

What is a Systematic Literature Review?

- Procedure for interpreting a large amount of information “designed to identify existing gaps in a field of research and to make recommendations for closing these gaps” [5]
- Involves 4 main steps:
 1. Define research questions and keywords for searching
 2. Find relevant research that meets inclusion criteria
 3. Systematically review each source
 4. Synthesize results

A Systematic Literature Review: How do students respond to active learning?

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Why look at active learning?

- Active learning positively influences a wide range of educational outcomes such as increased student learning and higher retention in STEM programs [1]
- STEM instructors are still reluctant to adopt active learning practices, partly due to perceived student resistance [2]-[4]
- Affective reactions refer to the range of possible positive and negative student reactions to active learning

- (1) Define research questions and keywords for searching
- (2) Find relevant research that meets inclusion criteria

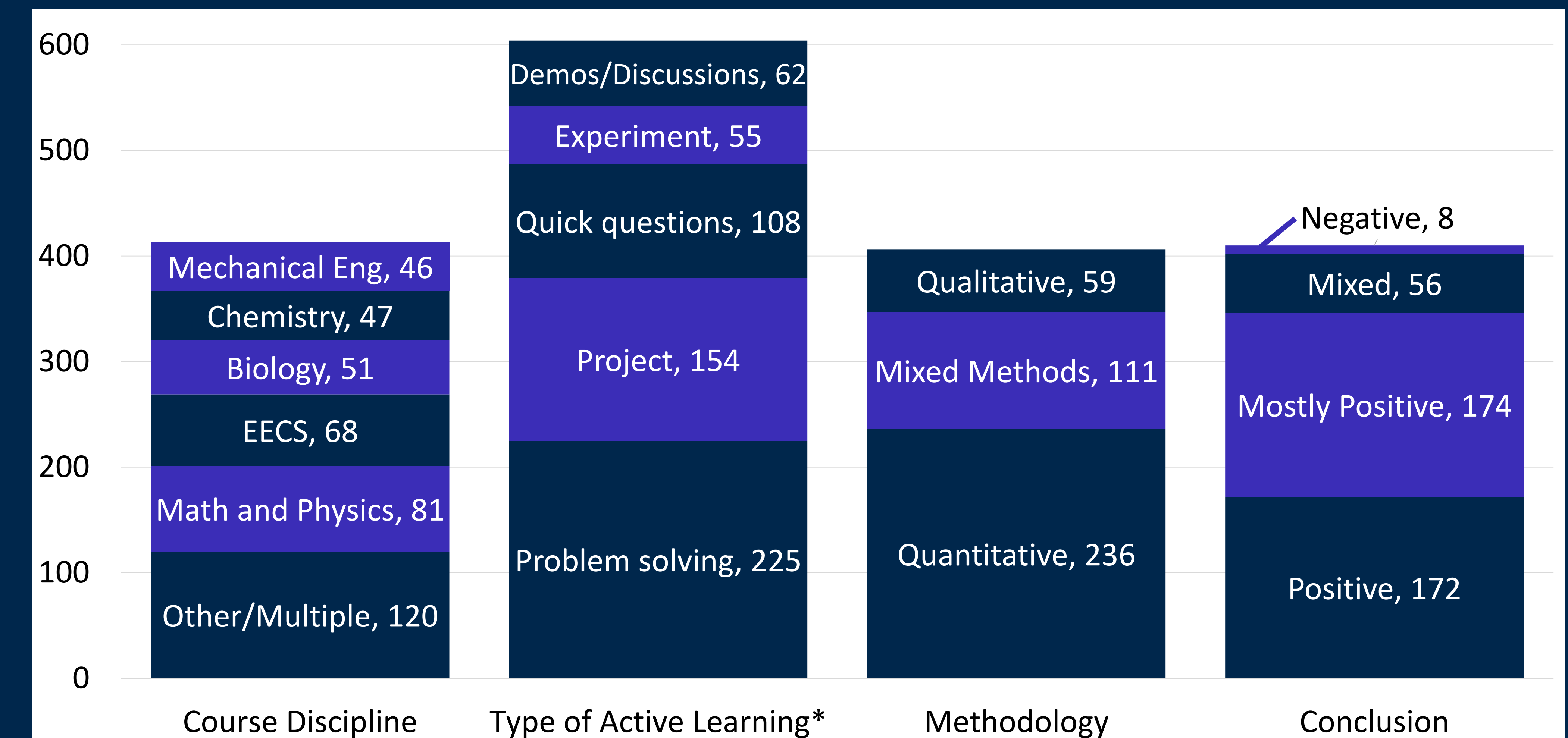
- (3) Systematically review each source
- (4) Synthesize results

Research questions

- What student affective responses are used to evaluate the effectiveness of active learning?
- What evidence is used to measure these student affective responses to active learning?
- What are the relative strengths and weaknesses of each type of evidence?
- How are contextual features of a course connected with positive or negative student affective responses?

Keywords and inclusion criteria

Category	Inclusion criteria	Example search terms
Active learning	Describes an active learning intervention during lecture class time.	Active learning, project based learning, peer instruction.
In-class	Must be in an undergraduate STEM course. The study must include course-level data.	Engineering education or mechanical engineering. AND Undergraduate or higher education. NOT K-12 or high school.
Affective response	Includes empirical evidence of student affective response to that active learning intervention.	Course evaluation, student responses, student perceptions, or affective response, affective outcome.



*Many studies use more than one type of active learning



2,365 abstracts found from database search and email solicitation

Partner screening of abstracts in RefWorks

686 abstracts meet criteria

Partner screening of full texts in RefWorks and Google Forms

410 full texts meet criteria

Full text coding guide

Coding Question	Example responses	
Course info	Discipline	Biology, Math, Civil Engineering, ...
	Year	First year, second year, third year, fourth year
	Characteristics	Required, elective, for majors, for STEM students
Study methodology	Sample size	Sample size, class size, and percentage reporting
	Evidence or data sources	Validated instruments, Instructor-generated survey, interviews, observations
Affective response	Design	Quantitative, qualitative, pre-post, comparison group, lists questions, reports statistical significance
	Activities	Summary of in-class activities
	Type of active learning	Individual, groups, problem solving, project, inquiry learning/experiment, quick questions, demos
	Affective responses	Satisfaction, enjoyment, self-reports of helpful to learning, confidence, engagement/participation
Misc.	Conclusion	Positive, mixed/neutral, negative, inconclusive
	Instructor strategies for active learning	
	Study design on cognition and conclusion	
	Additional comments	

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