help make people's lives better.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Doing this activity (check all that apply):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Helped me learn more about engineering.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Increased my interest in doing more engineering projects and activities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Helped me see I was good at engineering.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Was fun.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>The person who ran this activity (check all that apply):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Was friendly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Was fun.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Helped me when I needed it.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>What did you like best about the activity?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AWE Middle & High School Surveys

- **MS and HS Pre, Immediate Post, 3 to 6 Month Post**
  - Engineering, Science, Computer

- **Core Surveys — based on commonly targeted objectives**
  - Demographics, self-efficacy, confidence, career awareness, interest or attitudes to STEM careers, and formative participant evaluation of activity

- **Additional question sets**
  - Sense of community, hands-on activities/projects, presenter and activity/presentation combined, recruiting to a STEM career and/or institution

- **Paper downloads & online via Survey Monkey**
Pre-College Survey Description: What Do the Surveys Measure?

- Course-taking plans for high school.
- Intent to study science or engineering.
- Knowledge of what engineers, scientists, or computer scientists do.
- Skill and confidence level in areas important to successfully complete STEM degree.
- Satisfaction with the quality of the activity in which participated.
Adapting AWE Surveys

- Optional Questions address objectives

<table>
<thead>
<tr>
<th>Question Sets and related objective</th>
<th>Pre</th>
<th>IM Post</th>
<th>3-6 Mo. Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Rating Scales for Sense of Community</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Measure impact of activity on participant ability to form/identify a supportive STEM community.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. Hands-on Activities/Projects</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Measure impact of hands-on, skills oriented activities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III. Presentations (lecture-style)</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Measure impact of lecture-type presentation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. Presenter and Activity/Presentation Combined</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Measure impact of presenters and activities when multiple activities are offered within one event.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use with hands-on activities or lecture-style presentations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. Rating Scales for Recruiting to a STEM Career and/or Institution</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Measure whether activity causes participants to consider pursuing STEM studies in higher education and/or a specific institution.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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MS/HS Survey Questions Measure Whether Objectives are Achieved

Example: Use comparison of pre- and post- surveys to measure change of attitude

What are your goals?
12. The table shows statements about attributes of work that are may influence you as you think about your future career. For each sentence below check the appropriate box to tell us how what level of importance you place on each attribute:

<table>
<thead>
<tr>
<th>How important is it to you to do . . .</th>
<th>Not Important</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Work that makes me think</td>
<td></td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>b) Work that allows me to make lots of money</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>c) Work that allows me to use math, computer, engineering or science skills</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>d) Work that allows me to tell other people what to do</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>e) Work that allows me to help solve problems and create solutions</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>f) Work that is fun to do</td>
<td></td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>g) Work that allows me to have time with family</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>h) Work that allows me to help my community and/or society</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>i) Work that makes people think highly of me</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>j) Work that is satisfying to me</td>
<td></td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
Example: Survey Formative Questions

Tell us why you are here

18. Why are you attending this activity? Directions: Check all that apply.

☐ Have fun
☐ Learn more about <name of offering college or organization>
☐ Learn about what engineers do
☐ Meet others with interests similar to mine
☐ Not sure
☐ Add additional question here if needed
☐ Have something to do
☐ Learn more about different majors in college (e.g., engineering, science, computers, etc.)
☐ Make my parents/guardians happy
☐ Prepare me to do well in school
☐ Other: ____________________________
☐ Add additional question here if needed

19. How did you hear about this activity? Directions: Check all that apply.

☐ A guidance counselor at my school told me about it
☐ A teacher at my school told me about it
☐ I or my parents did a web/internet search
☐ Someone from this college or organization told me about it
☐ I saw a newspaper or other advertisement
☐ My parents told me about it
☐ I received something in the mail
☐ Other: ____________________________

Use formative answers to shape and improve delivery

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### Example: Hands-On Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>1 = Strongly Disagree</th>
<th>2 = Disagree</th>
<th>3 = Agree</th>
<th>4 = Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The activity helped me understand how to approach problem solving.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>If I have the right equipment, I can teach someone else how to do this activity.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I was able to learn from any mistakes made during this activity.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

The instructions were clear enough for me to start on the project.

Qu #. Name one problem you experienced in [your skill-building activity] today and explain how you [and your team] solved it:

<table>
<thead>
<tr>
<th>Problem:</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Enlarge answer spaces when adding to survey.]</td>
<td></td>
</tr>
</tbody>
</table>

Qu #. Write down one or two examples of how you would apply what you learned today to a problem you might find in the real world.
Import Online Versions of Surveys

- Import Surveys to your SurveyMonkey Account
  - Participants take surveys online
  - Eliminates data entry
  - Downloadable reports
- Free Service
- Contact awe@engr.psu.edu
12. What do engineers do?

Read the following statements about what engineers might do and indicate your agreement or disagreement with Engineers:

- Mainly work on machines and computers
- Mainly work with other people to solve problems
- Work on things that help the world
- Can choose to do many different kinds of jobs
- Mainly work on things that have nothing to do with me
- I don't know what engineers do

Other (please write in whole sentences)
Other AWE Pre-College Tools

- Outreach Activity Peer Observation Tool
  - Alternate way to assess activities and volunteer leaders/speakers
  - Provides feedback to organizers and volunteers
- Tool Implementation Guide
AWE Peer Observation Form:
An Alternative Assessment Tool

- Gathers data from Peer Observer
  - Specifics of an activity, such as demographics and timing
  - Ability of an activity to engage participants
  - Ability of an activity to meet objectives
  - Volunteer leader performance

- Allows organizers to:
  - Deploy volunteers effectively
  - Allocate resources to the most effective activities
  - Help volunteers hone their presentations or activities
Observation Tool

II. Demographics

Participants
Indicate the

Volunteers

For Hands On Projects or Activities:
Provides sufficient time for participant

☑ ☐ ☐ ☐ ☐

III. Presence

Primary Presenter

Check a box only if one person is the main presenter.

☑ ☐ ☐ ☐ ☐

Volunteer Does the volunteer actively participate?

☑ ☐ ☐ ☐ ☐

The Primary Presenter

Allows sufficient presentation

☑ ☐ ☐ ☐ ☐

Weaves in session (a problem involves problem solving)

☑ ☐ ☐ ☐ ☐

Uses language and understan
dable by the participants.

☑ ☐ ☐ ☐ ☐

Asks questions and
wait time for

☑ ☐ ☐ ☐ ☐

IV. Materials

Were there print-based, visual aids or other materials to support the presentation or use during the activity?

☐ Yes ☐ No

If yes, complete the following:

Materials ...

<table>
<thead>
<tr>
<th>Material Feature</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were easy to understand and use.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Were available for everyone.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Were age-appropriate.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Used gender-neutral language.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Represented diverse images of people</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

V. End of Event Reflections

Participant Engagement

List all portions of the presentation that fully captured the attention of participants:
Thank You!

For More Information

- Barbara Bogue (bbogue@psu.edu)
- Tricia Berry (tberry@mail.utexas.edu)
- Rose Marra (rmarra@missouri.edu)
- Brenda Britsch (bbritsch@psctlt.org)

The SWE AWE Project

- Register at AWEonline.org
- Email: AWE@engr.psu.edu