

CSU-TIPS RESEARCH LESSON STUDY PROPOSAL

2025-6

Adapted from CANMEE Lesson Study Proposal

For the lesson on: Confidence Intervals (various dates from Nov. 2025 through Feb. 2026)

Place: San Jose State University, Cal Poly Pomona, Sonoma State University

Instructor for Research Lesson: Tahir Bachar Issa (SJSU), Wai Tak Chan (CPP), Rodrigo Gaitan (SSU)

Facilitator: Martha Shott (SSU)

Lesson Study Team Members: all of the above!

Commentator: Ximena Cid

Course: Intro Stats

Title of Lesson:

Brief Description of Lesson:

- Students work in groups of 3-5. Their task is to choose a topic that is of interest to them, and pose a question that can be investigated using confidence intervals. They gather data (directly or from an online source), construct a CI, and interpret their results.
- Deliverable: a PPT/Google Slides “proposal.” They work on this in class, and submit the final version as a HW / extra credit assignment. Students who miss class either do this on their own or are placed in a group with other absent students to complete the work.

1. Students’ competencies and challenges

Evidence / assets-based descriptors include: why each focal student was chosen; their funds of knowledge (cognitive and affective), content and agency strengths; and a content and agency goal for each focal student Add rows as needed.>

<i>Focal Student</i>	<i>Competencies and Challenges</i>
Student 1 Teacher: Wai Tak Cal Poly Pomona	<i>Why chosen: Student seems interested in the course but is struggling with some concepts</i> <i>Assets: Shows effort to learn the course material.</i> <i>Content Goal:</i> <i>Agency Goal: Increased self efficacy</i>
Student 2 Teacher: Wai Tak Cal Poly Pomona	<i>Why chosen: Student attends Office Hours regularly to ask questions on course content</i> <i>Assets: Works hard and asks questions from which other students can learn.</i> <i>Content Goal:</i> <i>Agency Goal:</i>
Student 3 Teacher: Rodrigo Sonoma State	<i>Why chosen: Student was attentive in class sessions, but quiet/shy and that prohibited them from engaging actively in the class.</i> <i>Assets: Attended Student Hours and asked thoughtful questions about the material</i> <i>Content Goal:</i> <i>Agency Goal: Increased comfort and confidence in participating actively in class sessions</i>

Student 4 Teacher: Tahir San Jose State	<i>Why chosen: Student was engaged in class and wanted to better understand course content</i> <i>Assets: Very engaged in class and earnest desire to understand concepts</i> <i>Content Goal: Ability to connect statistics to their ultimate goal of developing a mobile app</i> <i>Agency Goal:</i>
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2. Rehumanizing STEM dimension and goal

<Resources: Standards for Mathematics Practices, Teaching for Robust Understanding, Aguirre et al 5 EQUITY PRACTICES The Impact of Identity in K-8 Mathematics Aguirre, Mayfield-Ingram, Martin; Bartell>

Rehumanizing STEM dimension: Stewardship / Ownership

Rehumanizing STEM Goal: Each student, especially focal students, will see confidence intervals (and statistics more broadly) as a tool that can help them uncover information about a topic that is meaningful to them or to their community.

3. Content goal

Each student, especially focal students will understand: the distinction between a parameter and a statistic.

Each student, especially focal students will be able to: identify when a confidence interval is the appropriate statistical tool for approaching a research question.

Each student, especially focal students will be able to: construct and interpret a confidence interval from gathered data and in context of their research question.

4. Connecting the Rehumanizing STEM dimension and the Content goal: How can the RS dimension support learning of the content?

When students feel ownership through selecting their topic and research question, the terms “parameter” and “statistic” begin to have more tangible meanings, which helps students to internalize the difference between the two values. Students also may feel that the outcome of their analysis (confidence interval estimate) is more meaningful and impactful when it relates to a topic they care about, and when they have collected the corresponding data themselves.

5. Choose the task and anticipate student responses <Do the task and anticipate how focal students will do the task>

We anticipated a few possible stumbling blocks and designed the lesson to hopefully avoid them:

1. Student anxiety about working with a group -- announce the plan for this project a session or two before groups are formed, allow students some agency in selecting their groups.
2. Students choosing a topic that cannot be investigated with a CI -- provide a warm-up that presents various research questions and has students work with peers to identify which one(s) are appropriate for CI vs. hypothesis testing or those that are not appropriate for statistical analysis.
3. Students gathering/finding data that cannot be used to calculate their parameter of interest -- explicitly have students identify their statistical question and parameter of interest before they gather data.

6. **Unit plan** < Describe lessons surrounding your research lesson, with a goal and task. Identify which lesson is the research lesson.>

Lesson	Unit Learning Goal and Tasks
1	Goal: Learn how to construct and interpret confidence intervals Task: Interactive lecture with various examples.
2	Goal: Brainstorm a topic of personal interest for the project. Task: Can be any of the following, based on course format. In each case we suggest using a list of example topics to get them thinking along the lines of a deep, personally meaningful question. - Discussion board prompt; submissions can be used to form groups - Ask students to connect this to their current / future lives - Have them form their own groups first, and within the groups decide on a question * Note: this piece is typically done as either a homework prior to the lesson study, or as a 15-20 minute activity at the end of the class period preceding the LS.
3	Goal: Complete a statistical inquiry using confidence intervals and develop a slideshow presentation to explain your motivation and to interpret your results. Task: Work in groups to gather data (directly or from an online source), construct a CI, and interpret their results. They complete a Google Slides template to organize the outcome of their work (see Lesson Study resources). *Note: this is the Lesson Study session.

7. Research Lesson Plan

Indicated time percentages are recommendations; adjust as necessary

Steps, Learning Activities Teacher's Questions and Expected Student Reactions	Teacher Support	Formative Assessment
ACT 1 :: IGNITE AND LAUNCH (15-20 mins, prior class period or homework)		
Ignite <Connect to prior knowledge, experiences, funds of knowledge, context of focal students> Wondering <What question will students answer with this lesson, awaken their curiosity, motivate to engage?>	<Connect to funds of knowledge, competencies, context>	<Are students motivated to do the work?>
Launch Task Brainstorm a topic of personal interest for the project. Task: Can be any of the following, based on course format. In each case we suggest using a list of example topics to get them thinking along the lines of a deep, personally meaningful question (e.g. climate change, mental health, effects of technology use, etc.) *Discussion board prompt; submissions can be used to form groups *Ask students to connect this to their current / future lives *Have them form their own groups first, and within the groups decide on a question	Note: Having students do this independently FIRST (before moving into groups) is ideal so that students can express their genuine interest and ideas without perceived peer pressures.	Do students develop topics/questions that feel deep and meaningful? Are these justified by connections to their personal lives, career ambitions, etc?
Steps, Learning Activities Teacher's Questions and Expected Student Reactions	Teacher Support	Formative Assessment

ACT II :: WARM-UP (10-15 mins)		
Post a few questions and ask students which ones would be appropriate to answer with a confidence interval. Include questions from a variety of topics to get them thinking about different themes: the environment, social justice, sports, music, movies, etc. Examples: 1. What proportion of students at (institution) identify as male? 2. How many hours do students spend, on average, volunteering in the community? 3. Which type of smartphone is most popular among students at our college? 4. What is the average number of course units/credits that students take per semester? 5. What proportion of college students think that climate change is a real problem? 6. Do humanities majors spend more time at the campus library, on average, than other majors do?	Circulate among the groups to check understanding and clarify misconceptions. Ensure that each group is visited at least once. Encourage all members of the group to share their ideas.	Can students identify a parameter that is stated in the research question? Can students rephrase a given question to refer to a parameter? Are students able to distinguish between a question that calls for estimation, versus a “yes/no” answer? Are students able to discern when statistical methods are not applicable? Are all students engaged with the warm-up? Are certain students talking over others in ways that diminish their peers’ participation?
Steps, Learning Activities Teacher’s Questions and Expected Student Reactions	Teacher Support	Formative Assessment
ACT III :: GROUP PROJECT WORK (40-50 mins plus homework time as needed)		

Students work in groups of 3-5. Their task is to choose a topic that is of interest to them, and pose a question that can be investigated using confidence intervals. They gather data (directly or from an online source), construct a CI, and interpret their results. Deliverable: a PPT/Google Slides “proposal.” They work on this in class, and submit the final version as a HW / extra credit assignment. Students who miss class either do this on their own or are placed in a group with other absent students to complete the work. Link to Google Slides template	As before, the instructor should actively monitor group progress and visit each group at least twice during this time frame: • verify that topic/research question/identified parameter is appropriate for the study • ensure groups have a viable plan to collect or gather data.	Do students frame their question in terms of a parameter? Does the question connect back to their chosen topic in a relevant and satisfying way? Do students avoid (or acknowledge) sources of bias when gathering data? Do students interpret the CI correctly as providing a plausible range for the unknown parameter value, based on the evidence from the sample? Do all group members contribute to the project development? Are all students sharing ideas openly, and responding with positive intent to ideas shared by their peers? Do students exhibit curiosity, enthusiasm, surprise, eagerness?
ACT IV: PRESENTATIONS (optional as time allows in next class session)		
Steps, Learning Activities Teacher’s Questions and Expected Student Reactions	Teacher Support	Formative Assessment
As time allows, student groups can present their work in the following class period.		

8. “Board” plan < How will the board be designed to reveal the history of the lesson? Make visible student thinking? Help students make connections across representations? To make sense of the content? >

Board work is not necessarily applicable to this assignment, although instructors may find it helpful to jot down big-picture content ideas that benefit all groups.

9. Observation question(s) <What question (about the lesson hypothesis) does the team want answered by the commentators and observers? Does the evidence from the points of assessment in the lesson plan lead to answering this question?>

Which students seem to be “leaning in” to the activity? Which ones are on the sidelines? How does the instructor’s interventions help to equalize participation? Do any interventions hinder participation?

What evidence is there of students feeling ownership or pride in their project?