

When a Triangle Becomes a Three-Sided Square:

Measuring Students' Science, Technology,
Engineering and Math (STEM) Interest and
Learning through **Data Triangulation**

Ginger Fitzhugh
Evaluation & Research Associates

American Evaluation Association Conference
Orlando, FL
November 13, 2009

Triangulation

What is it?

- Use multiple sources of data to investigate the same phenomenon

Why do it?

- Independent assessments offset bias and measurement error (Campbell & Fiske, 1959)
- Strengthen validity of findings through their congruence and/or complementarity (Greene & McClintock, 1985)
- Uncover variance ignored by single methods (Jick, 1979)



TechREACH

- After school clubs for middle school girls and boys
- STEM curriculum
- Teacher training
- Field trips, guest speakers
- Summer workshops



EVALUATION

& Research Associates

TechREACH Evaluation

Do TechREACH students' demonstrate increased interest in STEM-related topics, courses and careers?

- Student pre/post surveys and focus groups
- Club leader surveys and interviews
- Parent surveys, teacher surveys, guest speaker surveys



Congruent Data: Student Interest in Technology

Student Pre/Post Survey	Student Post Survey	Club Leader Survey	Parent Survey
"I like using computers and other technology for my school work."	"TechREACH has increased my interest in technology."	"Because of TechREACH , most of the students in my club are more interested in computers and/or technology."	"Because of TechREACH , my child is more interested in computers and/or technology."
91% pre and 93% post agree	83% agree	79% agree	91% agree



Incongruent Data: Student Interest in Science

Student Pre/Post Survey	Student Post Survey	Science Teacher Survey	Parent Survey	Club Leader Survey
"I like studying science."	"TechREACH has increased my interest in science."	"This student has exhibited an increased interest in the subject I teach [science]."	"Because of TechREACH, my child is more interested in math and/or science."	"Because of TechREACH, most of the students in my club are more interested in math and/or science."
69% pre 65% post agree	66% agree	55% agree	73% agree	93% agree



EVALUATION

& Research Associates

Why lack of congruence?

- Measuring different concepts
- Measuring different samples of the population
- Measuring same concept but at different times
 - *Methods need to be reconsidered or question reframed*
- Subjective difference of opinion (different viewpoints)



Before Data Collection

- Clearly define concepts
- Consider “congruence threshold”
- Weigh time/budget considerations



After Data Collection

- Collect additional data to help interpret incongruent findings
- Ask stakeholders to help interpret findings
- Refine measures
- Congruent data \neq certainty



Questions?

Ginger Fitzhugh

gfitzhugh@eraeval.org



EVALUATION

& Research Associates