Claims + Evidence: Assessing ATE Grant Outcomes

March 16, 2011

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Introductions

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Objectives

1. Articulate an important claim about your project’s outcomes

2. Identify evidence you need to gather to justify your claim.

The PI should establish claims as to the project’s effectiveness, and the evaluative activities should provide evidence on the extent to which the claims are realized.

―2010 ATE Program Solicitation
What story are you going to tell about your ATE grant?

"The PI should establish claims as to the project's effectiveness, and the evaluative activities should provide evidence on the extent to which the claims are realized."

--2010 ATE Program Solicitation

What Will Go on Your Project's Tombstone?

ATE Project 2010-2014

75% "Satisfied" or "Very Satisfied"
What Will Go on Your Project’s Tombstone?

ATE Project
2010-2014
75 Faculty & 350 Students Served

What Will Go on Your Project’s Tombstone?

ATE Project
2010-2014
Rolled out in 3 Phases Using XYZ Approach at 4 Colleges
What Will Go on Your Project’s Tombstone?

ATE Project
2010-2014
It Made a Difference

Establish Your Claim About Outcomes
**Outcomes**

**outcome**
something that follows as a result or consequence

**Outcomes**

Outputs are
- people reached
- products developed
- events held
- research instruments, data

Outcomes are changes in
- knowledge
- skills
- abilities
- behaviors
- performance
- practices
### Outcomes

Outcomes may be

- Short-term
- Long-term
- Anywhere in between

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project start up</td>
<td>New proposal due</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Claims

**Claim**

an assertion open to challenge
Making Your Claim

Develop, deliver, and disseminate a course focused on communication skills of students in technician programs

<table>
<thead>
<tr>
<th>Who will be affected?</th>
<th>What will be different for them?</th>
<th>What assertion do you want to be able to make about your project?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students in technician programs</td>
<td>Improved communication skills in writing, public speaking, and small-group facilitation</td>
<td>Students completing Communication for Technicians 101 are able to communicate technical content effectively in writing, presentations, and small-group contexts</td>
</tr>
</tbody>
</table>

Determine What Evidence Is Needed to Support Your Claim
Evidence

\[ \text{ev-i-dence} \]
\[ \text{a: an outward sign: indication} \]
\[ \text{b: something that furnishes proof} \]

Providing Evidence

CLAIM: Students completing *Communication for Technicians 101* are able to communicate technical content effectively in writing, presentations, and small group contexts.

<table>
<thead>
<tr>
<th>What are indicators of this outcome?</th>
<th>How will this indicator be measured?</th>
<th>How will the data be collected and by whom?</th>
<th>When will the data be collected?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ demonstration of skill in response to class assignments</td>
<td>Rubric-based ratings of student performance on presentation, facilitation, and writing assignments</td>
<td>Faculty trained as raters by evaluator</td>
<td>Beginning and end of each semester the course is offered (pre &amp; posttest)</td>
</tr>
</tbody>
</table>
To make a strong argument that X caused Y, three criteria must be met:

- Temporal precedence
- Covariation
- No plausible alternative explanations

—Learn more at www.socialresearchmethods.net
**Causation**

**Temporal precedence**
(intervention must occur before outcome)

Percent of students whose performance is “Proficient”

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Covariation**
(If intervention, then outcome)

Percent of students whose performance is “Proficient”

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>48%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Causation

Covariation
(If intervention, then outcome)

Percent of students whose performance is “Proficient”

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>48%</td>
<td>50%</td>
</tr>
<tr>
<td>52%</td>
<td>75%</td>
</tr>
<tr>
<td>59%</td>
<td>85%</td>
</tr>
</tbody>
</table>

No plausible alternative explanations
(scan the environment for potential influences)

Percent of students whose performance is “Proficient”

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
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<tr>
<td>Pretest</td>
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</tr>
<tr>
<td>48%</td>
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<td>75%</td>
</tr>
<tr>
<td>59%</td>
<td>85%</td>
</tr>
</tbody>
</table>

Other interventions?
Superior instructor(s)?
Attrition/self-selection?
Determine How You will Interpret the Results

Interpretation

Statistical significance is not the same as practical significance
Performance standards may be based on a variety of sources:
- Stakeholder values and experience
- Employer needs/standards
- Project recipient needs
- Cost
- Growth

### Performance Standards

<table>
<thead>
<tr>
<th>Question</th>
<th>Excellent</th>
<th>Acceptable</th>
<th>Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>What proportion of students achieve proficiency?</td>
<td>75% or more of students receive a rating of &quot;proficient&quot;</td>
<td>50-74% of students receive a rating of &quot;proficient&quot;</td>
<td>Less than 50% of students receive a rating of &quot;proficient&quot;</td>
</tr>
<tr>
<td>To what extent do students' skills improve?</td>
<td>90% or more of students move up at least one rating level from pre- to posttesting</td>
<td>75%-89% of students move up at least one level from pre- to posttesting</td>
<td>Less than 75% of students move up at least one rating level from pre- to posttesting</td>
</tr>
</tbody>
</table>
What Will Go on Your Project’s Tombstone?

TechCommunications 2009-

Our students gain the communication skills they need to succeed in the high-tech 21st century workplace.

Comments

Gerhard
Using Claims & Evidence to Evaluate Professional Development

Judy

Claim

A statement that is ...
- Substantive
- Able to be investigated empirically
- Refutable
Evidence (for a claim)

- Reliable/replicable
- Relevant
- Valid
- Rules out other explanations
- Stipulates the conditions/degree of certainty

Example Project

To deliver face-to-face and on-line professional development to prepare teachers to use inquiry-based teaching and learning strategies in their science and mathematics classes.
Evaluation Questions

Adapted from Guskey’s Model

1. Who participated in PD? To what extent?
2. What was the nature of the PD?
3. What were participants’ reactions to the PD?
4. Did the participants acquire the intended knowledge and skills?
5. Did the participants use the acquired knowledge and skills in the classroom?
6. Did student learning improve?

Knowledge Acquisition

<table>
<thead>
<tr>
<th>Claims</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants acquired the knowledge and skills that were covered in the PD.</td>
<td>Test of content and skills covered</td>
</tr>
<tr>
<td></td>
<td>Simulations and demonstrations</td>
</tr>
<tr>
<td></td>
<td>Participant reflections (oral and written)</td>
</tr>
<tr>
<td></td>
<td>Participant portfolios</td>
</tr>
<tr>
<td></td>
<td>Case studies</td>
</tr>
</tbody>
</table>
## Knowledge Application

<table>
<thead>
<tr>
<th>Claims</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching practices were improved as a result of participating in PD.</td>
<td>Classroom observations of participants (direct or videotaped)</td>
</tr>
<tr>
<td></td>
<td>Classroom observations of a matched sample (direct or videotaped)</td>
</tr>
<tr>
<td></td>
<td>Participant portfolios</td>
</tr>
<tr>
<td></td>
<td>Teaching practices instruments</td>
</tr>
<tr>
<td></td>
<td>Surveys</td>
</tr>
<tr>
<td></td>
<td>Interviews</td>
</tr>
</tbody>
</table>

## Student Learning

<table>
<thead>
<tr>
<th>Claims</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student learning improved as a result of the improved teaching resulting from the PD.</td>
<td>Student achievement tests with students in PD participant’s classes</td>
</tr>
<tr>
<td></td>
<td>Performance assessments with students in PD participant’s classes</td>
</tr>
<tr>
<td></td>
<td>Same tests/assessments with matched sample of classes</td>
</tr>
<tr>
<td></td>
<td>School and student records</td>
</tr>
<tr>
<td></td>
<td>Portfolios/work samples</td>
</tr>
<tr>
<td></td>
<td>Interviews</td>
</tr>
<tr>
<td></td>
<td>Surveys</td>
</tr>
</tbody>
</table>
### Example

<table>
<thead>
<tr>
<th>Claim</th>
<th>Evidence</th>
<th>Eliminate/reduce counterevidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers who participated in professional development (PD) on inquiry-based teaching used more inquiry in their science classrooms than teachers who did not participate.</td>
<td>Classroom observations of teachers who participated in the PD and those who did not</td>
<td>Differences in teachers</td>
</tr>
<tr>
<td></td>
<td>Teachers’ responses on a survey of teaching practices for both groups of teachers.</td>
<td>Differences in students (e.g., SES, race/ethnicity)</td>
</tr>
<tr>
<td></td>
<td>Student surveys of classroom practices for both groups of teachers</td>
<td>Differences in schools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Differences in instructional materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Differences in time allotted to instruction</td>
</tr>
</tbody>
</table>

### Example from PRISM

- Comprehensive 5-year NSF Math and Science Partnership grant
- Multiple grade levels (K-16), sites, strategies
  - Several strategies focused on PD for K-12 and higher education faculty
  - One PD strategy was to form K-16 Professional Learning Communities
**Sample Logic Model for PD**

<table>
<thead>
<tr>
<th>Input: Who participated in what?</th>
<th>Short-term outcomes: Did K-16 faculty obtain and use the desired knowledge and skills?</th>
<th>Long-term outcomes: Did student achievement in SM improve?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative (Case Study)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quantitative (Quasi-experimental Design)</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Evaluation Work Plan**

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Instruments</th>
<th>Sample/Data Source</th>
<th>State/regional Contact (Person(s))</th>
<th>Timeline for reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty participation</td>
<td>Rosters of participants Attendance Rosters Agendas Participant logs Quarterly regional reports</td>
<td>All participants</td>
<td>Case study external evaluators Regional Co-PI</td>
<td>Ongoing, at least quarterly</td>
</tr>
<tr>
<td>What is the nature of the professional development?</td>
<td>Document collection, e.g., lists Agendas Participant logs</td>
<td>All participants</td>
<td>Case study external evaluators Regional co-PI</td>
<td>Ongoing, at least quarterly</td>
</tr>
<tr>
<td>Interviews</td>
<td>Purposeful sample of participants</td>
<td>Case study external evaluators</td>
<td>Reports quarterly to Leadership Team and Regional teams.</td>
<td></td>
</tr>
<tr>
<td>Did the participants acquire the intended knowledge and skills?</td>
<td>Content knowledge instruments to be tailored to professional development content</td>
<td>Sample of projects funded either by PRISM or teacher quality enhancement funds.</td>
<td>Internal evaluator</td>
<td>Beginning and end of PD</td>
</tr>
<tr>
<td>Inventory of Teaching and learning</td>
<td>Sample of participants and non-participants</td>
<td>Internal evaluator</td>
<td>Based on timeline for delivering professional development.</td>
<td></td>
</tr>
<tr>
<td>Open-ended interviews</td>
<td>Sample of participants and non-participants</td>
<td>Case study external evaluators</td>
<td>Reports quarterly to PRISM Leadership Team and Regional teams.</td>
<td></td>
</tr>
</tbody>
</table>
Observation Protocol

N. LESSON DESIGN AND IMPLEMENTATION

1) The instructional strategies and activities help students gain knowledge and the presentation flows well.

2) The lesson was designed to engage students as members of a learning community.

3) The lesson includes opportunities for guided practice/feedback.

4) This lesson encourages students to seek and value alternative modes of investigation or problem solving.

5) The teacher and students' prior knowledge were often determined by ideas originating with students.

IV. CONTENT

1) The lesson involved fundamental concepts of the subject.

2) The lesson involved clear, coherent, and relevant connections.

3) The teacher used a wide variety of student interaction methods.

4) The lesson provided opportunities for students to demonstrate their level of understanding.

Teaching Practices Survey

Please consider your typical teaching and learning situation in the subject you just identified and make a judgment relative to the emphasis you place on each of the best reflects the degree of emphasis you typically give to that practice. Remember that it is not expected or desirable that you would emphasize all these practices in one course.

Scale:
1 = No Emphasis
2 = Limited Emphasis
3 = Some Emphasis
4 = Moderate Emphasis
5 = Strong Emphasis
6 = Very Strong Emphasis

1. Teaching to a set of state standards.
2. Reviewing and processing students' prior knowledge, ideas, and preconceptions before implementing new lessons.
3. Engaging students as members of a learning community.
4. Providing opportunities for students to seek alternative modes of investigation and problem solving.
5. Asking students to demonstrate more than one way to solve a problem.
Evaluation Questions

1. To what extent did participation in a K-16 Professional Learning Community (PLC) influence K-12 teachers’ use of reformed teaching and learning practices?

2. To what extent did the involvement of higher education faculty members in a PLC influence K-12 teachers’ use of reformed teaching and learning practices?

Q1 Findings

K-12 Teacher Participation in a PLC on Standards-based Teaching & Learning Practices -- MATHEMATICS

p < .01 for all 4 comparisons
Q1 Findings

K-12 Teacher Participation in a PLC on Standards-based Teaching & Learning Practices -- SCIENCE

p < .01 for all 4 comparisons

Q2 Findings

STEM Faculty Participation in a PLC on K-12 Teachers’ Use of Inquiry-based Teaching & Learning Practices -- MATH

p < .01 for all 4 comparisons
Q2 Findings

STEM Faculty Participation in a PLC on K-12 Teachers’ Use of Inquiry-based Teaching & Learning Practices — SCIENCE

Q1 Claims

<table>
<thead>
<tr>
<th>Claim</th>
<th>Evidence</th>
<th>Counterevidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers who participated in PLCs reported more emphasis on standards-based teaching and learning strategies than teachers who did not.</td>
<td>Teachers’ responses on a survey of teaching and learning practices of teachers who participated in the PLC and those who did not</td>
<td>Self-selection into PLCs</td>
</tr>
</tbody>
</table>
Q2 Claims

<table>
<thead>
<tr>
<th>Claim</th>
<th>Evidence</th>
<th>Counterevidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers who participated in a PLC with a STEM faculty member reported greater use of inquiry-based teaching and learning strategies than teachers in a PLC without a STEM faculty member</td>
<td>Teachers’ responses on a survey of teaching and learning in a PLC with and without a STEM faculty member</td>
<td>Self-report of emphasis (need additional evidence to support the claim)</td>
</tr>
</tbody>
</table>

Closing Thought

“Extraordinary claims require extraordinary evidence.”

—Carl Sagan
Comments

Gerhard

Coming Attractions

May 18
Developing & Validating Survey Instruments

July 20
Strong Evaluation Plans = Stronger Proposals

Register at
www.evaluate.org/events
Coffee Break Webinar Series
April 14
What are Nonparametric Statistics and When Do You Use Them?
April 21
Utilization-Focused Evaluation

Annual Conference
October 31-November 5 in Anaheim
Proposals due Friday (March 18)

Get more information/join at www.eval.org

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