



# Assessing Critical Thinking Using the CAT Instrument

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# CAT Workshop

- Give institutions hands-on experience with the CAT instrument.
- Explore how the CAT can be used to encourage more effective practices within disciplines.
- Discuss potential ways to use the CAT for assessment.

# Workshop Materials

## Yours to Keep

- Abbreviated Training Manual
  - Technical Information
  - Overview CD
  - Sample Institutional Reports

## Secure Items (not to be taken)

- CAT Test with Sample Responses
- Scoring Guide

# Importance of Critical Thinking

National polls indicate over 90% of the faculty in this country think critical thinking is the most important part of undergraduate education.

Derek Bok, 2005

President Emeritus of Harvard University

[Link](#)

# What is Critical Thinking?

Classic Emphasis

```
graph TD; A[Classic Emphasis] --- B[Evaluate Arguments and Conclusions]; B --- C[Reasoning];
```

Evaluate Arguments and Conclusions

Reasoning

# What is Critical Thinking?

**Classical Emphasis**

**Expanded Contemporary Emphasis**



**Evaluate Arguments  
and Conclusions**

**Evaluate Ideas  
And Plans**

**Evaluate One's Own  
Understanding**

**Reasoning**

**Problem Solving**

**Life-Long Learning Skills**

**Communication**

**Creativity**



# Bloom's Taxonomy

**Evaluation**

**Synthesis**

**Analysis**

**Application**

**Comprehension**

**Information (rote retention)**

**Critical Thinking**

# Agreement on what is not Critical Thinking

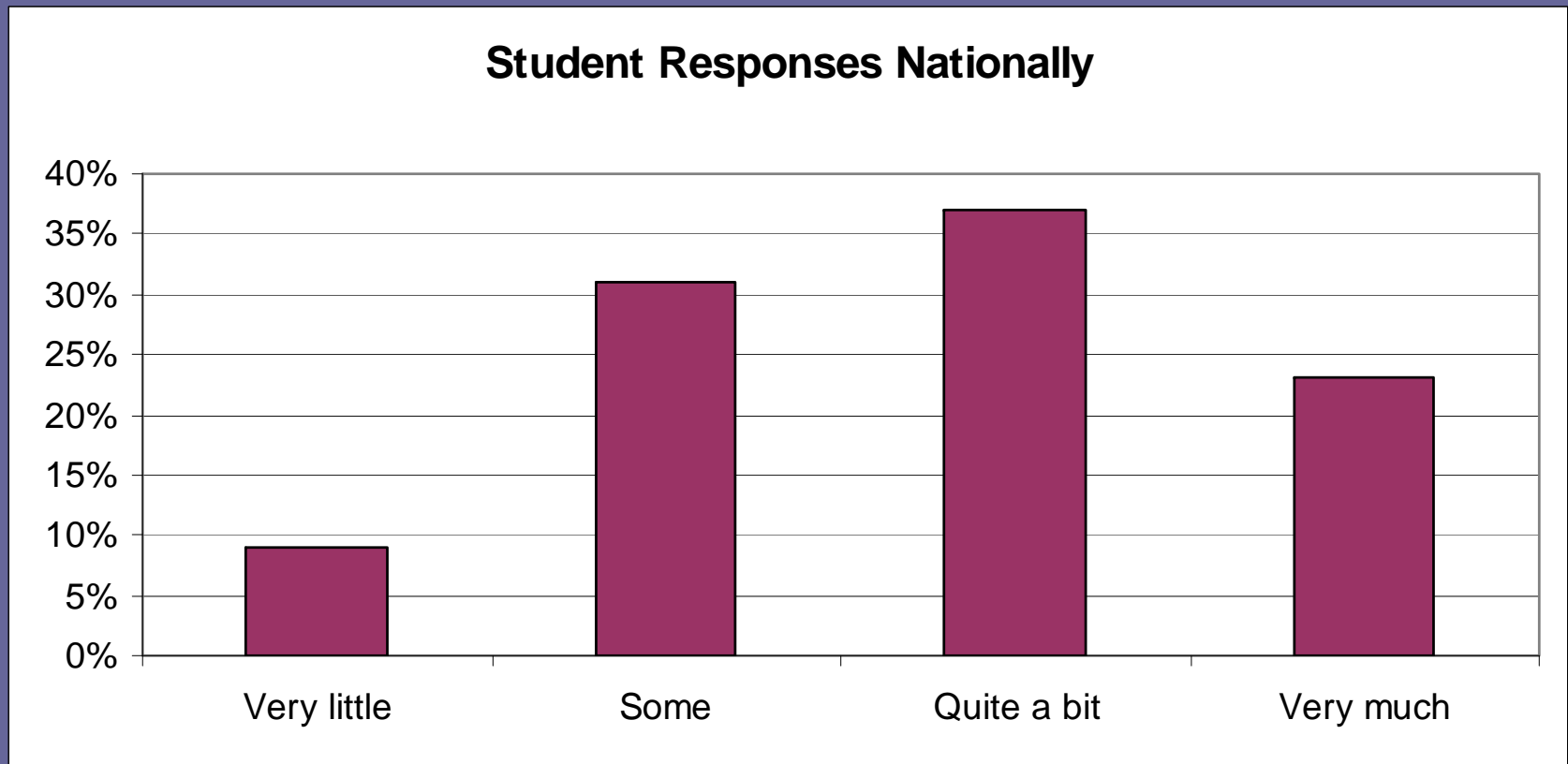
## \*NSSE Question

**(2a) Memorizing facts, ideas, or methods from your courses and readings so you can repeat them in pretty much the same form.**

[Video](#)

\*National Survey of Student Engagement , Indiana University

# NSSE: Coursework emphasizes: Memorizing facts, ideas, or methods from your courses and readings



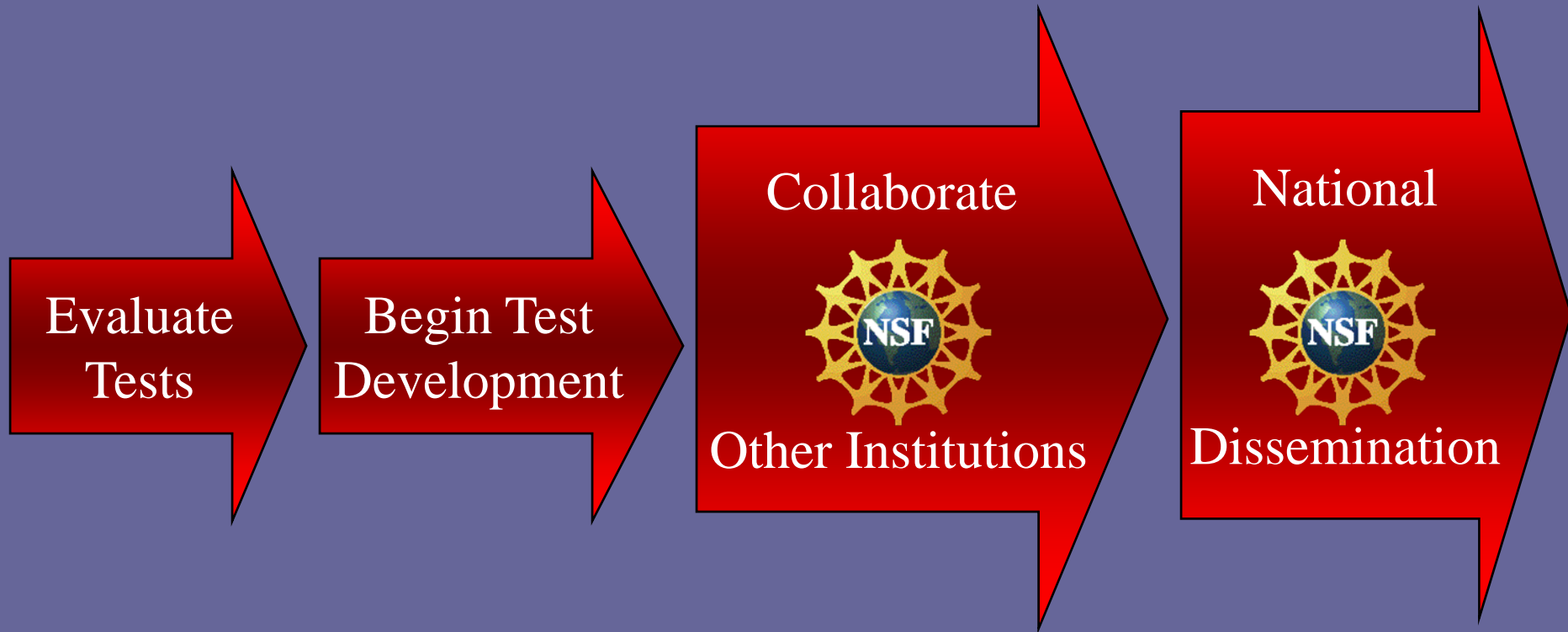


# Why Assess Critical Thinking?

**Need to Measure Success for Accountability**

**Assessment Drives Improvement Efforts**

# History of CAT Development



# Institutions Participating in Test Development



- Howard University
- Madisonville Community College
- The University of Colorado
- The University of Hawaii
- The University of Southern Maine
- The University of Texas
- The University of Washington

# Developing the CAT Instrument

**Faculty & Students**

**Learning Sciences  
Experts**

**CAT**

**External Evaluators**

**Statistical  
Findings**



# Skills Evaluated by CAT Instrument

## Evaluating Information

Separate factual information from inferences.

Interpret numerical relationships in graphs.

Understand the limitations of correlational data.

Identify inappropriate conclusions.

## Evaluating Ideas/Other Points of View

Identify & evaluate evidence for a theory.

Identify new information that might support or contradict a hypothesis.

Explain how new information can change a problem.

## Learning & Problem Solving

Separate relevant from irrelevant information.

Integrate information to solve problems.

Learn & apply new information.

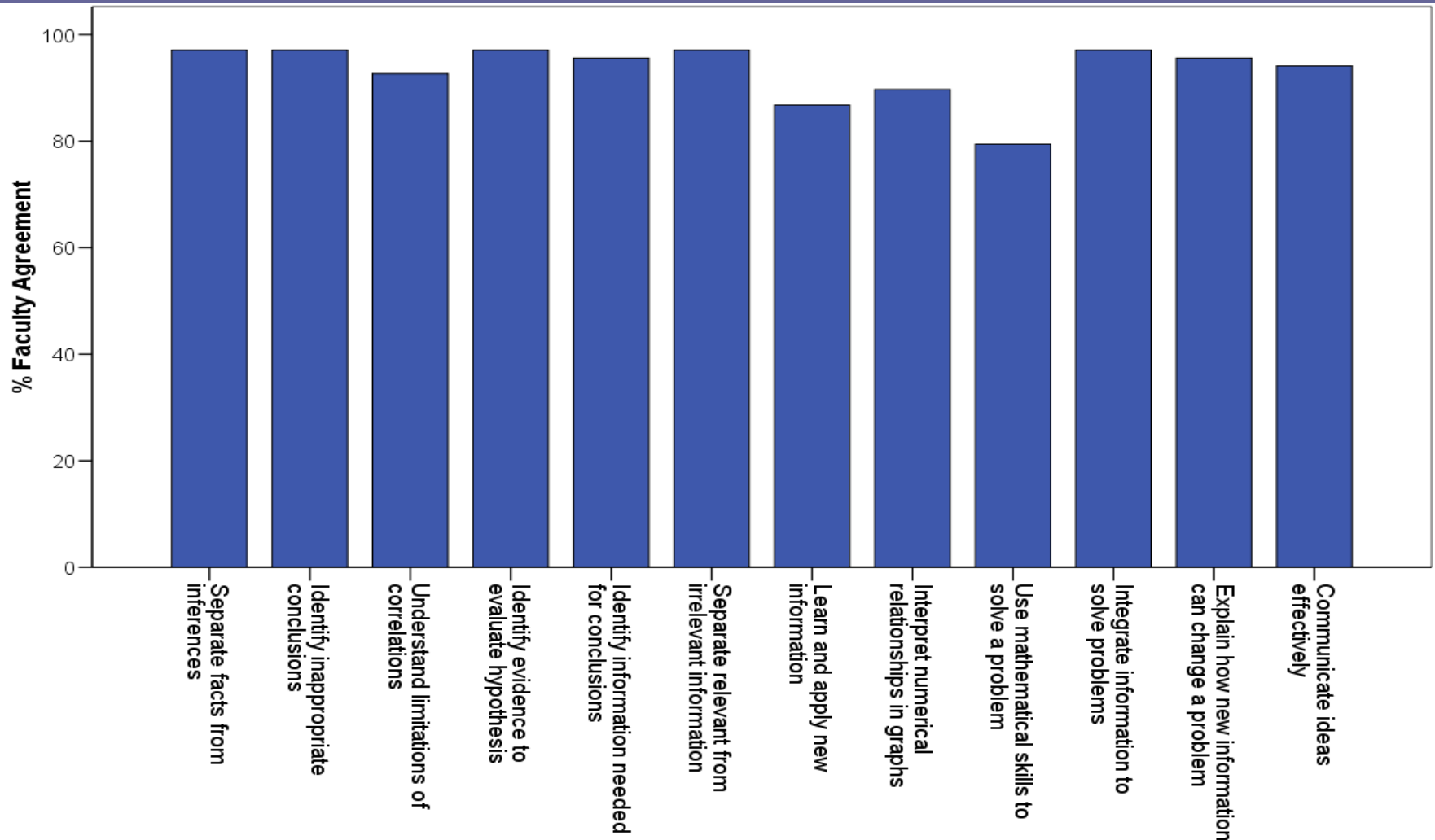
Use mathematical skills to solve real-world problems.

## Communication

Communicate ideas effectively.



# Percent of Faculty that Identify Areas Targeted by CAT as Important Components of Critical Thinking



# CAT Statistics

## General Measures of Academic Performance

	<b>ACT</b>	<b>SAT</b>	<b>Academic Profile</b>	<b>Grade Point Average</b>
<b>CAT</b>	0.599*	0.527*	0.558*	0.345*

\* correlations significant,  $p < .01$

## Other Measures of Critical Thinking

	<b>CCTST</b> (California Critical Thinking Skills Tests)	<b>CAAP</b> Critical Thinking Module
<b>CAT</b>	0.645*	0.691*

\* correlations significant,  $p < .01$

# CAT Results with 2005 NSSE

(National Survey of Student Engagement)

Multiple R = .490

(explains 24% of variability in CAT)

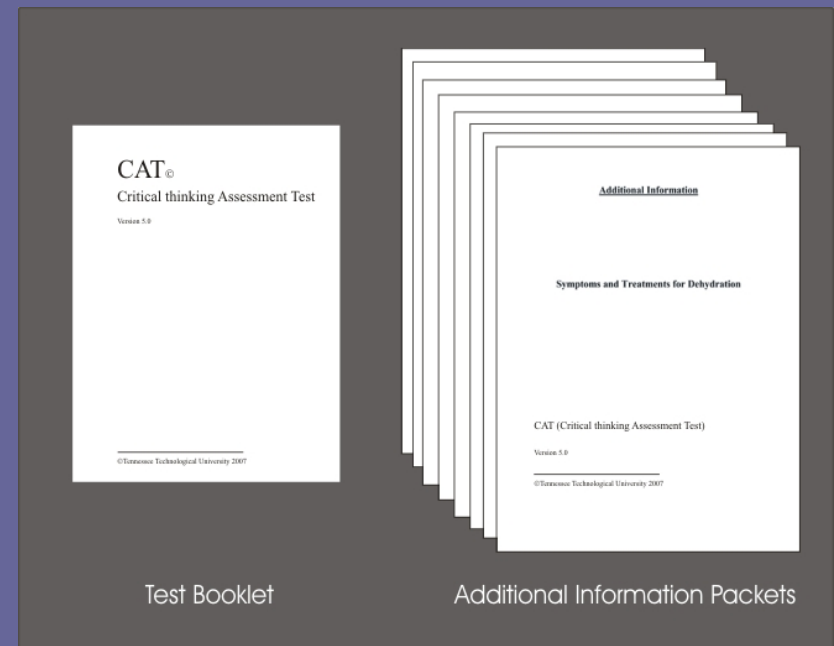
NSSE Question	Beta Coefficient
<b>(2a) Memorizing facts, ideas, or methods from your courses and readings so you can repeat them in pretty much the same form. <i>(negative relationship)</i></b>	<b>-.341 **</b>
<b>(3b) Number of books read on your own (not assigned) for personal enjoyment or academic enrichment.</b>	<b>.277 **</b>
<b>(11e) Thinking critically and analytically &amp; (11m) Solving complex real-world problems</b>	<b>.244 **</b>
<b>(7h) Culminating Senior Experience (thesis, capstone course, project, comprehensive exam, etc.)</b>	<b>.231 *</b>

\* Significant at .01 level

\*\* Significant at .001 level

# CAT features

- One hour exam
- Mostly short answer essay
- Faculty scored in workshops
- Detailed scoring guide
- Reliable (.82 - .85)
- Valid



# Sample Disclosed Question

A scientist working at a government agency believes that an ingredient commonly used in bread causes criminal behavior. To support his theory the scientist notes the following evidence.

- 99.9% of the people who committed crimes consumed bread prior to committing crimes.
- Crime rates are extremely low in areas where bread is not consumed.

Do the data presented by the scientist strongly support their theory? Yes \_\_\_\_ No \_\_\_\_

Are there other explanations for the data besides the scientist's theory? If so, describe.

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What kind of additional information or evidence would support the scientist's theory?

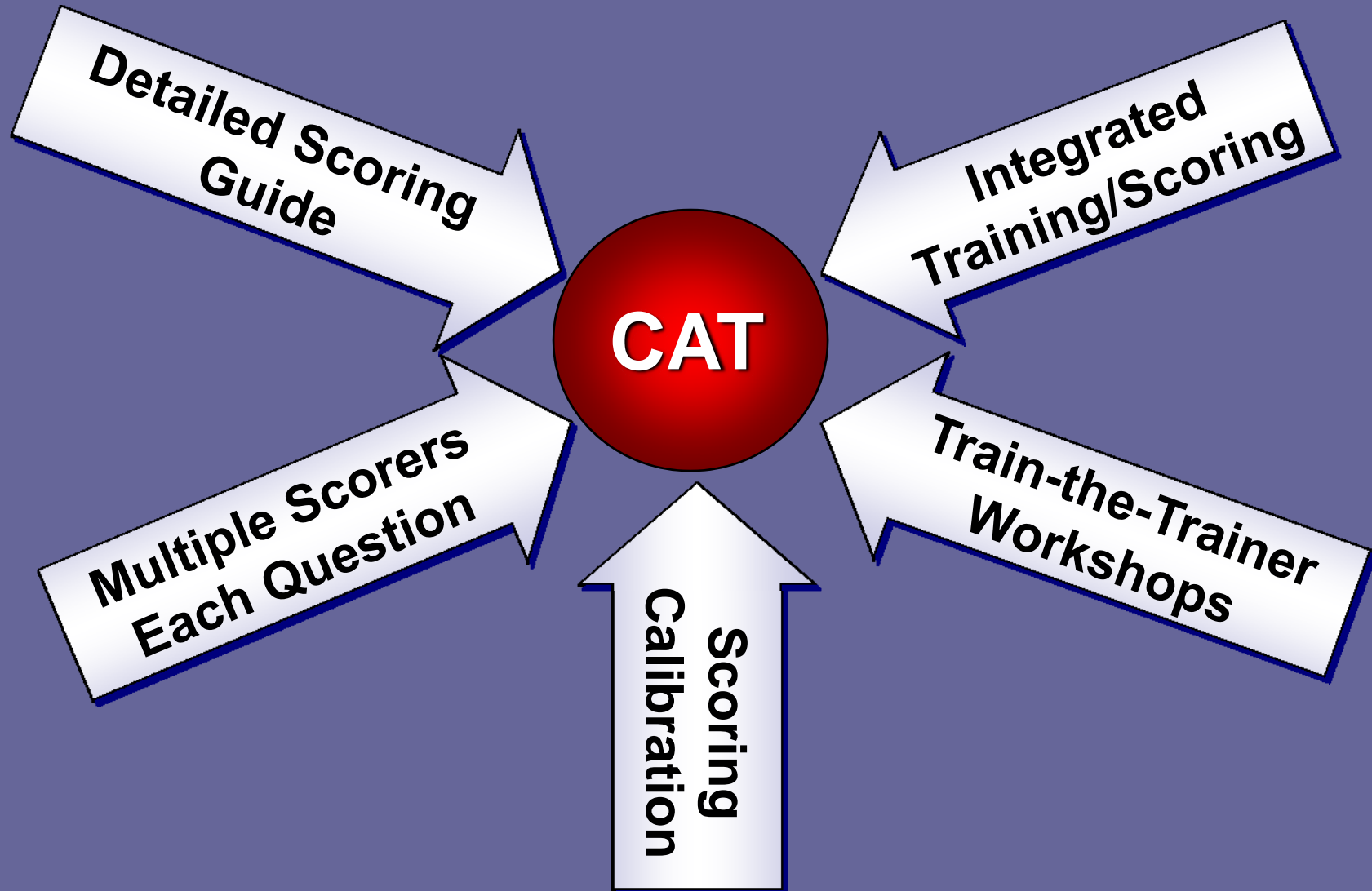
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# Student Comments

- I thought the test wasn't too difficult, but it was challenging. You have to look at things deeply to truly understand.
- I thought the assessment was interesting and made me use real life scenarios and data to decide my results.
- I thought the test was thought provoking, but not too difficult.
- It was an easy test that tests the mind. I enjoyed the stories and the questions on the test. I think I did very well on the test.

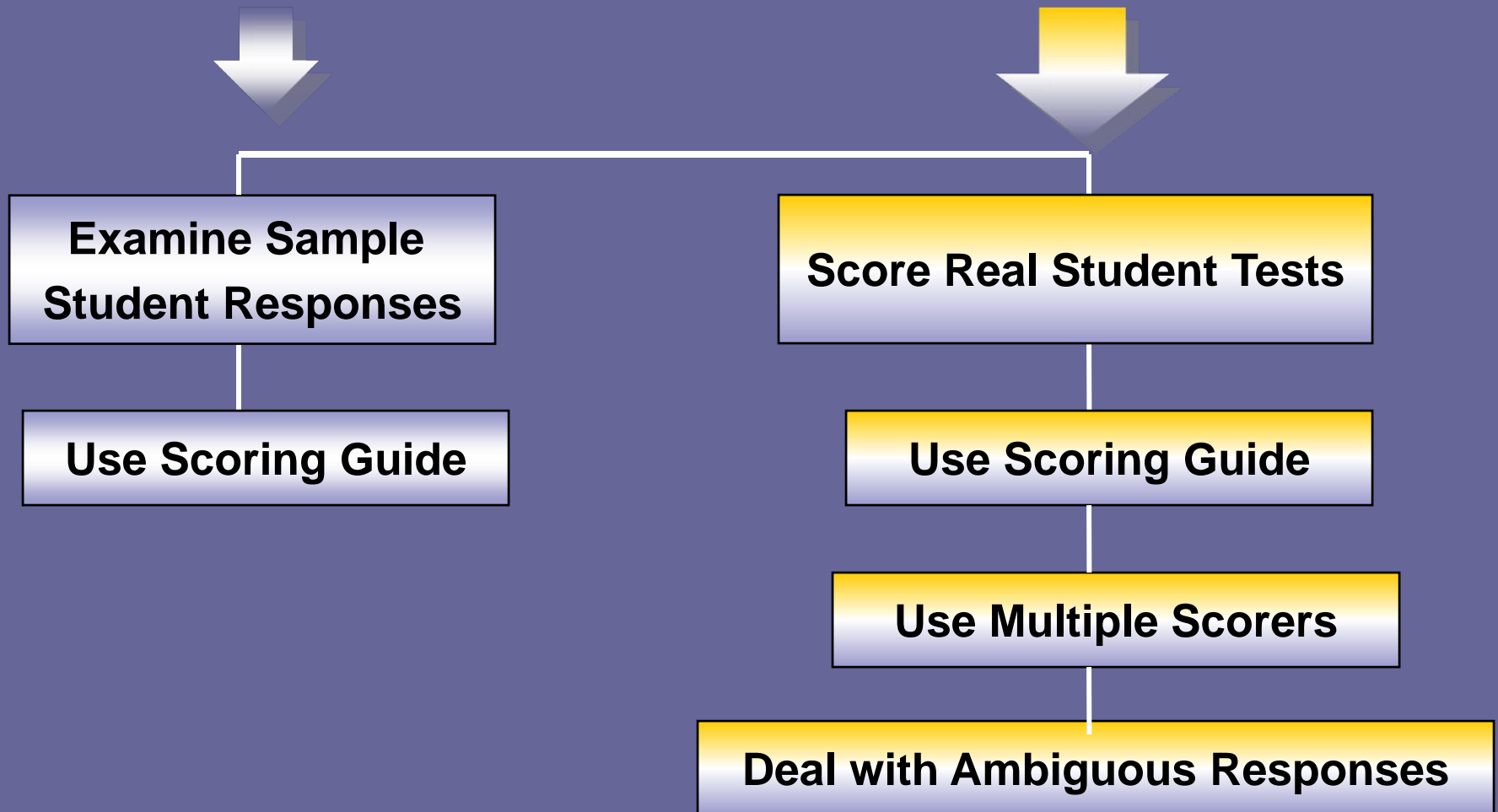
# Ensuring Reliability of Scoring



# Mini-workshop vs. Standard Training

Mini-workshop

Standard Train-the-Trainer Workshop







# CAT Test with Sample Student Responses

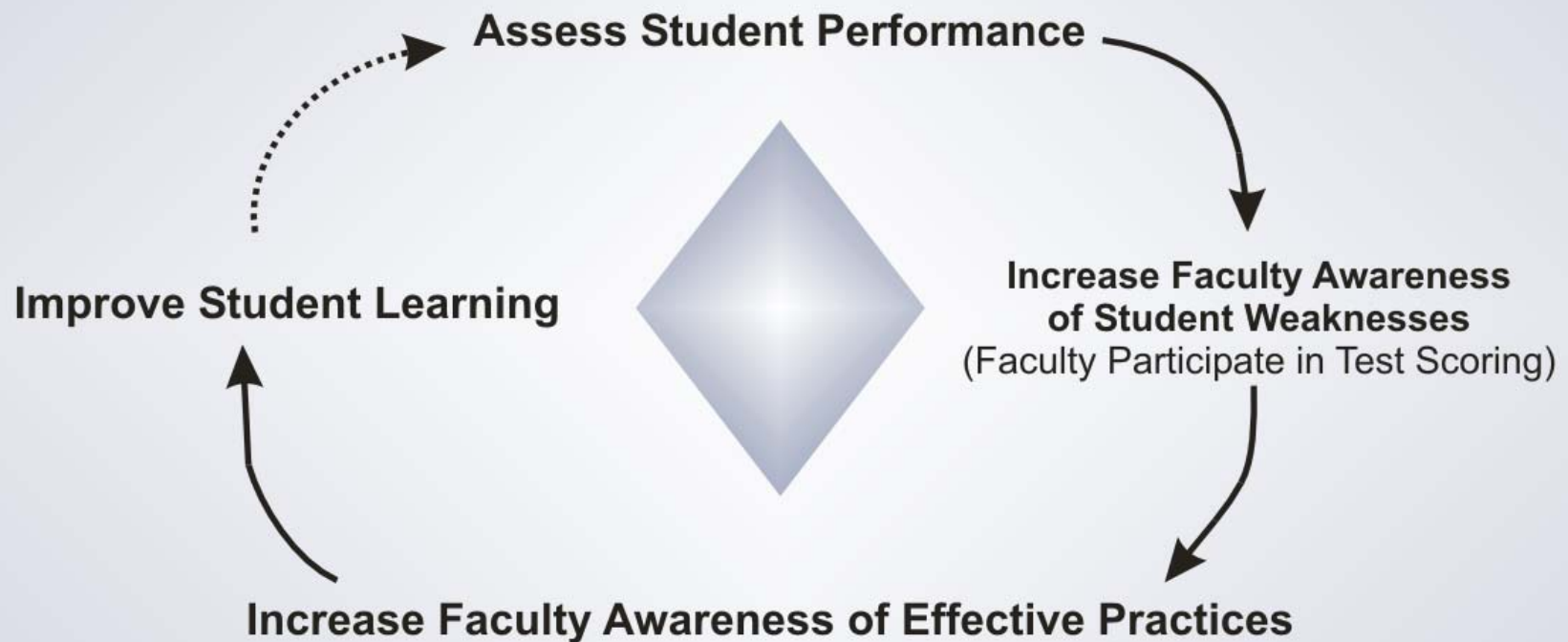


# Effective Practices Are A Moving Target

**Video**

# Closing the Loop in Assessment and Quality Improvement

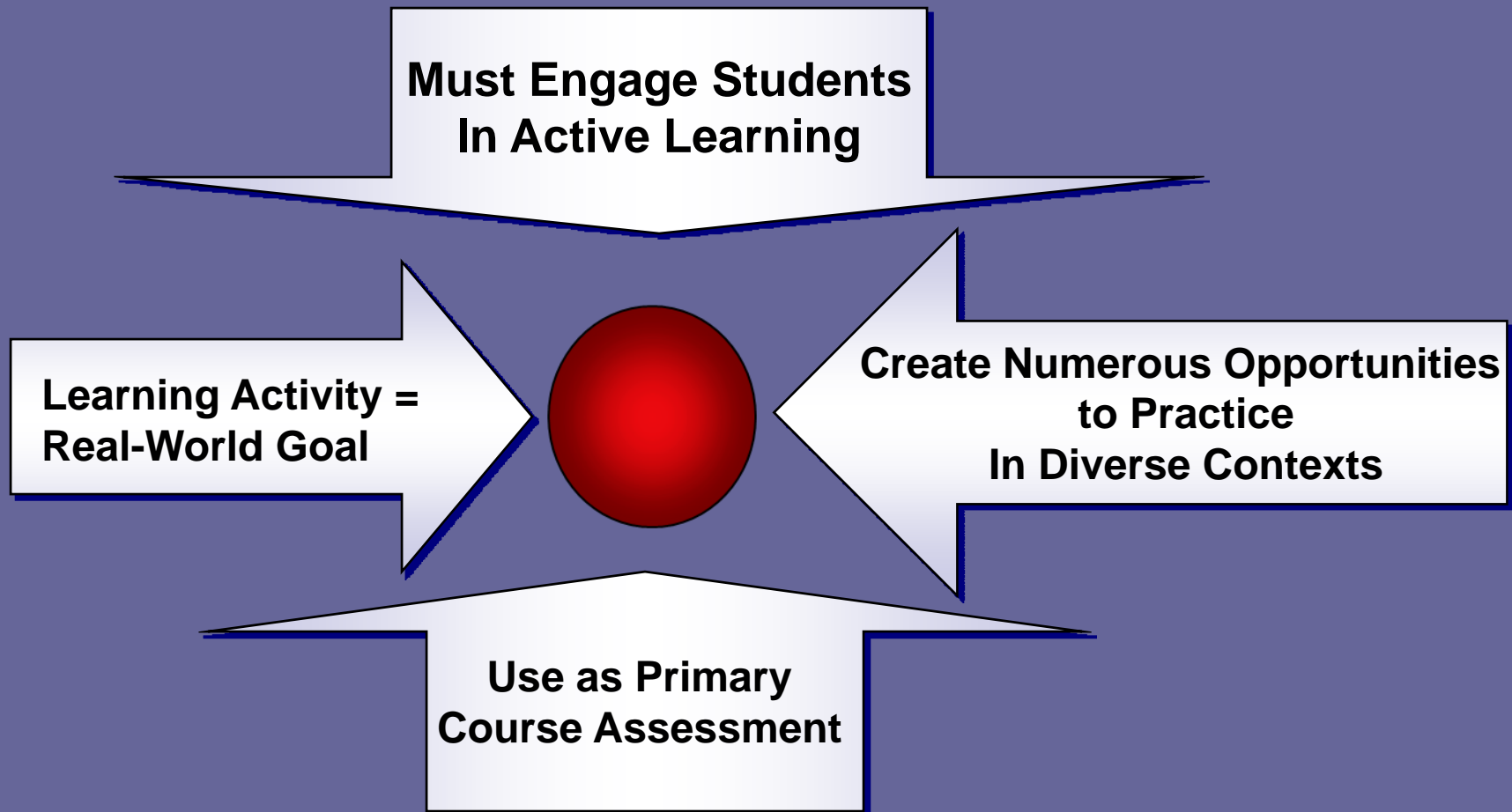
## Closing the Loop in Assessment and Quality Improvement




# Professional Development: Faculty Involvement in CAT Scoring



# Design a task that resembles what we want students to do.





# Designing Discipline Specific Analog

# Various CT Assessments

## **CAT**

**Portfolios, Rubrics & Other Tests  
(CLA, CCTST, CAAP CT module)**

**Student Performance**

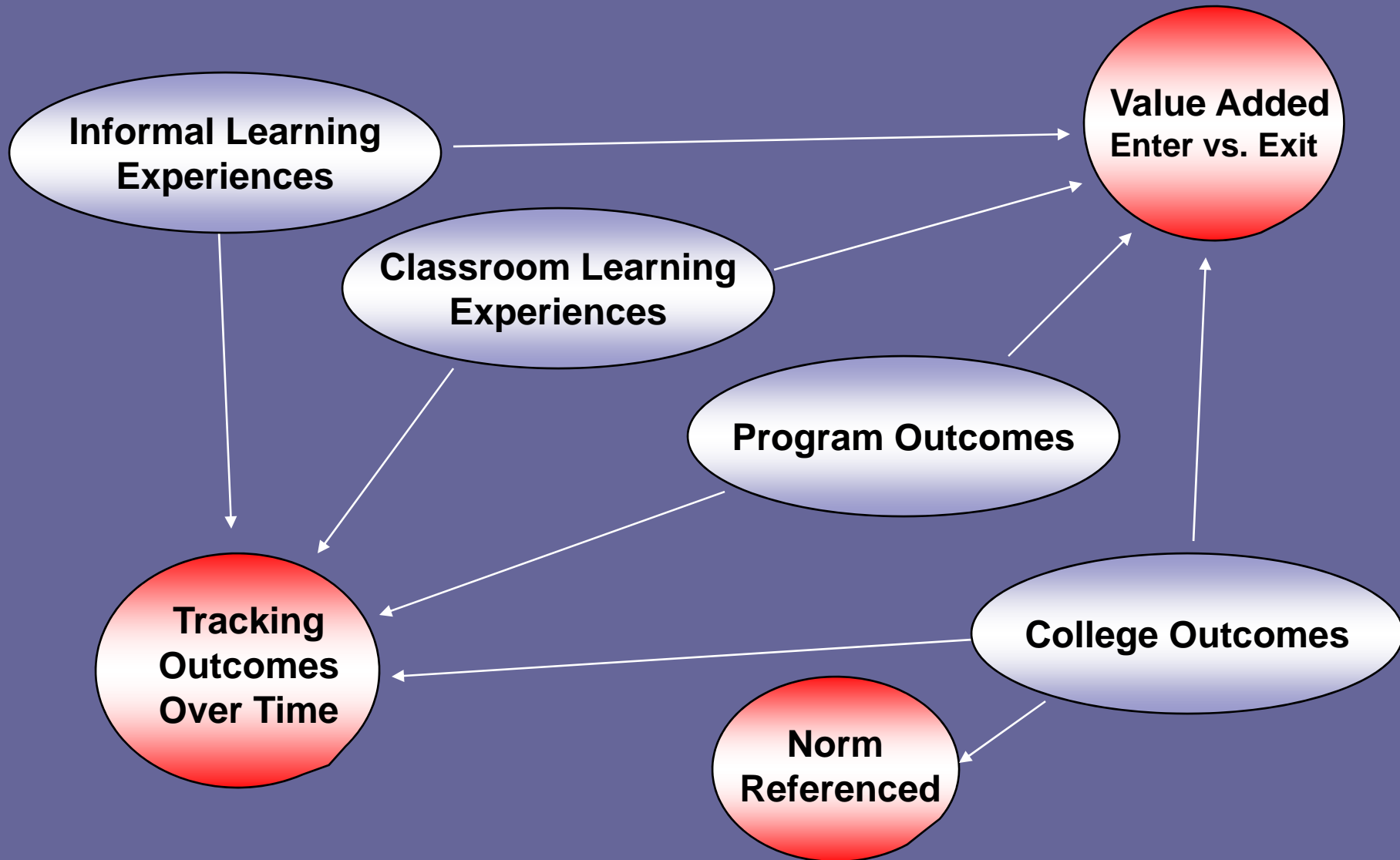
**IDEA Teaching Evaluations  
NSSE/CSSE & other surveys**

**Student Perceptions**

**Alumni & Employer surveys**

**Alumni/Employer  
Perceptions**

# Assessment Uses of CAT





## Designing an Assessment Plan Using the CAT Instrument

	Model/Design	Population	Sampling Procedure	Desired Finding	Issues	# Tests Needed
More Expensive	Pre-test vs. Post-test with Control Group (in course or program)	Course			Students show more improvement from the pre-test to the post-test than the control group	expense
		Program				
	Pre-test vs. Post-test (in course or program)	Course			Students show improvement from the pre-test to the post-test	
		Program				
	Freshmen vs. Upperclassmen (value added) Track same students over time	Freshmen & Upperclassmen		Students show significant gains from freshmen year to senior year	Attrition, expense, time	
Freshmen vs. Upperclassmen (value added) Cross-sectional study (must equate groups)	Freshmen & Upperclassmen		Senior level students perform better than freshmen	Must control for ability		
Less Expensive	Track Institutional Progress over time	Upperclassmen		Institution scores improve over time		
	Track Institutional Progress over time with National Norm Comparison	Upperclassmen		Institution scores improve over time and/or surpass national norms		



# CAT Institutional Reports

## **Sample Report**

*Page # 15 of Manual*



# Next Steps for Institutions Interested in Using the CAT

- Assessment Plan
- Train-the-Trainer Workshop
  - Who will you send (2-3 people)
  - New England – Fall semester
- Ordering Tests
- Processing Tests

# CAT National Dissemination Project

[www.tntech.edu/CAT](http://www.tntech.edu/CAT)

or

[www.CriticalThinkingTest.org](http://www.CriticalThinkingTest.org)

**Center for Assessment and Improvement of  
Learning**

