# Problem Busting Jams in CS 111 Laboratories

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# Project Overview

- Current CS111 structure:

  - Labs consist of randomly assigned student pairs with no graded components.

  - Lab is intentionally designed to be a place where their work is not graded, and the environment is question-friendly.

- Proposed Innovation:

  - This pilot project introduces peer-to-peer learning in group problem-solving with accountability.

  - In this document, we will refer to the proposed pilot project as Problem-Busting Jams (PBJ).

# Key Components of PBJs

1) Problem solving commences with conversations and diagrams, rather than with code

2) Each group member is held accountable for their group's solution

# Innovative Components of PBJs

- Students participating in the PBJ pilot will be able to:

  - Verbally/pictorially **decompose a problem** into smaller parts

  - **Explain a solution with words** and drawings to a peer who does not understand it

  - **Describe** multiple plausible approaches in English and **model** a potential solution on paper

  - **Reason** about which type of programming flow should be used (if, loops, LC, recursion) and what variables and data structures should be used (lists, strings, dictionaries, etc.)

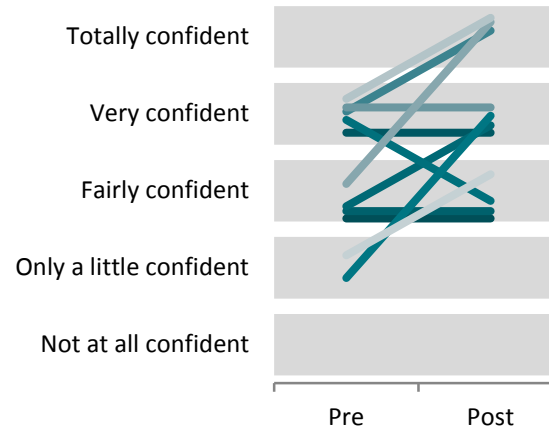  - **Contribute** meaningfully to effective team dynamics
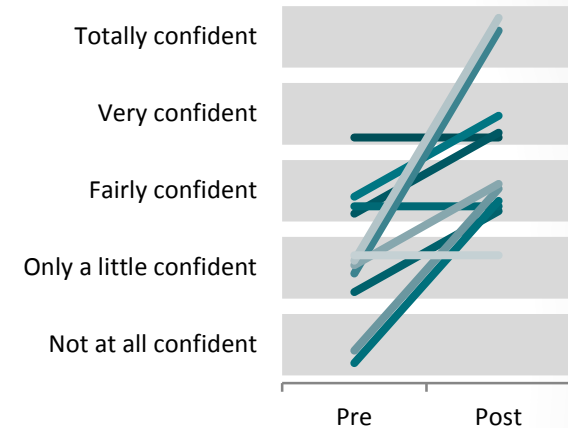
# Key Findings:
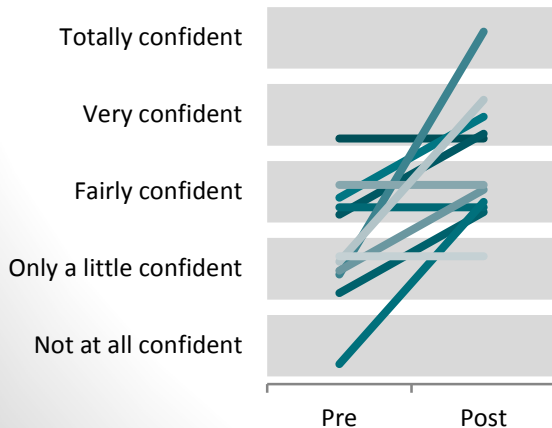# Student Ratings of Confidence



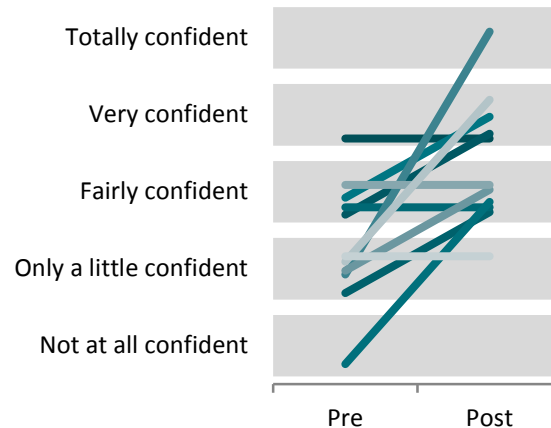**Decompose a Problem**
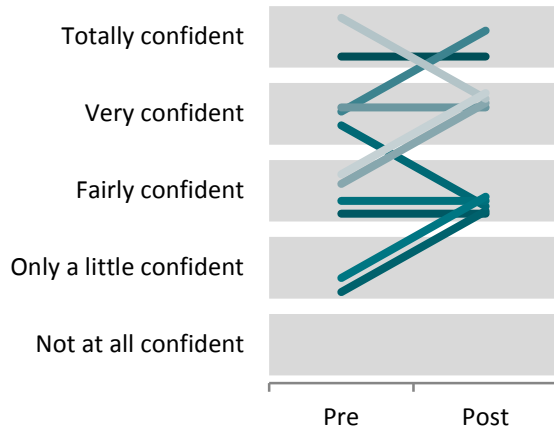
**Explain my Solution in English**

**Express Solution with Python**

**Include Descriptive Comments**

**Run Python Program Successfuly**

**Notes/observations:**
In these skill areas, the dominant trend seems to be one of considerable growth. Some students reported no changes, and infrequently students became less confident in their skills in these areas.

# Key Findings:
# Student Perceptions of Program Value

**In what ways was this program valuable to you? Or, if you didn't find it useful, what made it so?**

| Emergent Themes: | # of times theme was mentioned | Select Representative Quotes/Excerpts |
|---|---|---|
| **Improve understanding** | 6 | "Discussing tasks with group members helps me gain better high level understanding of both the problem and what I'm doing." |
| **Comfort Asking Questions** | 5 | "The small group with coaches made me feel extremely comfortable asking questions or speaking out." |
| **New perspectives** | 3 | "Working in groups also exposed me to other and sometimes more efficient/better ways to solve problems." |
| **Talk out problems** | 3 | "I found that talking through ideas with a group in English really enhanced my comprehension and encouraged me to be more confident in my ideas and collaboration." |
| **Relationships** | 2 | "it really helped me learn how to work with people and treat them with kindness and patience" |
| **Gain confidence** | 2 | "Having a different group of students each time also helped me gain confidence when explaining my ideas or asking questions to others." |
| **Prefer working alone** | 2 | "I personally would have liked to learn things on my own." |

# Key Findings: Instructor Reflections

- Group work/student-to-student learning is wonderful in action; it makes everyone happy

-  Creating an environment where student-to-student learning is the goal is challenging


- Tips:
  - Establishing group norms on Day 1 and building cohesive community go a long way
  - Friendly competitions between groups often heightens team cohesion (but can sometimes backfire and isolate individuals who feel they are less capable of contributing)