


# Claims + Evidence:

## Assessing ATE Grant Outcomes

March 16, 2011

# Evaluat|e

EVALUATION RESOURCE CENTER *for*  
advanced technological education



*This material is based upon work supported by the National Science Foundation under grant number. 0802245. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*

# Introductions



Mark



Mark Viquesney


Lori Wingate

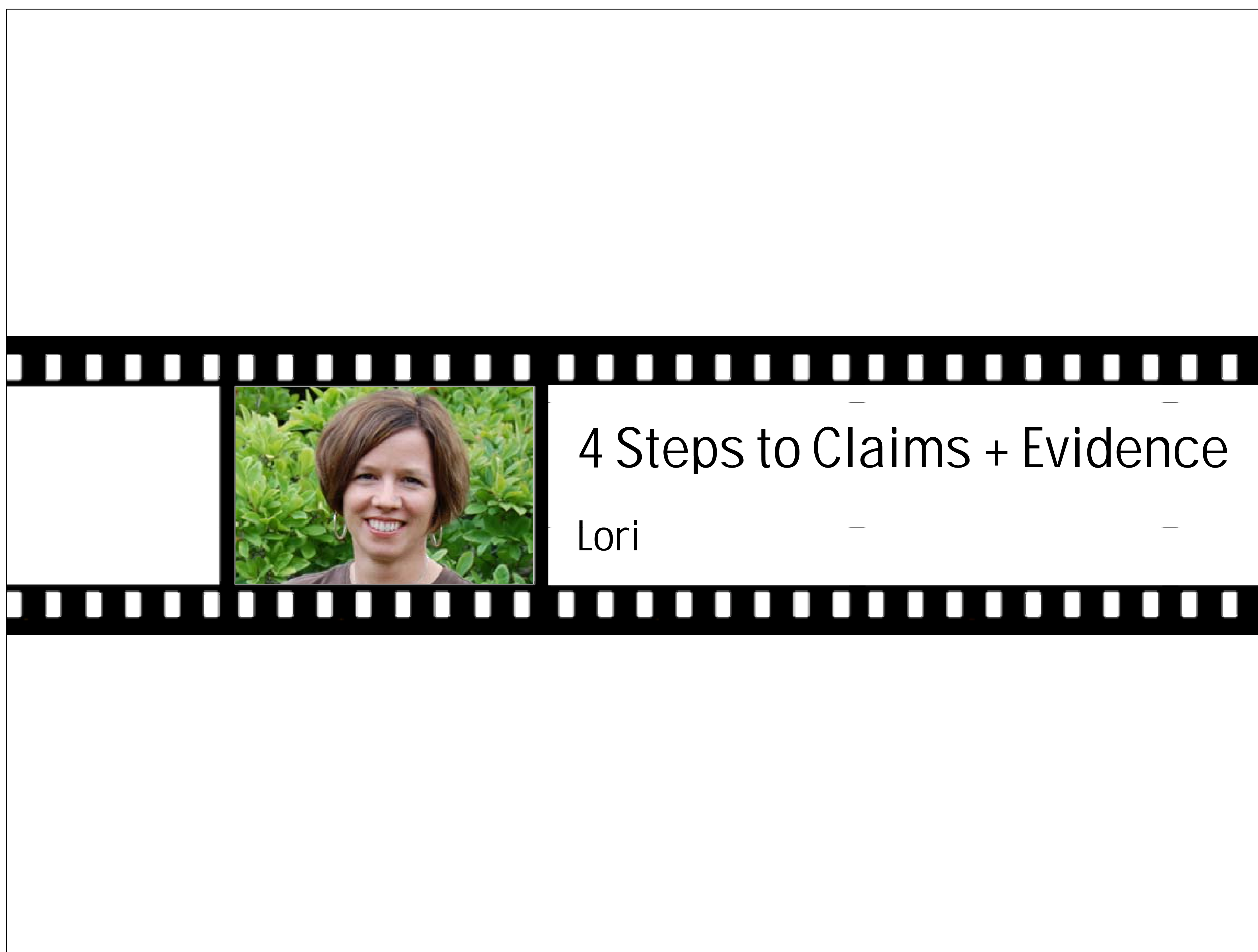
Judy Monsaas

Gerhard Salinger




<h1>Handout</h1>		<p>Mark</p>
<p>Available from  <a href="http://www.evalu-ate.org/resources">www.evalu-ate.org/resources</a></p> <p>Keyword search:  <b>claims</b></p>  <p>The handout image contains the following text:</p> <p>Handout for the webinar on <b>Establishing Claims &amp; Providing Evidence of Effectiveness</b> conducted March 16, 2011 by Stephanie Evergreen, Judith Monsaas, Lori Wingate, and Gerhard Salinger</p> <p>This material is based upon work supported by the National Science Foundation under grant No. 0802445. The content reflects the views of the authors and not necessarily those of NSF.</p> <p><b>Claims &amp; Evidence Evaluation</b>  Impacts are changes in knowledge, skills, abilities, performance, or practices.  Claims are statements that are substantive, empirically investigable, and refutable.  Evidence is reliable/replicable, relevant, and valid, rules out other explanations and stipulates the conditions/degree of certainty.  For more information about establishing causality, see the Research Methods Knowledge Base chapter on Establishing Cause and Effect at <a href="http://www.socialscisearch.com/methods/mkba/causality.php">www.socialscisearch.com/methods/mkba/causality.php</a>  in his book, <i>Utilization-Focused Evaluation</i>, Michael Quinn Patton, discusses the characteristics of importance and rigor of claims and suggests an approach for engaging stakeholders in making claims—see pages 497-500 available from <a href="http://books.google.com">books.google.com</a>  A worksheet from EvaluATE's 2010 workshop on Establishing Claims and Providing Evidence of Effectiveness is available from <a href="http://www.evalu-ate.org/downloads/establishing.pdf">www.evalu-ate.org/downloads/establishing.pdf</a>  A variety of tools to assess student mastery of "21st century" skills is from the Partnership for 21st Century Skills' "Route 21" website <a href="http://www.p21.org/route21/">www.p21.org/route21/</a></p> <p><b>Using Claims &amp; Evidence to Evaluate Professional Development: The PRISM Case</b>  To find out more about the PRISM project and its evaluation, funded by NSF through its Math-Science Partnership program, see <a href="http://prism.msu.edu/">prism.msu.edu/</a>  To learn about Tom Guskey's approach to professional development evaluation, check out his book, <i>Evaluating Professional Development</i>, published by Corwin Press. A summary is available from EvaluATE's resource library at <a href="http://evalu-ate.org/resources/">evalu-ate.org/resources/</a>—search on "Guskey." His approach is based on the work of Donald Kirkpatrick's Four Level of Training Evaluation—learn more at <a href="http://www.kirkpatrick.com">www.kirkpatrick.com</a>  The <i>Inventory of Teaching and Learning (IT&amp;L)</i> is a web-based survey of teaching and learning practices, and scales for inquiry-based teaching and learning practices, standards-based teaching and learning practices, and traditional practices. Learn more at <a href="http://hub.msu.edu/index.cfm?i=4284">hub.msu.edu/index.cfm?i=4284</a>  The <i>Reformed Teaching Observation Protocol (RTOP)</i> is an observation instrument that provides a "standardized means for detecting the degree to which K-12 classroom instruction in mathematics or science is reformed the national science and mathematics standards." General information about the protocol is available at <a href="http://www.buffalostate.edu/ATEC/RTOP/rtop_full/">http://www.buffalostate.edu/ATEC/RTOP/rtop_full/</a>. A manual, training guide, and forms are online at <a href="http://www.ec.nyu.edu/rtop/">www.ec.nyu.edu/rtop/</a>  To learn more about using evidence to inform decisions throughout a project's lifecycle, see the NSF published guide to evaluating MSP programs, <i>Evidence: An Essential Tool</i>, at <a href="http://www.nsf.gov/evidence/2005/01/03/">www.nsf.gov/evidence/2005/01/03/</a></p> <p><a href="http://www.evalu-ate.org">www.evalu-ate.org</a>   269/387.5895   Western Michigan University</p> <p><b>Evaluat e</b></p>		

<h1>Objectives</h1>		<p>Mark</p>
<ol style="list-style-type: none"> <li>1. Articulate an important claim about your project's outcomes</li> <li>2. Identify evidence you need to gather to justify your claim.</li> <li>3. Better understand NSF's expectations for ATE evaluation.</li> </ol>		




4 Steps to Claims + Evidence  
Lori



ATE Program Solicitation

“ 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

ATE Program Solicitation		Lori
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**“ What story are you going to tell about your ATE grant? ”**

--2010 ATE Program Solicitation

What Will Go on Your Project's Tombstone?		Lori
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ATE Project  
2010-2014

75% "Satisfied" or "Very Satisfied"

What Will Go on Your Project's Tombstone?



Lori



ATE Project  
2010-2014  
75 Faculty & 350 Students Served

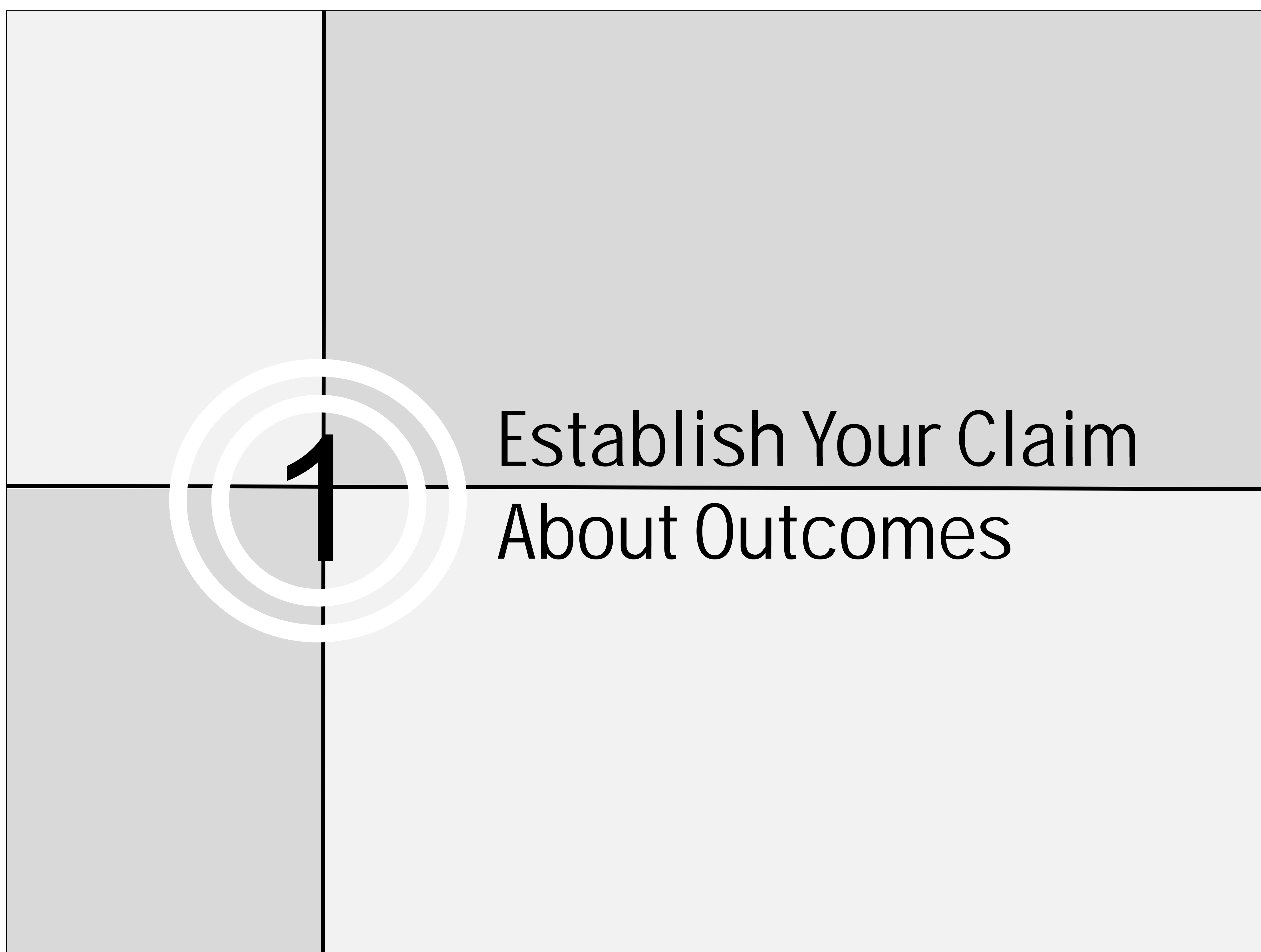
What Will Go on Your Project's Tombstone?




Lori




ATE Project  
2010-2014  
Rolled out in 3 Phases Using  
XYZ Approach at 4 Colleges



Outcomes




Lori



**out·come**  
something that follows as a result or consequence

Outcomes



Lori

Outputs are


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

→

Outcomes are changes in

- knowledge
- skills
- abilities
- behaviors
- performance
- practices


# Outcomes



Lori

Outcomes may be


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




Year 1   Year 2   Year 3   Year 4   Year 5   Year 6   Year 7   Year 8

↑ Project start up   ↑ New proposal due

# Claims




Lori



**claim**  
an assertion open to challenge



# Making Your Claim




Lori


**Tech  
Communications  
Project**


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

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



## Determine What Evidence Is Needed to Support Your Claim


Evidence

Lori



**ev·i·dence**

a: an outward sign: indication

b: something that furnishes proof


Providing Evidence

Lori

Tech  
Communications  
Project

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

What are indicators of this outcome?	How will this indicator be measured?	How will the data be collected and by whom?	When will the data be collected?
Students' demonstration of skill in response to class assignments	Rubric-based ratings of student performance on presentation, facilitation, and writing assignments	Faculty trained as raters by evaluator	Beginning and end of each semester the course is offered (pre & posttest)

3 Determine How You Will Establish Causation


Causation		Lori
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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](http://www.socialresearchmethods.net)

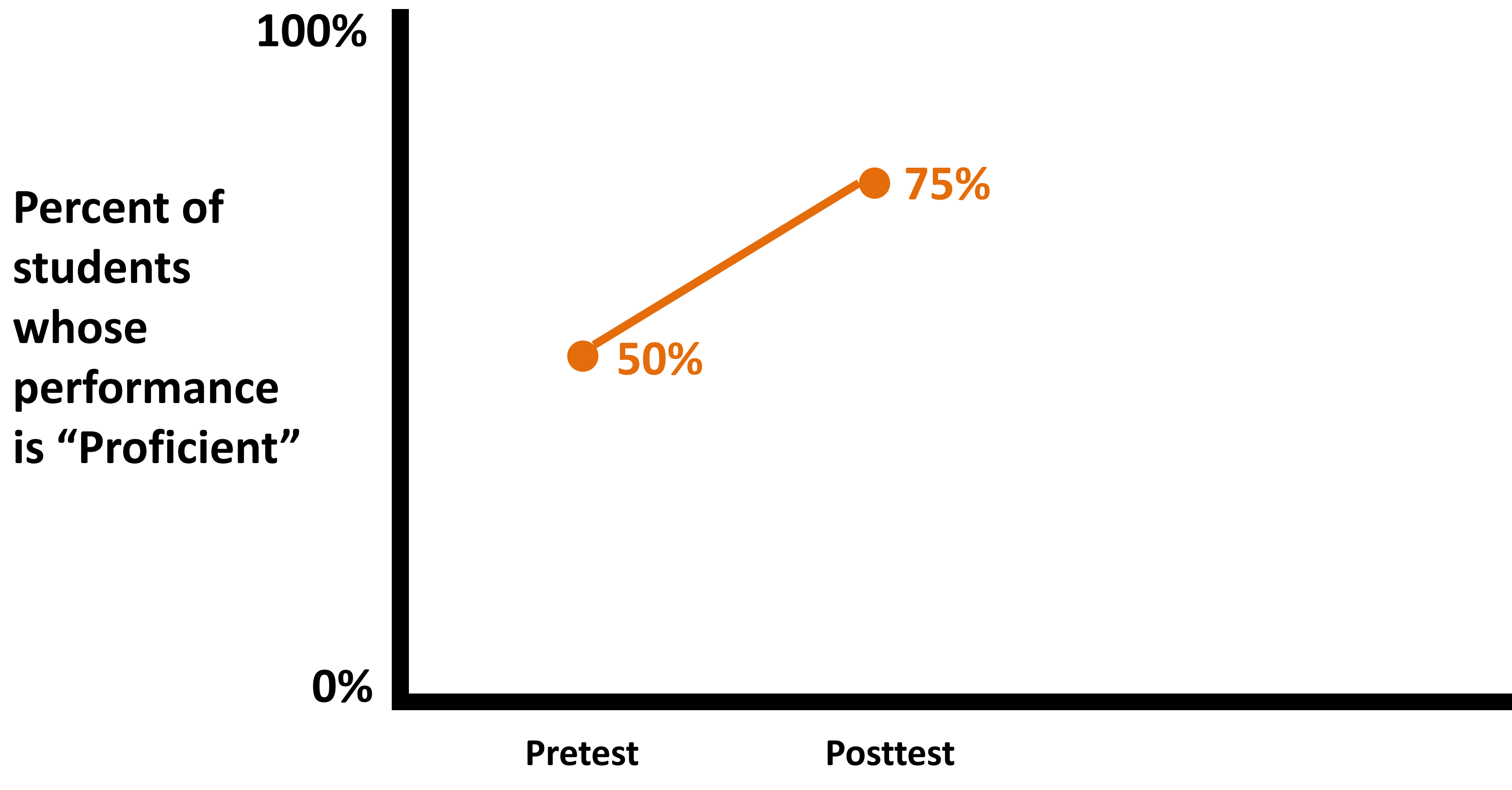
Causation



Lori


### Temporal precedence

(intervention must occur before outcome)



Time Point	Percent of students whose performance is "Proficient"
Pretest	50%
Posttest	75%

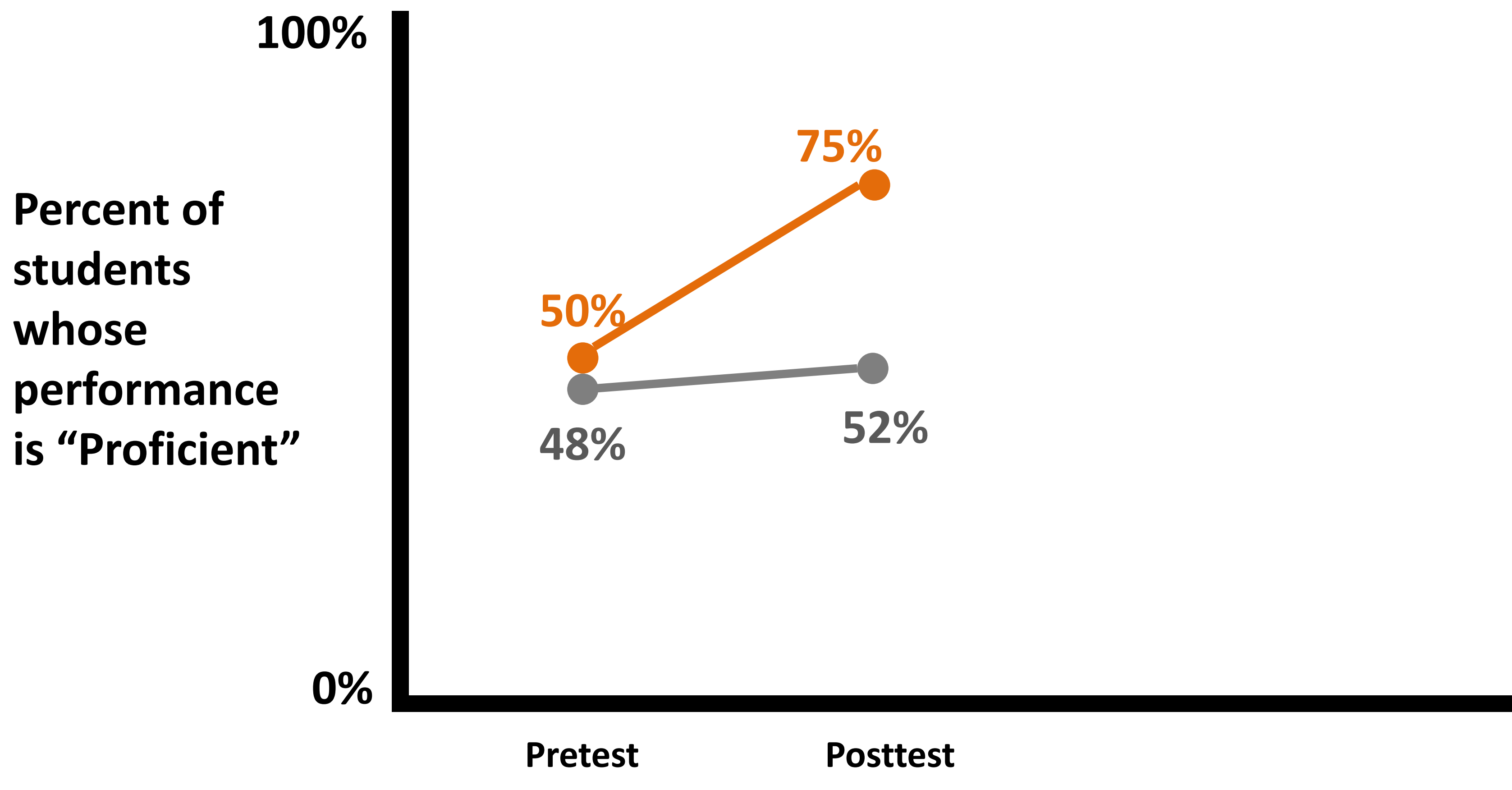
Causation



Lori


### Covariation

(If intervention, then outcome)



Time Point	Orange Line (%)	Grey Line (%)
Pretest	50%	48%
Posttest	75%	52%

Causation




Lori

### Covariation

(If intervention, then outcome)

Semester	Pretest	Posttest
Semester 1	48%	52%
Semester 2	59%	85%

Causation



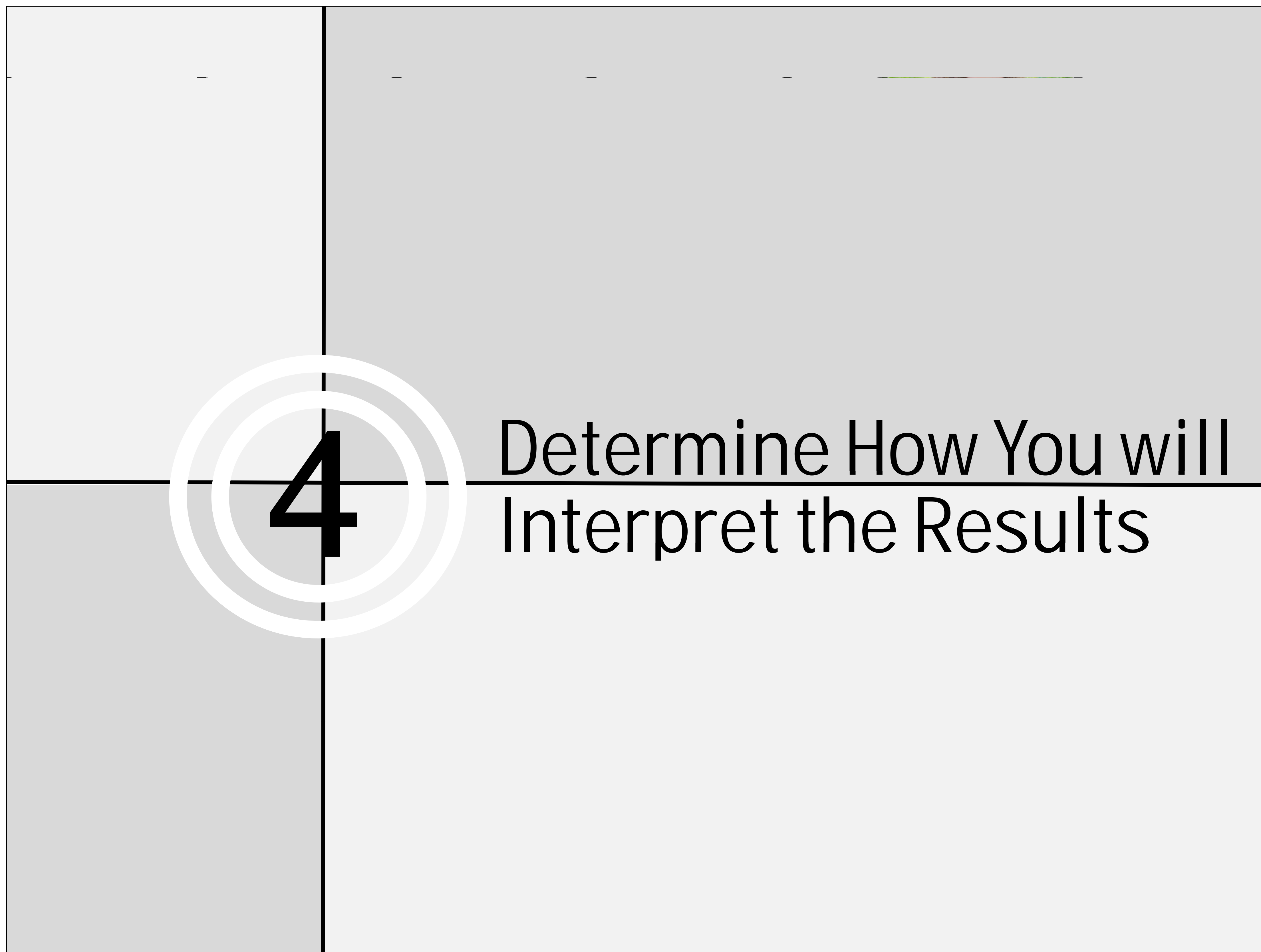
Lori

### No plausible alternative explanations

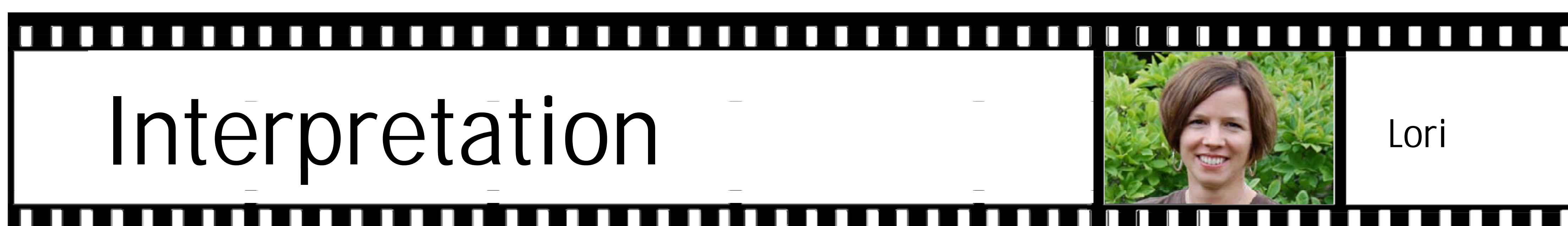
(scan the environment for potential influences)


Semester	Pretest	Posttest
Semester 1	48%	57%
Semester 2	59%	85%

**Other interventions?**  
**Superior instructor(s)?**  
**Attrition/self-selection?**



4 Determine How You will Interpret the Results



Interpretation  Lori


Statistical significance is not the same as practical significance

Interpretation

Lori

Performance standards may be based on a variety of sources:

- Stakeholder values and experience
- Employer needs/standards
- Project recipient needs
- Cost
- Growth

Interpretation

Lori

Performance Standards

Question	Excellent	Acceptable	Unsatisfactory
What proportion of students achieve proficiency?	<ul style="list-style-type: none"> <li>▪ 75% or more of students receive a rating of “proficient”</li> </ul>	<ul style="list-style-type: none"> <li>▪ 50-74% of students receive a rating of “proficient”</li> </ul>	<ul style="list-style-type: none"> <li>▪ Less than 50% of students receive a rating of “proficient”</li> </ul>
To what extent do students’ skills improve?	<ul style="list-style-type: none"> <li>▪ 90% or more of students move up at least one rating level from pre- to posttesting</li> </ul>	<ul style="list-style-type: none"> <li>▪ 75%-89% of students move up at least one level from pre- to posttesting</li> </ul>	<ul style="list-style-type: none"> <li>▪ Less than 75% of students move up at least one rating level from pre- to posttesting</li> </ul>

What Will Go on Your Project's Tombstone?



Lori



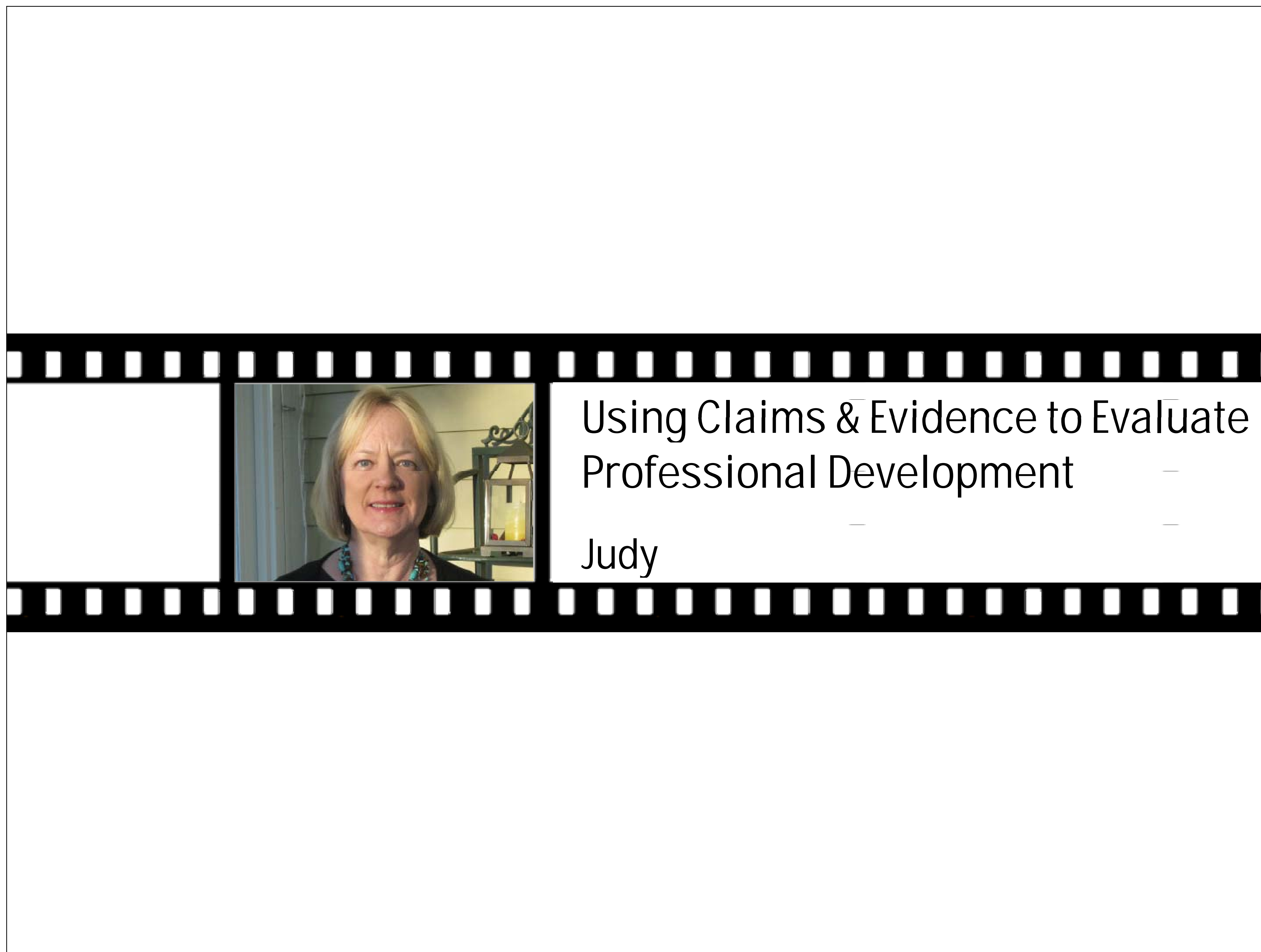
TechCommunications  
2009-  
Our students gain the communication skills they need to succeed in the high-tech 21<sup>st</sup> century workplace



Comments

Gerhard

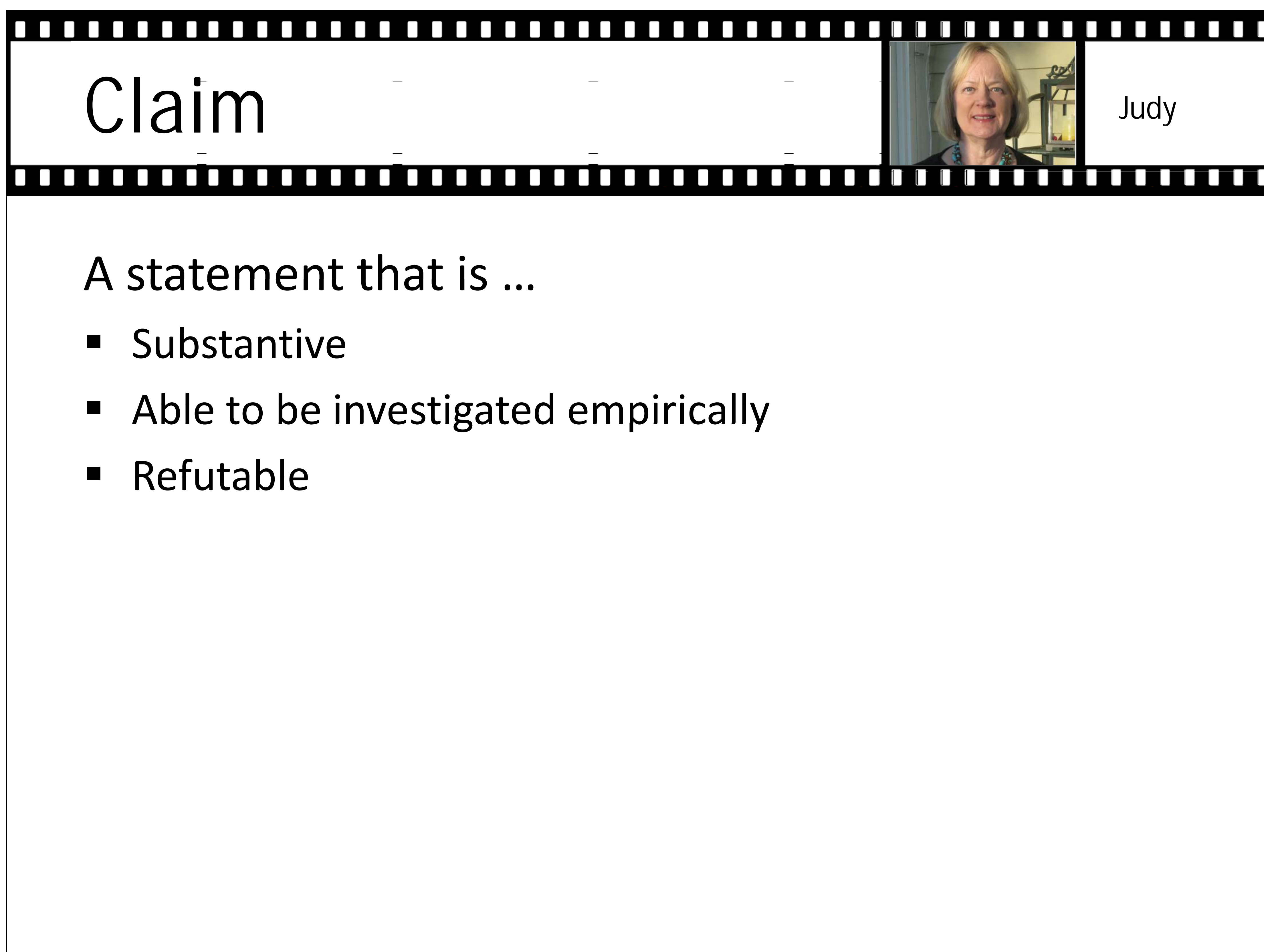




Using Claims & Evidence to Evaluate Professional Development

Judy

The slide features a black filmstrip border with white sprocket holes. The title and name are positioned to the right of a small video inset showing a woman with blonde hair.




# Claim



A statement that is ...

- Substantive
- Able to be investigated empirically
- Refutable


Judy

The slide features a black filmstrip border with white sprocket holes. The word 'Claim' is in a large font at the top left. Below it is a definition and a bulleted list. A small video inset of the speaker is on the right side.

<h2>Evidence (for a claim)</h2>		<p>Judy</p>
<ul style="list-style-type: none"> <li>▪ Reliable/replicable</li> <li>▪ Relevant</li> <li>▪ Valid</li> <li>▪ Rules out other explanations</li> <li>▪ Stipulates the conditions/degree of certainty</li> </ul>		

<h2>Example Project</h2>		<p>Judy</p>
<p>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.</p>		


# Evaluation Questions



Judy

**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




Judy

Claims	Evidence
Participants acquired the knowledge and skills that were covered in the PD.	Test of content and skills covered Simulations and demonstrations Participant reflections (oral and written) Participant portfolios Case studies
	

Knowledge Application	
 <span style="margin-left: 20px;">Judy</span>	
Claims	Evidence
<p>Teaching practices were improved as a result of participating in PD.</p> 	<ul style="list-style-type: none"> <li>Classroom observations of participants (direct or videotaped)</li> <li>Classroom observations of a matched sample (direct or videotaped)</li> <li>Participant portfolios</li> <li>Teaching practices instruments</li> <li>Surveys</li> <li>Interviews</li> </ul>

Student Learning	
 <span style="margin-left: 20px;">Judy</span>	
Claims	Evidence
<p>Student learning improved as a result of the improved teaching resulting from the PD.</p> 	<ul style="list-style-type: none"> <li>Student achievement tests with students in PD participant's classes</li> <li>Performance assessments with students in PD participant's classes</li> <li>Same tests/assessments with matched sample of classes</li> <li>School and student records</li> <li>Portfolios/work samples</li> <li>Interviews</li> <li>Surveys</li> </ul>

Example

Judy


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


Example from PRISM

Judy


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

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

Observation Protocol


Judy

**III. LESSON DESIGN AND IMPLEMENTATION**


		Never Occurred	0	1	2	3	4	Very Descriptive
1)	The instructional strategies and activities respected students' prior knowledge and the preconceptions inherent therein.		0	1	2	3	4	
2)	The lesson was designed to engage students as members of a learning community.		0	1	2	3	4	
3)	In this lesson, student exploration preceded formal presentation.		0	1	2	3	4	
4)	This lesson encouraged students to seek and value alternative modes of investigation or of problem solving.		0	1	2	3	4	
5)	The focus and direction of the lesson was often determined by ideas originating with students.		0	1	2	3	4	

**IV. CONTENT**

**Propositional knowledge**

6)	The lesson involved fundamental concepts of the subject.		0	1	2	3	4	
7)	The lesson promoted strongly coherent conceptual understanding.		0	1	2	3	4	
8)	The teacher had a solid grasp of the subject matter content inherent in the lesson.		0	1	2	3	4	
	Elements of abstraction (i.e., symbolic representations, theory building) were		0	1	2	3	4	

Teaching Practices Survey


Judy

*PRISM Inventory of Teaching and Learning*


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 following practices. Using the six-point scale provided below, choose one number that 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



Judy

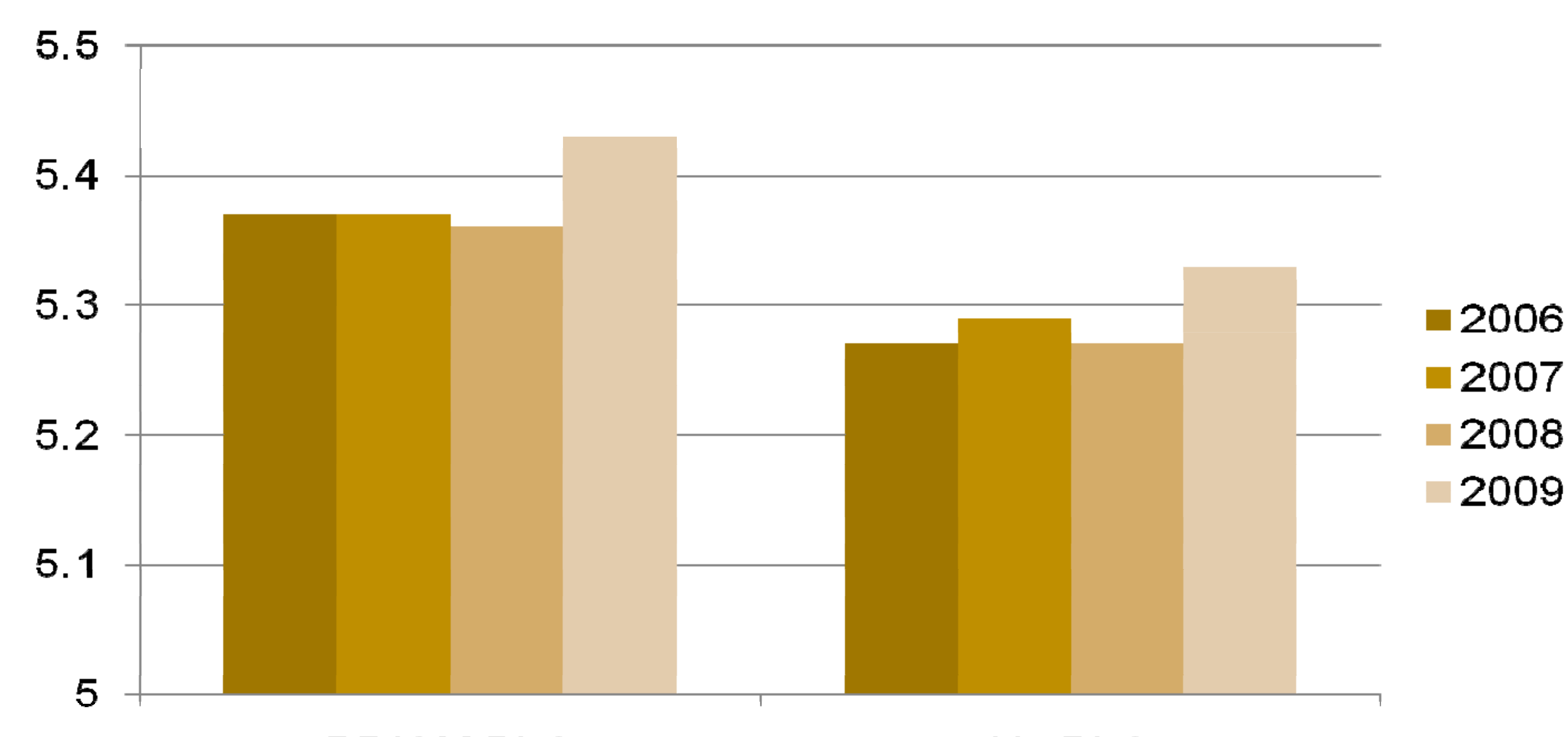
1. To what extent did participation in a K-16 Professional Learning Community (PLC) influence K-12 teachers' use of reformed teaching and learning practices?
  
2. To what extent did the involvement of higher education faculty members in a PLC influence K-12 teachers' use of reformed teaching and learning practices?

Q1 Findings



Judy

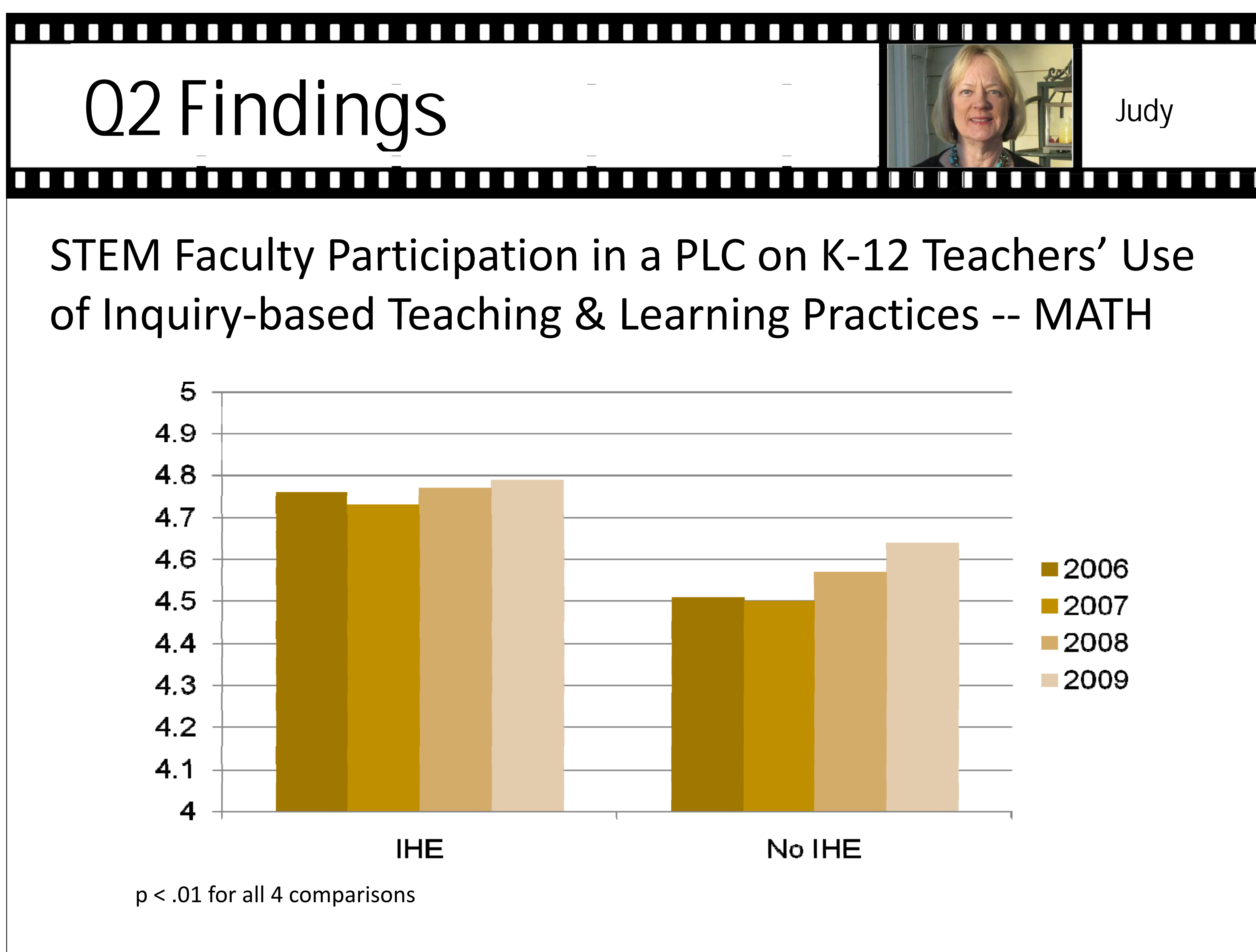
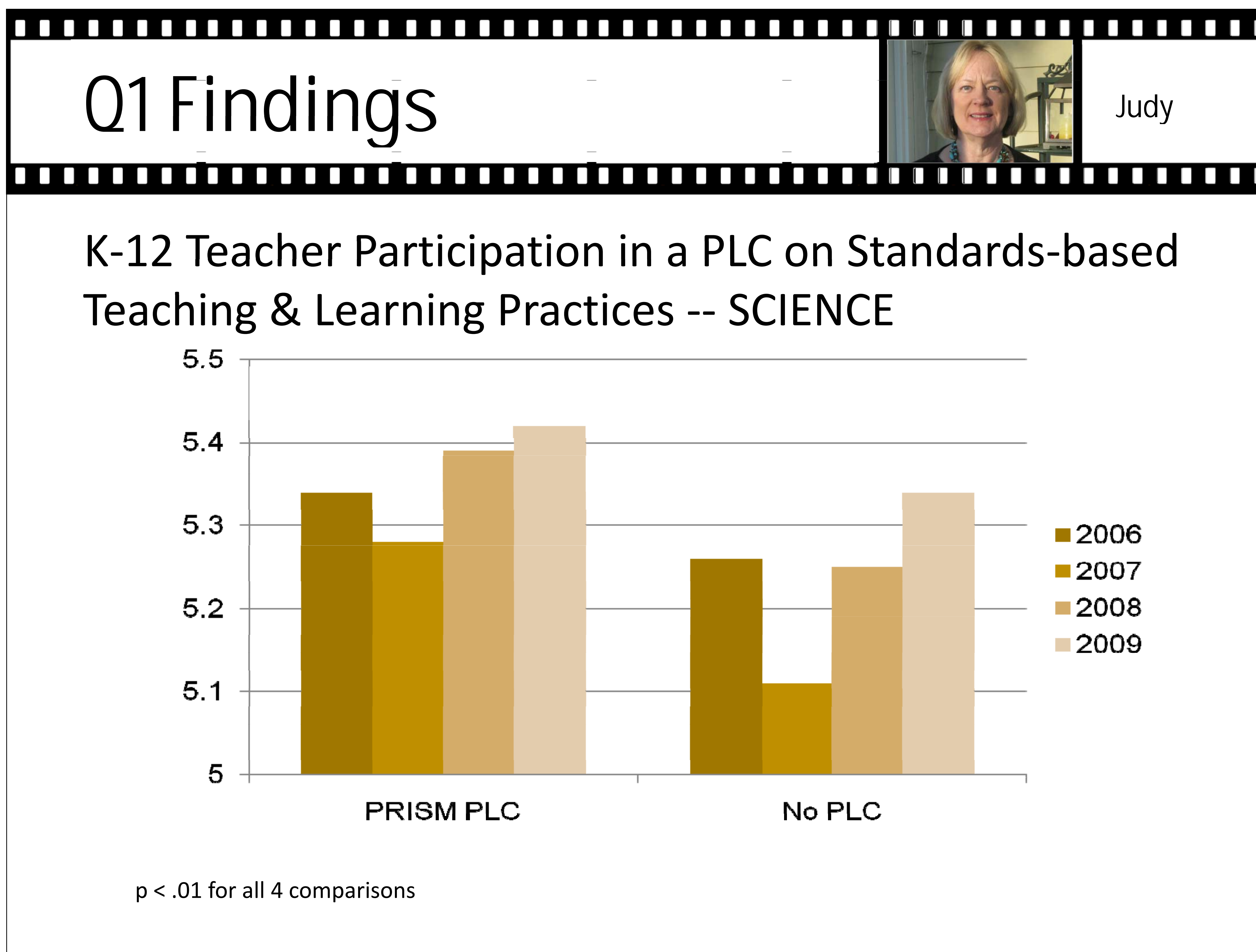
K-12 Teacher Participation in a PLC on Standards-based Teaching & Learning Practices -- MATHEMATICS




Group	2006	2007	2008	2009
PRISM PLC	~5.37	~5.37	~5.36	~5.43
No PLC	~5.27	~5.29	~5.27	~5.33

p < .01 for all 4 comparisons



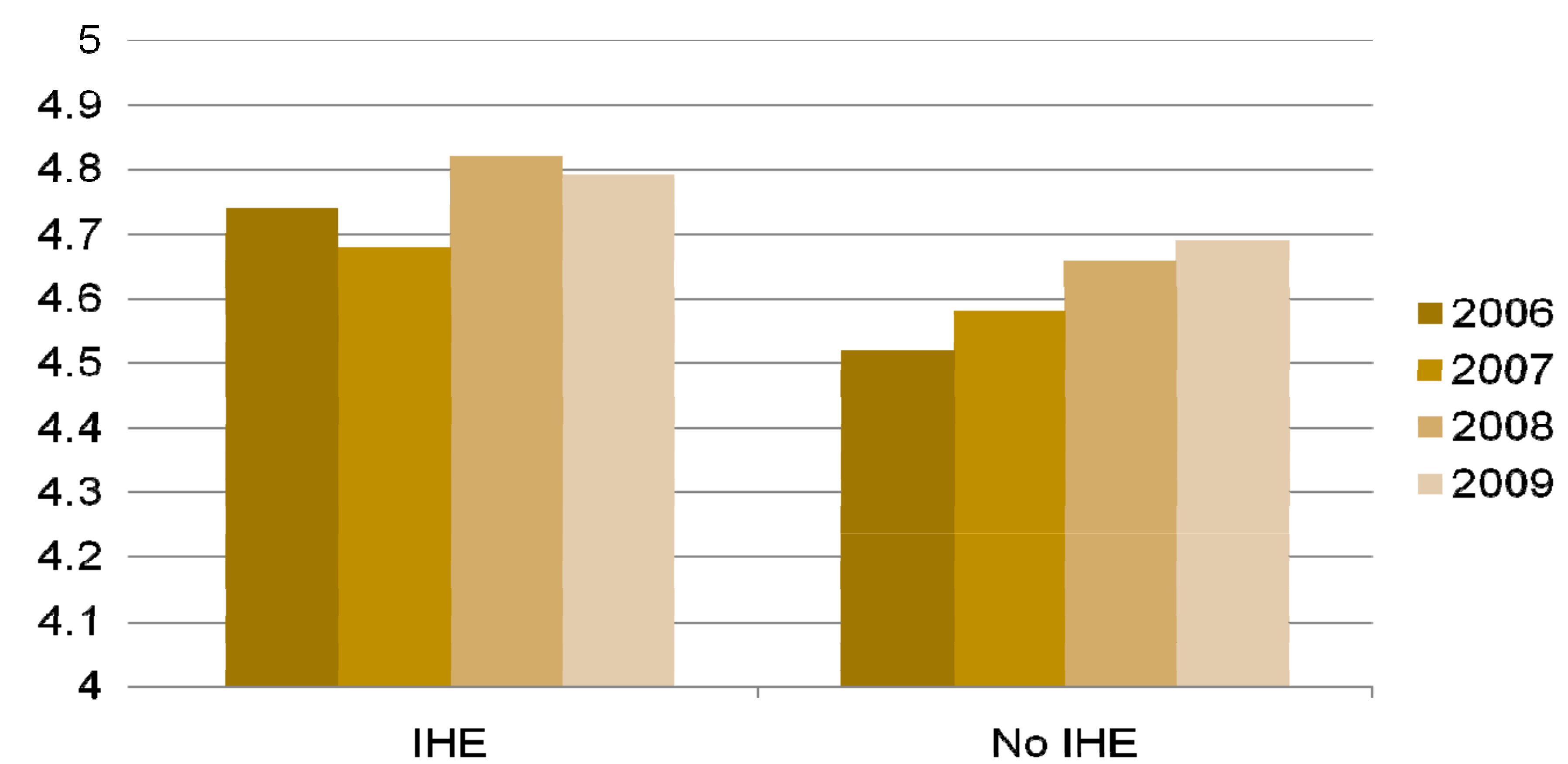


Q2 Findings




Judy

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




Group	2006	2007	2008	2009
IHE	4.74	4.68	4.82	4.79
No IHE	4.52	4.58	4.66	4.69

Q1 Claims




Judy

Claim	Evidence	Counterevidence
Teachers who participated in PLCs reported more emphasis on standards-based teaching and learning strategies than teachers who did not.	Teachers' responses on a survey of teaching and learning practices of teachers who participated in the PLC and those who did not	Self-selection into PLCs  Self-report of emphasis (need additional evidence to support the claim)

Q2 Claims

Judy

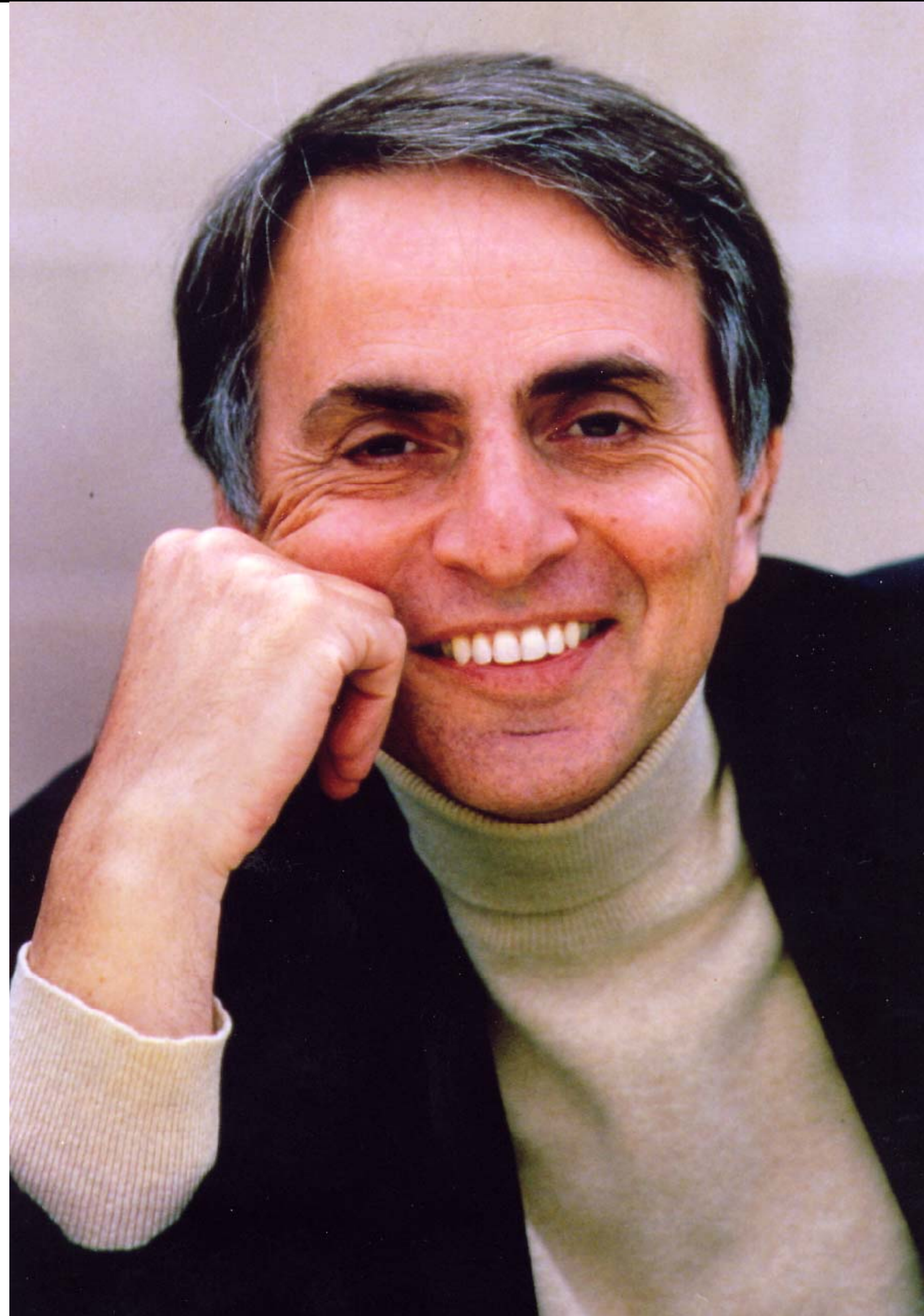
Claim	Evidence	Counterevidence
Teachers who participated in a PLC with a STEM faculty member reported greater use of inquiry-based teaching and learning strategies than teachers in a PLC without a STEM faculty member	Teachers' responses on a survey of teaching and learning in a PLC with and without a STEM faculty member	Self-report of emphasis (need additional evidence to support the claim)

Closing Thought

Judy

“

Extraordinary claims require extraordinary evidence. ”

—Carl Sagan





Comments

Gerhard



## Coming Attractions





Lori







**May 18**  
Developing & Validating  
Survey Instruments


**July 20**  
Strong Evaluation Plans =  
Stronger Proposals

Register at  
[www.evalu-ate.org/events](http://www.evalu-ate.org/events)



AEA		Lori
<p><b>Coffee Break Webinar Series</b> April 14 What are Nonparametric Statistics and When Do You Use Them?  April 21 Utilization-Focused Evaluation</p> <p><b>Annual Conference</b> October 31-November 5 in Anaheim <b>Proposals due Friday (March 18)</b></p> <p>Get more information/join at <a href="http://www.eval.org">www.eval.org</a></p>		<p>AMERICAN EVALUATION ASSOCIATION</p> 


<a href="http://www.eval-ate.org">www.eval-ate.org</a>		Lori
    	<p>ATE Evaluation Listserv</p> <p><i>Conduit</i> Newsletters</p> <p>ATE Evaluator Directory</p> <p>Digital Resource Library</p> <p>Events</p>	



# Thank You

## Evaluat|e

EVALUATION RESOURCE CENTER *for*  
advanced technological education



*This material is based upon work supported by the National Science Foundation under grant number. 0802245. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*