

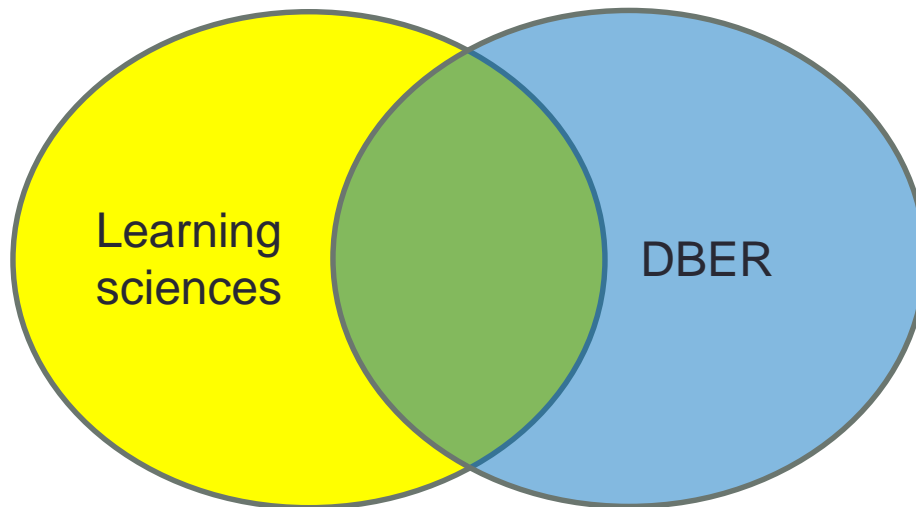
WRITING TO LEARN SCIENCE: HIGH-IMPACT, LOW-COST PRACTICES

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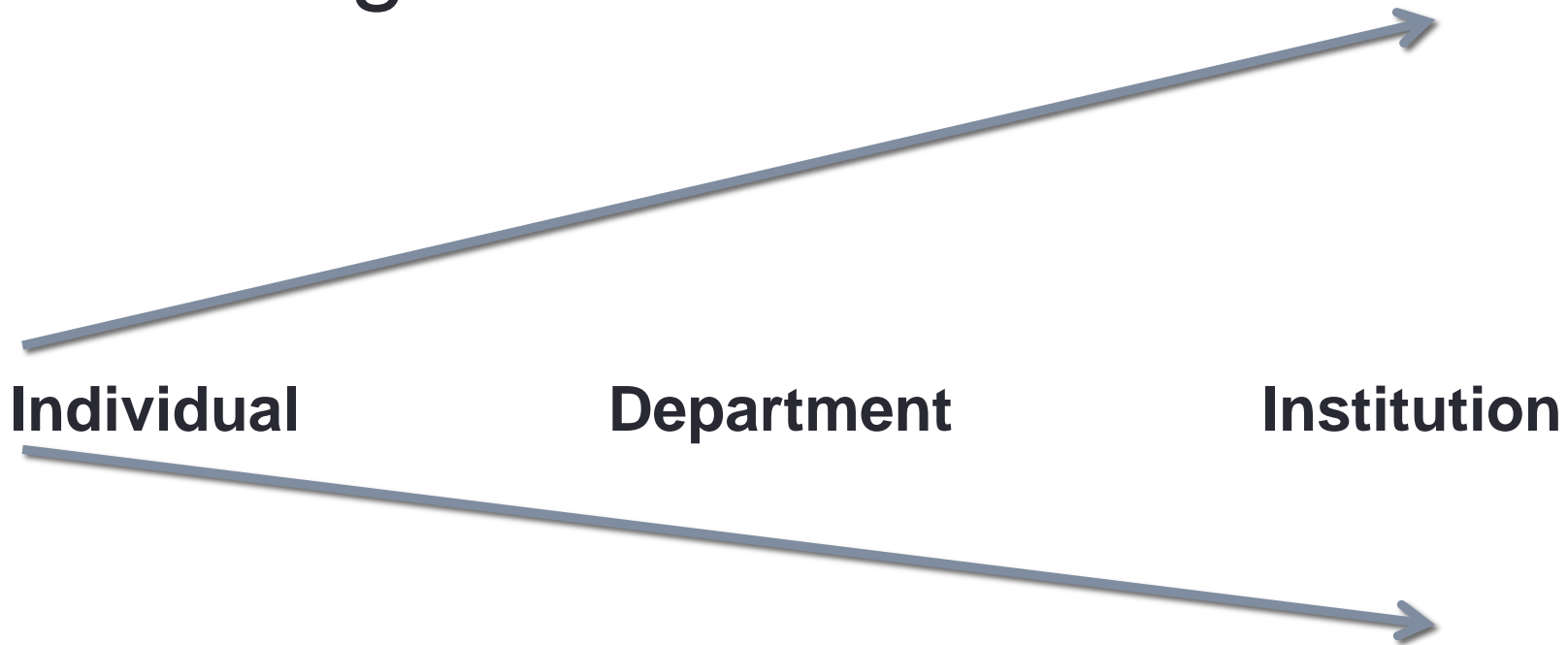
2014

The Big Questions

1. How are we going to apply what we know?



2. How can we accelerate the pace of change?



	Biology/ Life Sciences	Chemistry	Engineering	Math/Computer Science/ Statistics	Physics/ Earth Sciences
Content knowledge	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone
Conceptual understanding	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone
Scientific method	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone
Critical thinking	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone
Effective communication	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone
Metacognition	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone
Professionalization	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone	Intro Advanced Capstone

Heuristic Model

What is the role of _____ [specific practice]

in improving _____ [disciplinary specific learning objective]

through impacting _____ [specific cognitive, motivational, emotional process;
prior knowledge; beliefs]

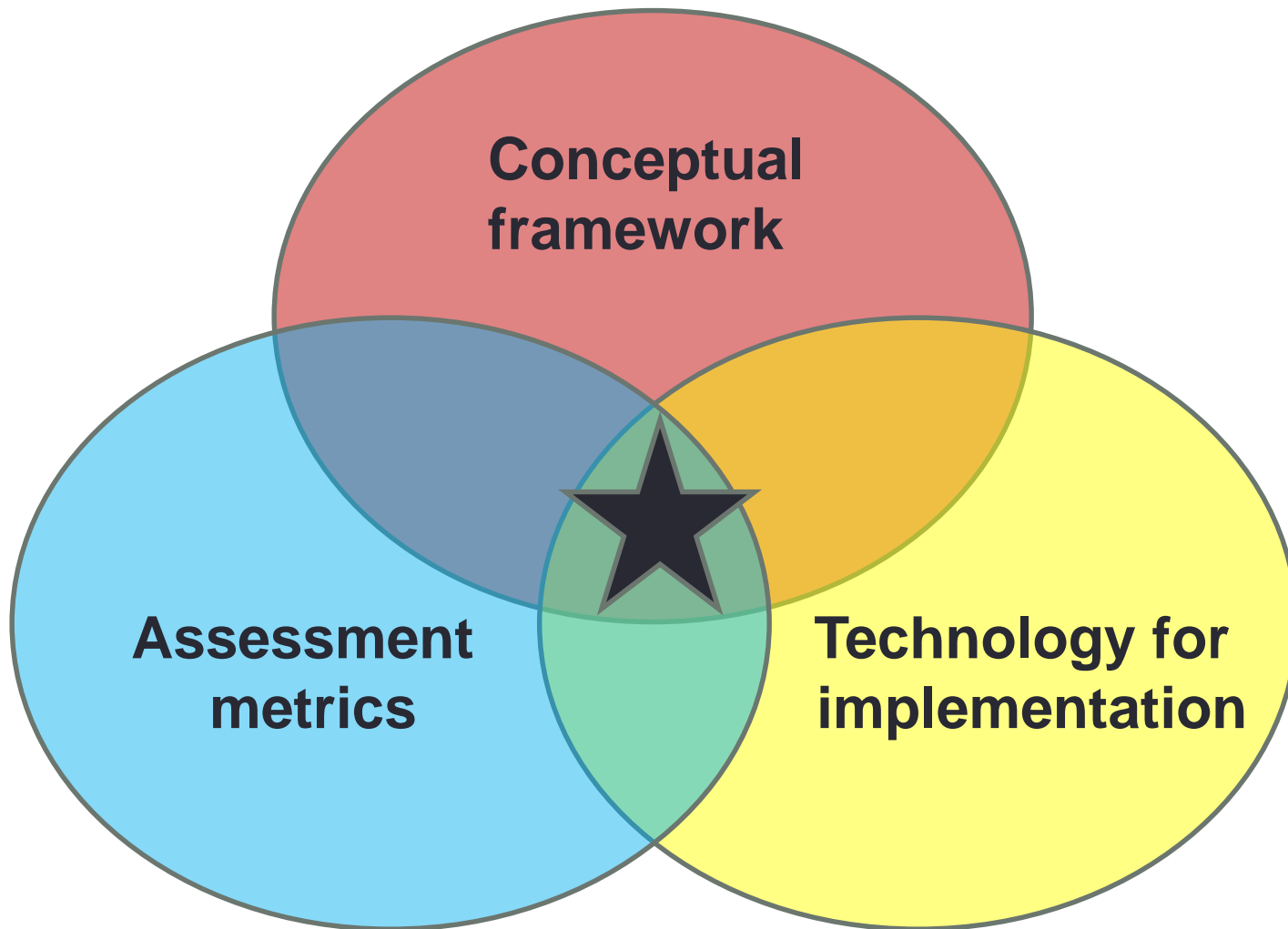
as a function of _____ [course level, class size; discipline; level, background,
and goals of the student; and institutional factors] ?

What is the role of writing an undergraduate thesis

in improving critical thinking and writing skills

through impacting metacognition, epistemology, and/or self-efficacy

as a function of course context ?



**Conceptual
framework**

**Assessment
metrics**

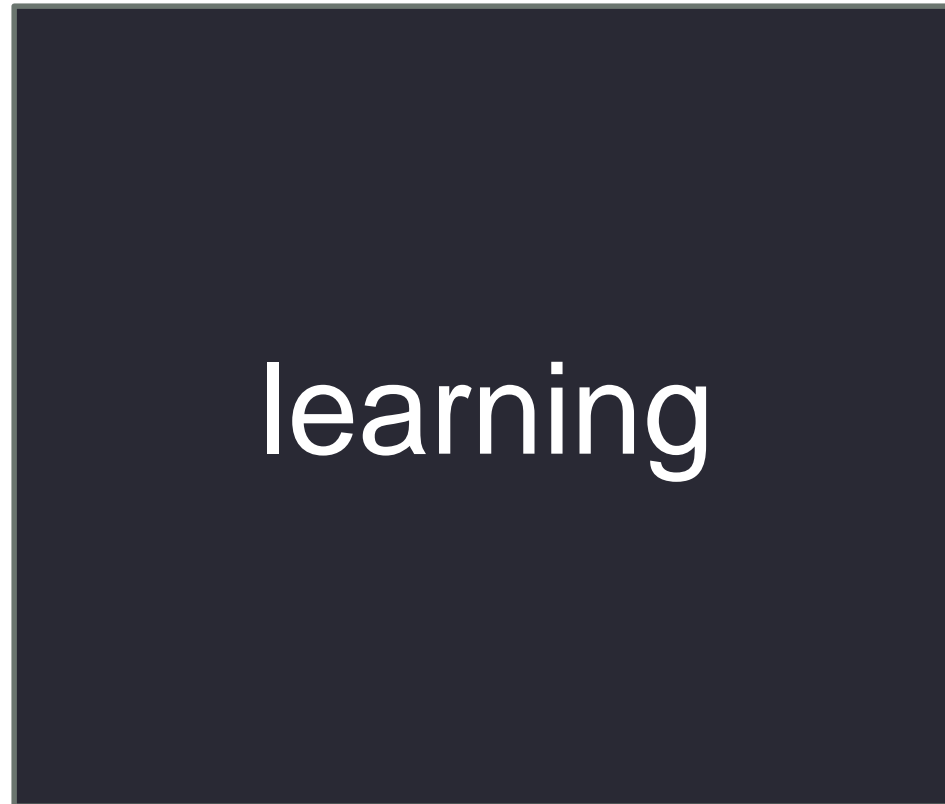
**Technology for
implementation**

Prior knowledge

Cognitive skills

Metacognitive skills

Motivation



Emotions

Beliefs

Epistemology

My session

- What do we want our STEM students to learn?
- How does writing promote deep learning by targeting mediating and moderating variables?
- What are the most promising writing practices?

- Research on WTL in STEM, exposing gaps,
- Address specific barriers to implementing WTL
- Introduces our systematic approach to research.