Creating a Community of Practice to Assess and Improve Critical Thinking using the CAT Instrument
SACSCOC 2019 ANNUAL MEETING

PRESENTED BY:

Dana Calland
Maysville Community & Technical College

Kevin Harris
Tennessee Tech University

CAT · NSF

National Science Foundation's IUSE Program under grant 1022789.

Why is Critical Thinking Important?
Information Overload

Assessing Critical Thinking

Need to Measure Success for Accountability

Assessment Drives Improvement Efforts

Designing the CAT Instrument

Construct Validity:
Learning Sciences

Faculty Driven:
High Face Validity
Involved in Scoring

Engaging for Students

Reliable & Consistent Scoring Essay Responses

Skills Evaluated by CAT Instrument

Evaluating Information

Separate factual information from inferences.

Interpret numerical relationships in graphs.

Understand the limitations of correlational data.

Evaluate evidence and identify inappropriate conclusions.

Creative Thinking

Identify alternative interpretations for data or observations.

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.

Sample Disclosed Question

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

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

Do the data described above strongly support the scientist's hypothesis?   Yes____   No____

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

_____

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

_____

CAT Features

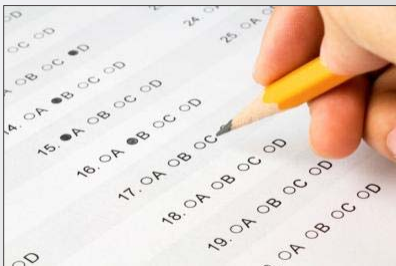**One hour exam; mostly short answer essay**

Paper Administration

Online Administration

	ADMINISTER	
Any Proctored Setting	ADMINISTER	Proctored Computer Lab
Faculty Scored	SCORE	Machine Scored (AI)
ENGAGE FACULTY IN SCORING Develop Course Assessments	FACULTY DEVELOPMENT	Engage Faculty in Scoring DEVELOP COURSE ASSESSMENTS

Understanding the Disconnect

Teaching Critical Thinking   **Assessing Factual Knowledge**

Why Assess Critical Thinking?

Need to Measure Success for Accountability

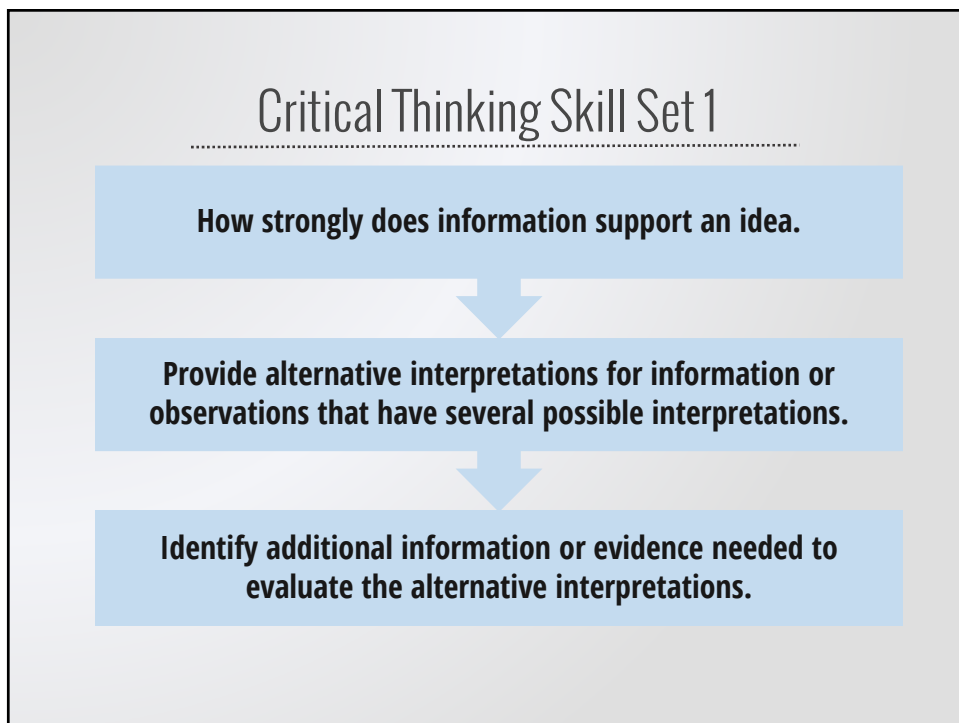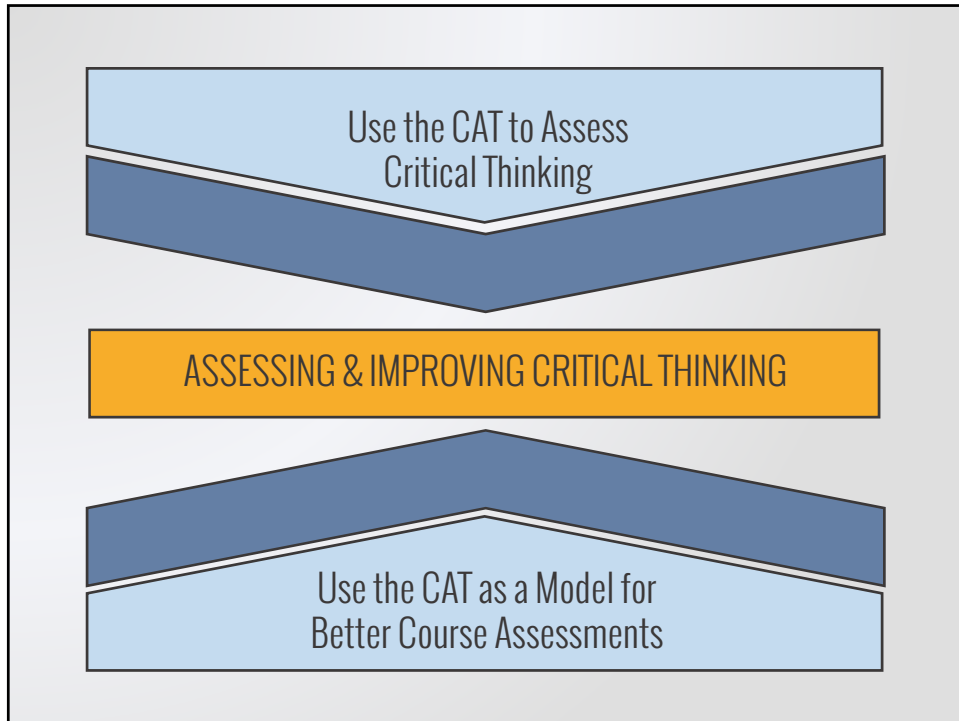**Assessment Drives Improvement Efforts**
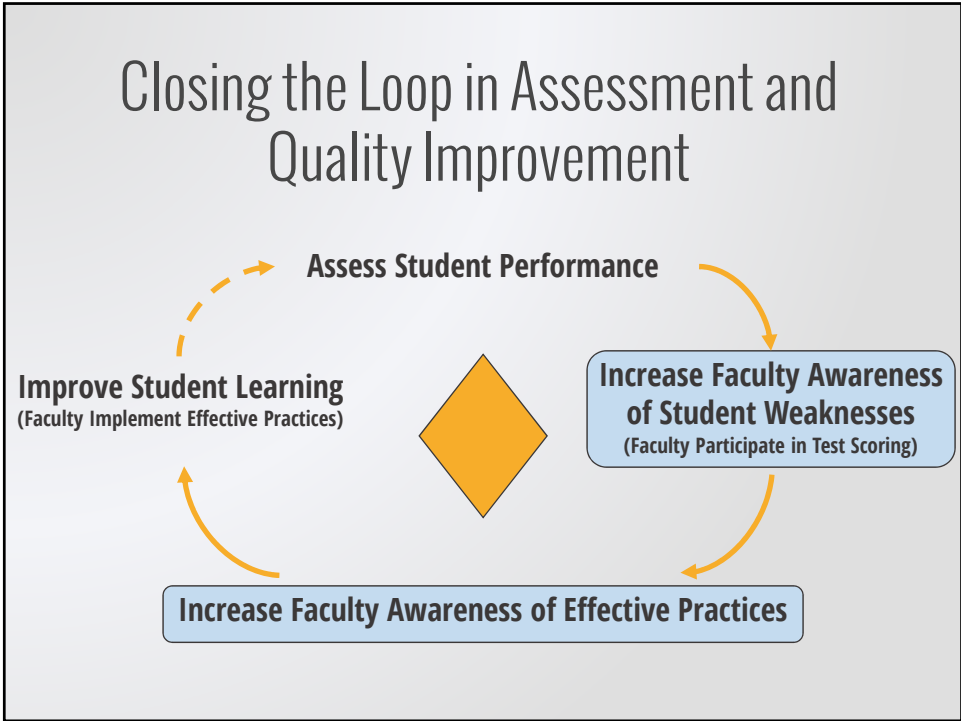
How We Assess - Determines What Students Learn

Benefits of Course-Based CT Assessment

How you learn determines how you will be able to use knowledge

SOLVING REAL WORLD PROBLEMS

Infusing critical thinking with discipline content prompts application

Use the CAT to Assess
Critical Thinking

ASSESSING & IMPROVING CRITICAL THINKING

Use the CAT as a Model for
Better Course Assessments

Critical Thinking Skill Set 1

How strongly does information support an idea.

Provide alternative interpretations for information or observations that have several possible interpretations.

Identify additional information or evidence needed to evaluate the alternative interpretations.

Closing the Loop in Assessment and Quality Improvement

Assess Student Performance

Improve Student Learning
(Faculty Implement Effective Practices)

Increase Faculty Awareness of Student Weaknesses
(Faculty Participate in Test Scoring)

Increase Faculty Awareness of Effective Practices

Quality Enhancement Plan (QEP) 2.0

Let's Solve It: Problem-Solving Skills for Life

MCTC QEP

Selected topic:

Soft Skills or Employability Skills

⬇

Problem-Solving skills

Let's Solve It: Problem-Solving Skills for Life

Problem-Solving Skills

Background notes:

- Highly sought skill by employers
  KCTCS survey of Business and Industry Program Advisory Councils

- Integral part of MCTC's General Education competencies

- Clear connection to MCTC Strategic Plan 2016 – 2022

  Initiatives III – V that support the topic of Problem Solving and student learning leading to successful employment

Focus on Student Learning

Goal: *MCTC will provide the instruction and resources to increase the student capacity for work-place success by improving problem-solving and reasoned decision-making skills.*

Student Learning Outcomes:
MCTC students will improve problem solving skills by learning to:
1. Examine the evidence
2. Define the problem
3. Identify strategies
4. Analyze potential solutions
5. Implement the solution
6. Reflect on the outcome

MCTC students will improve employability skills of students enrolled in FYE and other appropriate classes through improved problem solving skills.

MCTC students will increase the capacity for work-place success by improving problem solving and reasoned decision making skills.

MAYSVILLE COMMUNITY & TECHNICAL **COLLEGE**

Assessment

Critical-thinking Assessment Test (CAT)--key measurement

- Serves as a key measurement to assess the essential components of critical thinking and real-world problem solving
- Based on the expanded contemporary definition of critical thinking that emphasizes problem-solving skills
- Bonus--Uses short-answer, essay questions to measure problem-solving skills
- Skill sets I and II align well to measure SLOs
- Department faculty will report summary formative assessment results in the annual unit plan--identifying strengths and weaknesses and actions to be taken for improvement.

MAYSVILLE COMMUNITY & TECHNICAL **COLLEGE**

How is CAT Administered?

Administered in the following classes:
- ENG 101 and ENG 102—pre and post test design, baseline data collected Fall 2018
- STA 220—baseline data collected Spring 2018
- Technical program Capstone courses-Cohorts I and II

Format
- Proctored, computer setting
- Easy Administration
- Developed instruction sheet for testing center administration for heavy content courses

Scoring
- Online scoring
- Institutional report, course report, data file, & student response file
- Faculty review of student responses

MAYSVILLE COMMUNITY & TECHNICAL **COLLEGE**

Professional Development

CAT Workshops

April 6, 2018	Initial Training-Skill Set I
September 20-21, 2018	Skill Set I and II-returning and new participants
March 2020	Skill Set II

Overview of CAT, online scoring, STA 220 student responses, CAT framework and skill sets, initial development of discipline specific CAT application problems

MAYSVILLE COMMUNITY & TECHNICAL **COLLEGE**

Professional Development

Internal Workshops

March 4 & 29, 2019 April 12, 2019	Reviewed MCTC Student responses to Questions 4, 7 & 15 in small groups
May 16, 2019	CAT Rubric Scoring Session
August 23, 2019 September 6, 2019	*Where to Start?* Faculty Workshops focused on teaching suggestions and reporting requirements

Sustaining our efforts:
- Continued professional development & contact with CAT developers
- Sharing our CAT report results
- Discussion at monthly Faculty Assembly meetings—CAT App participants
- FYE involvement—Problem Solving Scavenger Hunt—pics on Twitter
- Library hosting Faculty & Staff QEP resources
  https://libguides.maysville.kctcs.edu/qep

MAYSVILLE
COMMUNITY & TECHNICAL **COLLEGE**

MCTC CAT Apps
Are cows causing global warming?

A research study suggests that cattle are significantly contributing to carbon emissions resulting in global warming.

- What types of additional information would be needed to more fully evaluate the proposed hypothesis that cattle are significantly contributing to carbon emissions?
- Identify 3 types of additional information and explain how each would help evaluate the hypothesis.

Rubric Draft:

Student responses may tend to be:
- Info that help support the hypothesis that cattle do significantly contribute to carbon emissions
- Info that would help evaluate an alternative interpretation of the effect of carbon emissions

MAYSVILLE
COMMUNITY & TECHNICAL **COLLEGE**

MCTC CAT Apps
FYE 105 Social Media

Sara would like to be a nurse and is currently taking Anatomy and Physiology. While taking a break from studying, she sees a social media post about the importance of social skills. The post stated:

Harvard and Carnegie studies related to career success indicate that 85% of future success is based on social skills, with only 15% related to technical skills.

As a result, Sara believes her time is best spent on social media building her social network so she can be successful in her nursing career.

- How strongly does the information provided support Sara's conclusion?
- Provide two alternative explanations for the results of the study, besides Sara's conclusion.
- Identify three types of additional information needed to fully evaluate Sara's conclusion that her time is best spent on social media. Explain why each type of information would be helpful.

MAYSVILLE COMMUNITY & TECHNICAL **COLLEGE**

CAT Apps:

- FYE
- Math
- Communication
- Physics
- Stats
- Nurse's Aid
- Computer Information Technology
- Medical Lab Technology

MAYSVILLE COMMUNITY & TECHNICAL **COLLEGE**

Student Responses

- Our campus QEP is currently about problem-solving skills. These are skills we all need to help us conquer life. For me, my MCTC classes and professors have stepped up the problem-solving game. For that, I say a huge thank you.

  A. W.

- As a non-traditional student that works full time, raises a family and tries to give to my community having a solid game plan is crucial for me to get my work done on time. By using QEP problem-solving concepts I am able to focus my thought process and to quiet my anxiety when it comes to deadlines and fast paced assignments.

  K. D.

MAYSVILLE COMMUNITY & TECHNICAL COLLEGE

Faculty Responses

Positive!

Who is involved?
          We all have a part!

MCTC is committed to our students and to the success of

Let's Solve It: Problem-solving Skills for Life

MAYSVILLE COMMUNITY & TECHNICAL COLLEGE