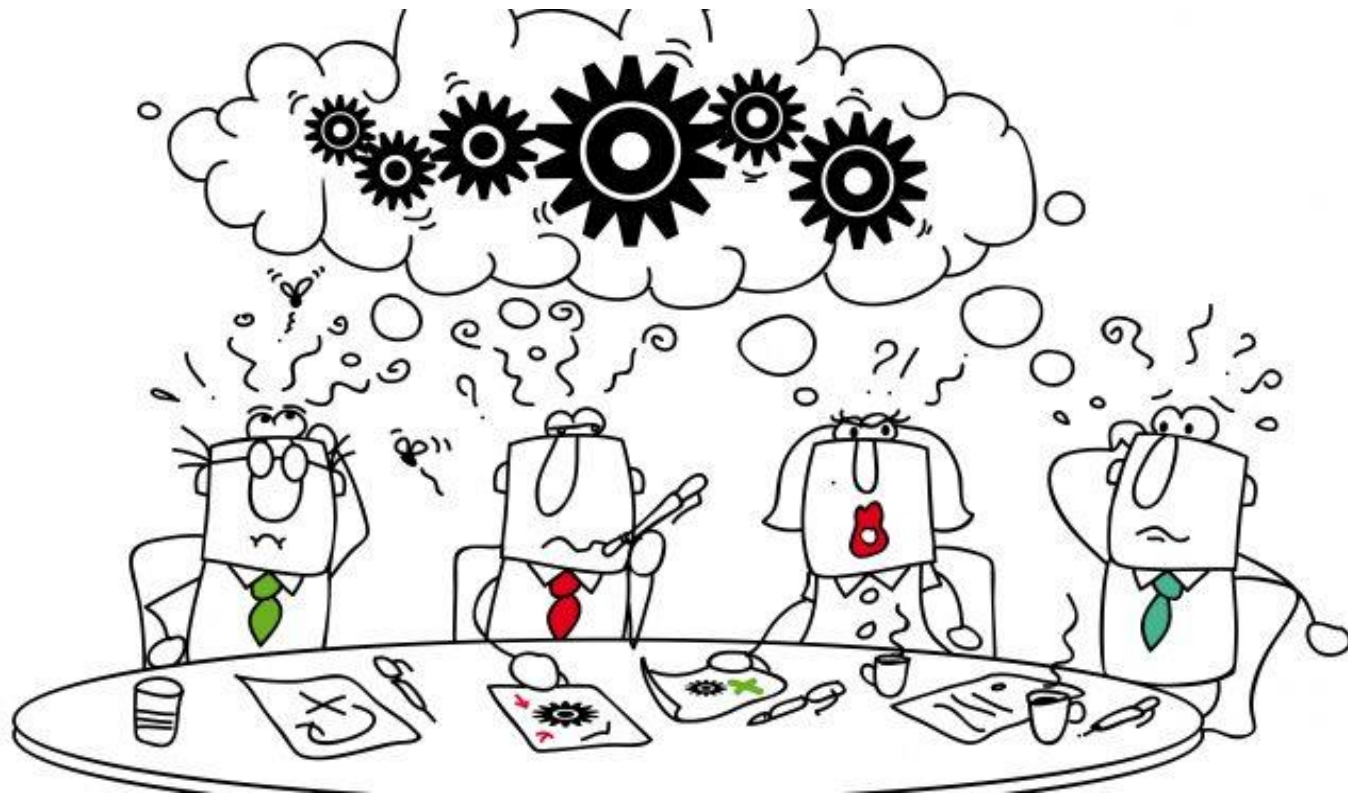


# Problem Solving in Computer Science Education

## University of Texas at El Paso

Ann Q Gates, PI  
Christina Convertino, Co-PI  
Martine Ceberio, Co-PI  
Salamah Salamah, Co-PI  
Natalia Villanueva Rosales, Co-PI  
Angelica Monarrez, Research Associate



# Curriculum Change: Theory-to-Practice Modules

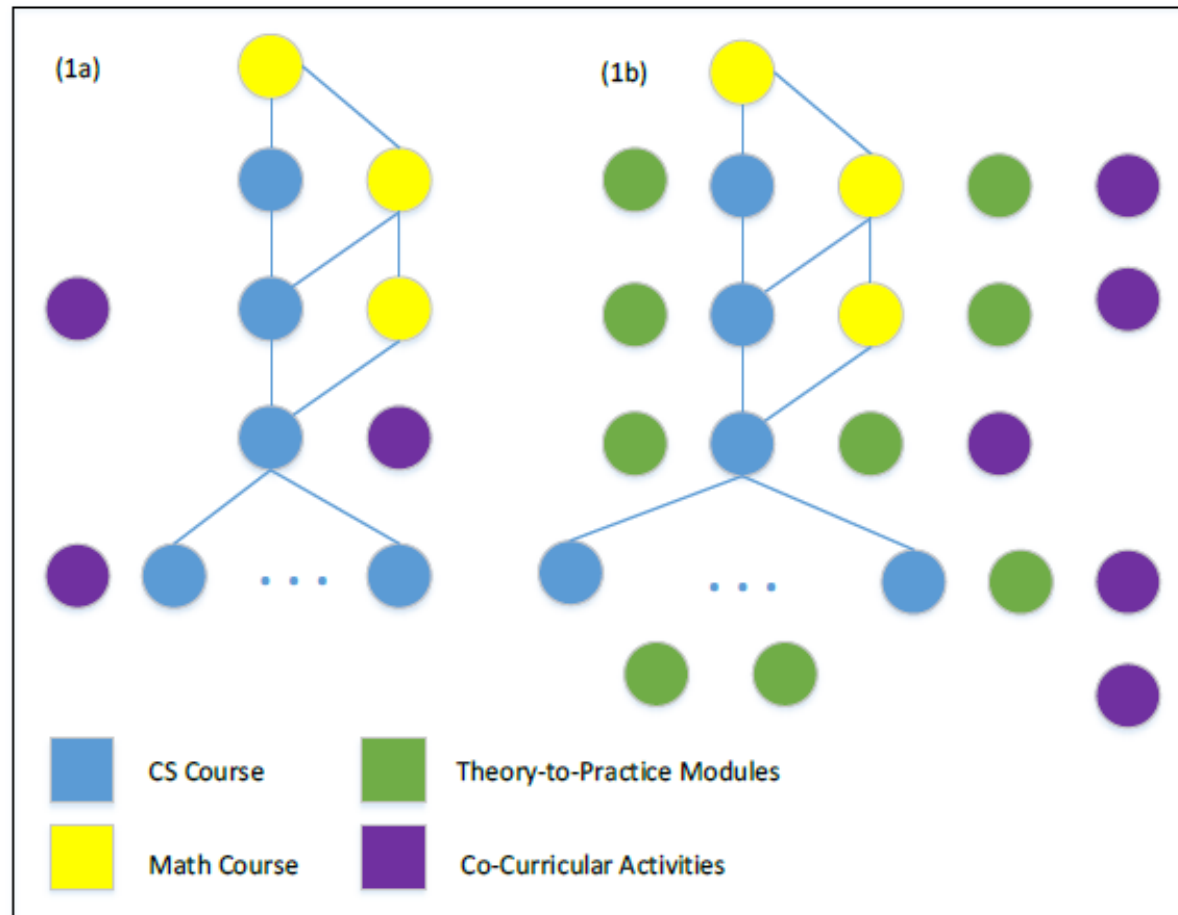
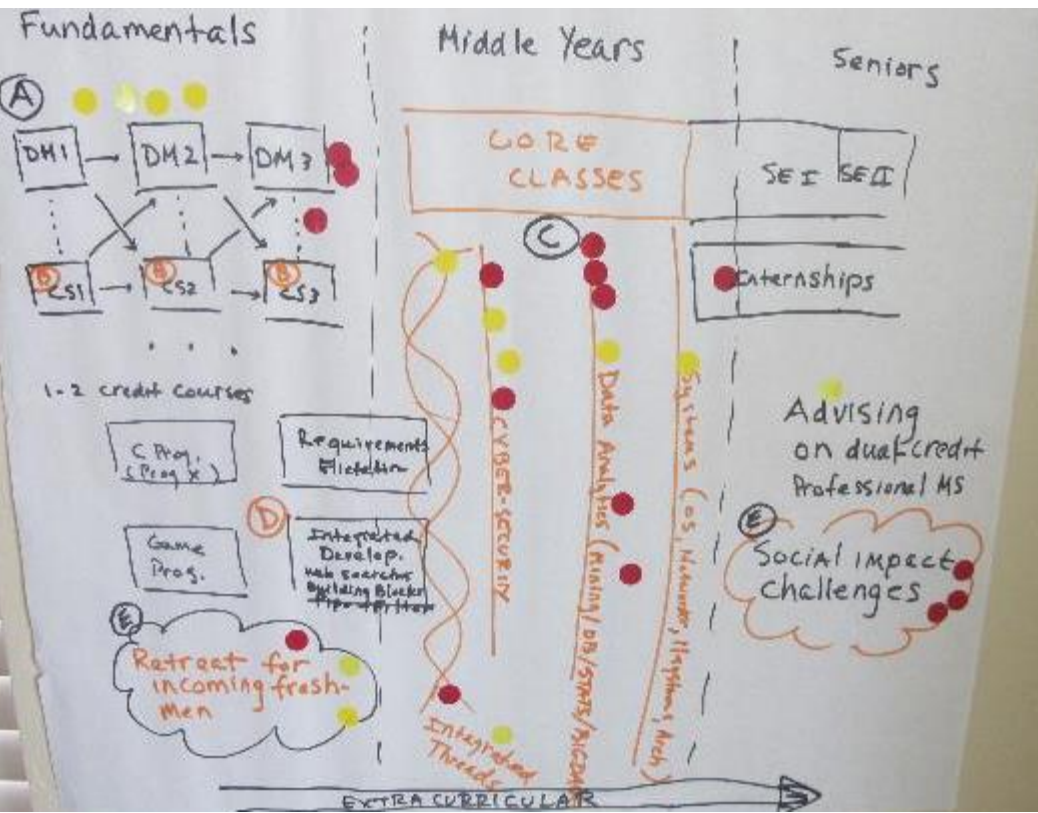
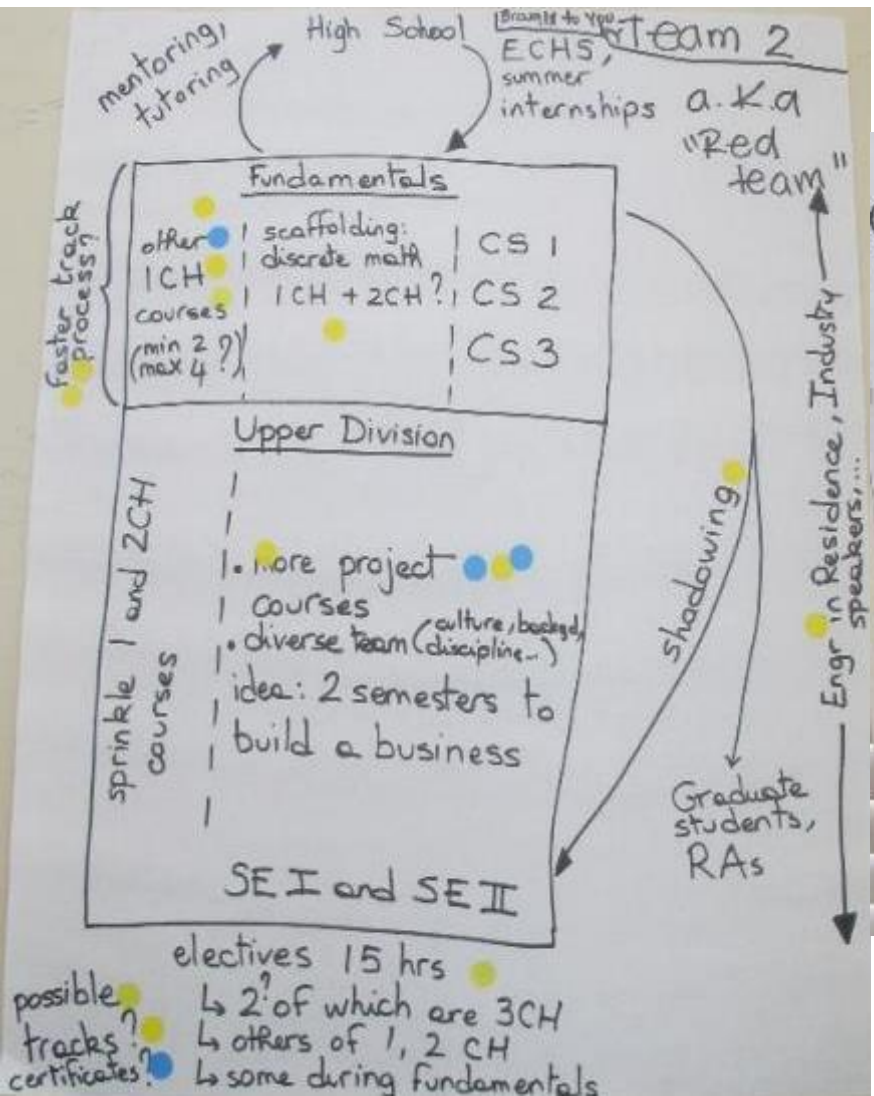


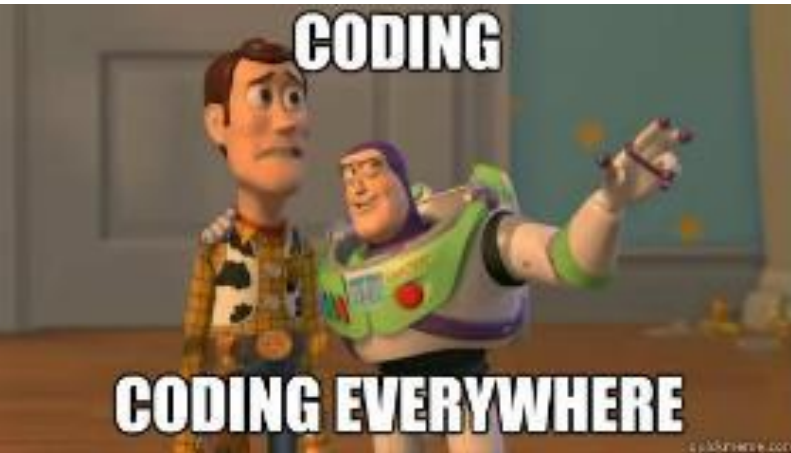
Figure 1: (a) Snippet of current degree plan  
(b) Snippet of revolutionized degree plan

# Critical Conversations for Creating Change



# Defining the Need

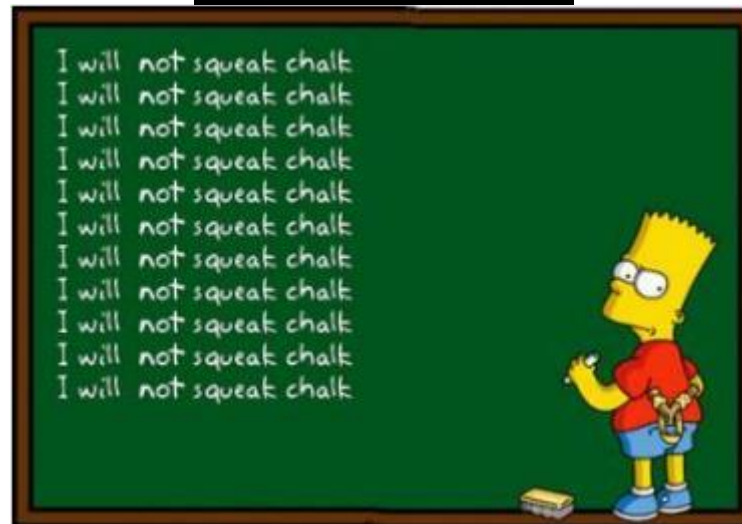
Students



Industry



Professors



# At the Center of Curriculum Change

- **Problem Solving**



- Created for students to: a) learn about different problem solving approaches, b) connect freshman and sophomores with the major, and c) provide strategies for CS courses.

- **Computational Problem Solving**



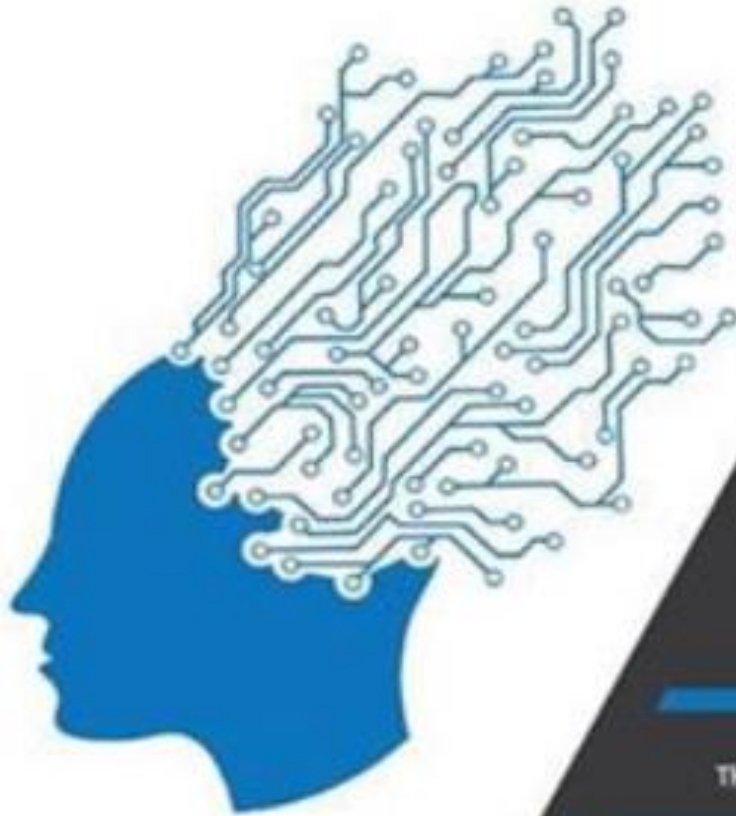
- Created for students to: a) address complex real-world problems by using a computer and related tools, b) connect freshman and sophomore to the major, and c) provide strategies for CS courses.

- **Algorithmic Problem Solving**



- Created for students to practice solving problems employers use during *real* interviews

# Piloting Change

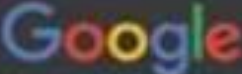


The course will start  
10/30/17

CS 1190

## PROBLEM SOLVING & ALGORITHMS CRN 19585

Learn to Analyze and Understand Problems  
Understand and Apply Problem-Solving Strategies  
Explore Problems and find Creative Solutions

The class will include interactions with engineers from: 

Wednesday  
9:00AM-9:50AM

Friday  
12:00PM-1:20PM

# Uncovering Meaning-Making

This is problem solving:

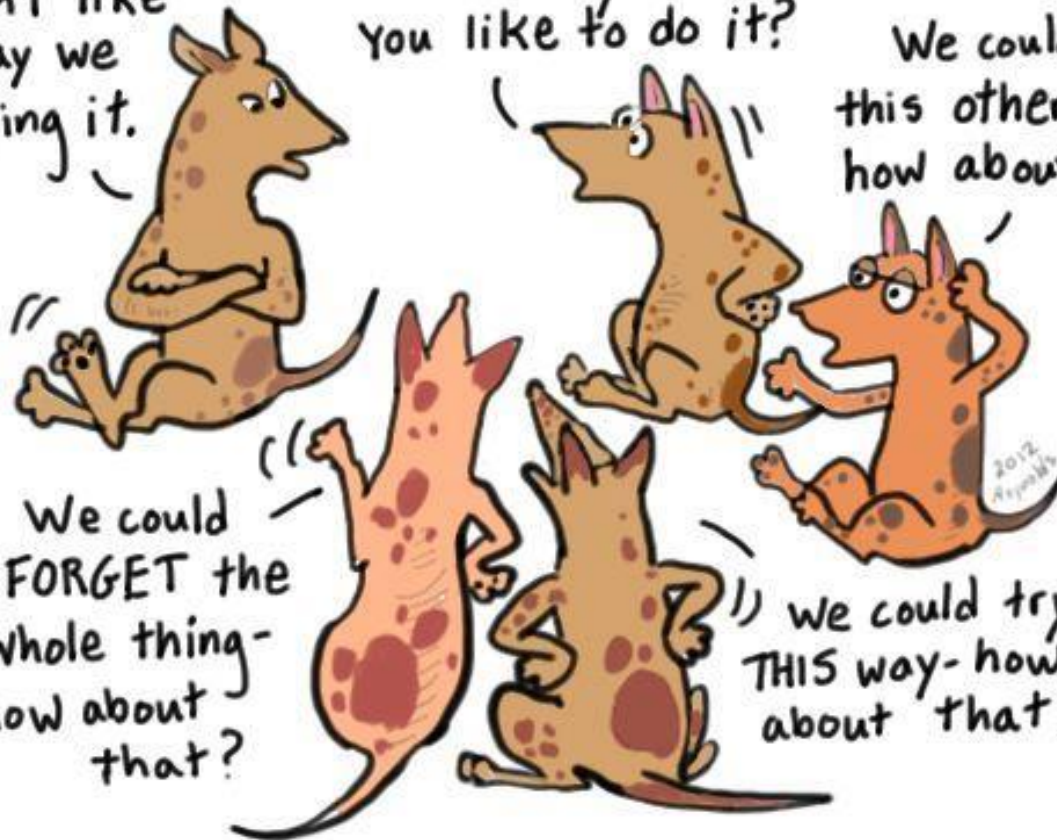
I don't like  
the way we  
are doing it.

What way would  
you like to do it?

We could try  
this other way-  
how about that?

We could  
**FORGET** the  
whole thing-  
how about  
that?

We could try  
**THIS** way- how  
about that?



# Sociocultural Theories of Learning

Social Interaction:  
May cause nausea,  
confusion and  
extreme drowsiness.



someecards  
user card



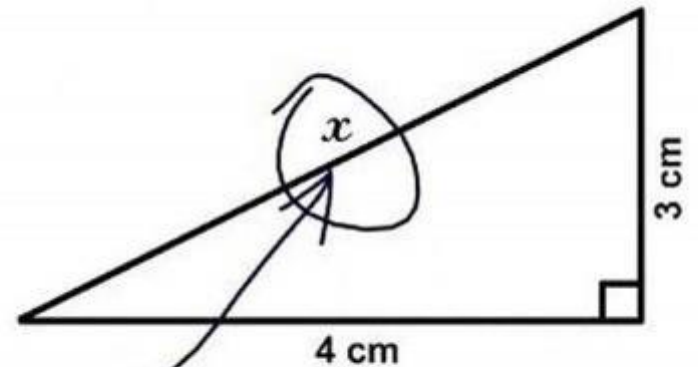
# “Brut Force”



Habit

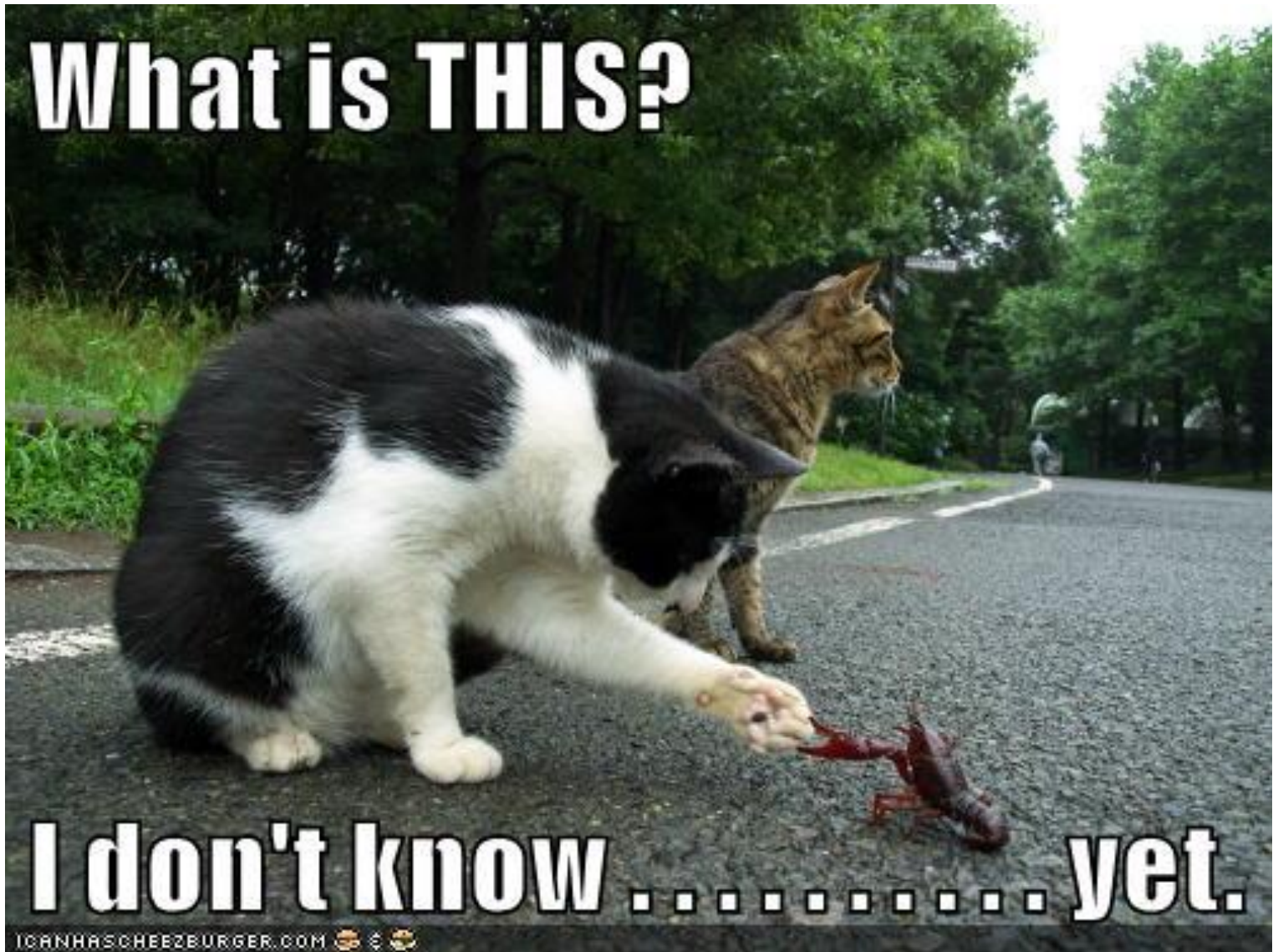
## Quick Solution

3. Find  $x$ .

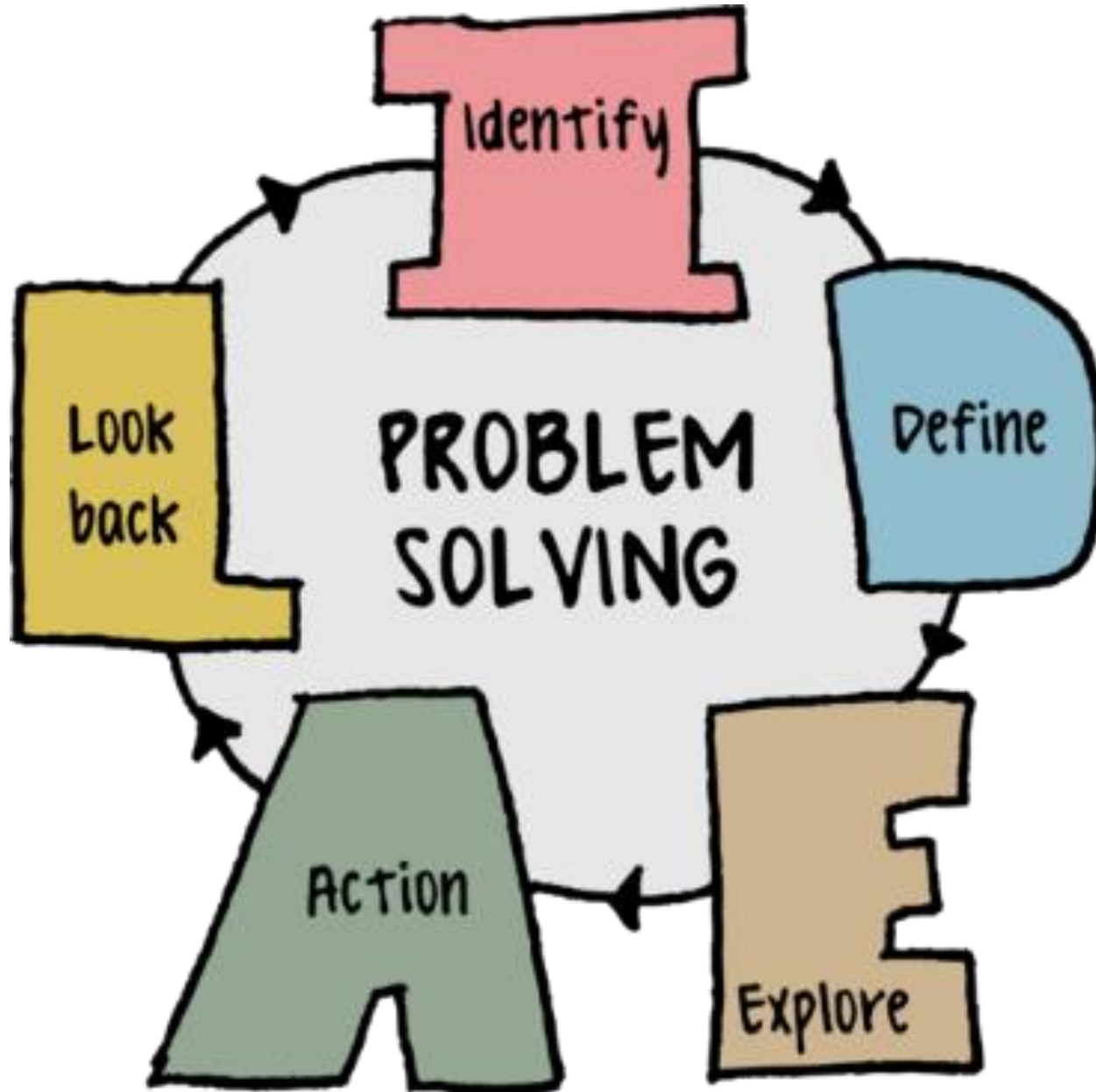


*Here it is*

Shift

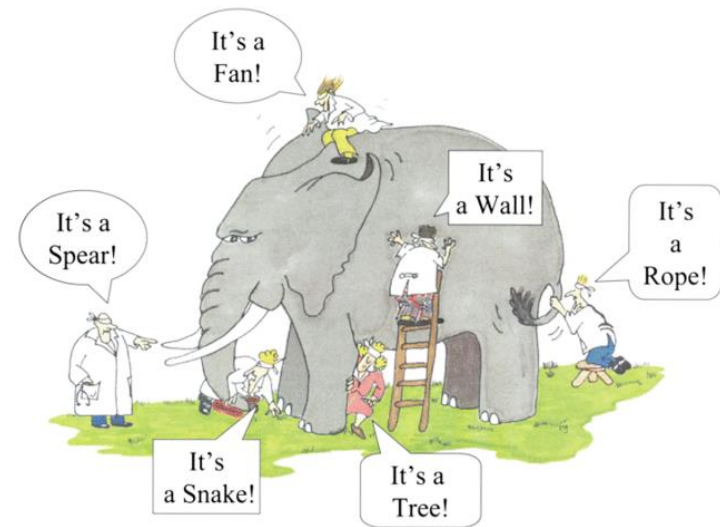


# Tools that Mediate Learning



# Change

## Multiple Perspectives



## Multiple Solutions



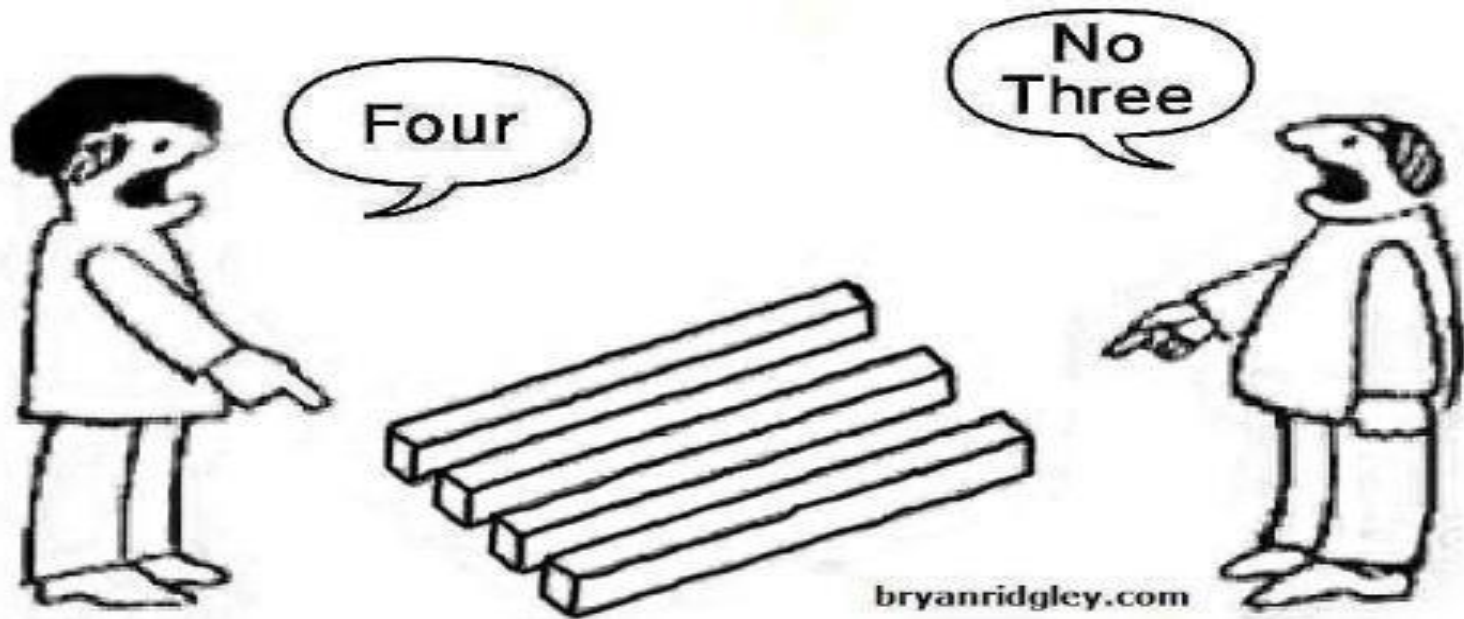
Communication and  
Collaboration

# Powerful Systems



# Powerful Systems

Reality can be so complex that equally valid observations from differing perspectives can appear to be contradictory.



# Scalability

