

# Creating a Problem-Solving Culture

---

Henri Picciotto

[www.MathEducationPage.org](http://www.MathEducationPage.org)

[henri@MathEducationPage.org](mailto:henri@MathEducationPage.org)

[blog.MathEducationPage.org](http://blog.MathEducationPage.org)

# The key challenge

Any group of kids is heterogeneous

Alliance with the strongest

Support for the weakest



# Racers vs. Diggers



What about the others?



Access and challenge can coexist



# Sample Problem

Arrange the whole numbers from 1 to 18 into nine pairs, so that the sum of the numbers in each pair is a perfect square.

Think



Arrange the whole numbers from 1 to 18 into nine pairs, so that the sum of the numbers in each pair is a perfect square.

What makes this a decent problem?

# Honing the Question

Arrange the whole numbers from 1 to 18 into nine pairs, so that the sum of the numbers in **each pair** is a perfect square.

Arrange the whole numbers from 1 to 18 into nine pairs, so that the sum of the numbers in **as many pairs as possible** is a perfect square.

# Generalizations

Find some numbers other than 18  
for which this is possible.

Find many such numbers.

Find all such numbers.

etc.

# Shaping the Culture

# The Elevator Strategy



Stop on all the floors!

# Every day...

- ◇ Something too difficult
- ◇ Something too easy
- ◇ Something “just right”



# Possible Structure

1. Think

2. Pairs or groups of four

3. Whole-class discussion

4. Repeat

# Group Work

- ◇ Random groups
- ◇ Students mostly work independently
  - are expected to help each other
- ◇ If a group does not function well
  - intervene directly to get the behaviors you want
- ◇ If more than one group is stuck
  - stop them all for a class discussion



# Verbalizing

Putting things in words is crucial to understanding

◇ Encourage talking

◇ Require writing

# Don't answer questions they don't have

They cannot hear you!

- ◇ Seed with questions, problems, discussion
- ◇ Lecture in small doses when appropriate

# Creating a safe environment

◇ No putdowns

◇ "Tell your neighbor..."

◇ "Can you restate what X said?"

# Praise participation and risk-taking

- rather than correct answers

# Handling wrong answers

- ◇ write down many answers
- ◇ poker face vs. telling
- ◇ "Choose someone to help you"
- ◇ make 'mistakes' yourself

# Feedback from all

votes

gestures

writing

# Nothing Works

for every student

every group

every teacher

every day

# There is no one way





Henri Picciotto

[www.MathEducationPage.org](http://www.MathEducationPage.org)

[henri@MathEducationPage.org](mailto:henri@MathEducationPage.org)

[blog.MathEducationPage.org](http://blog.MathEducationPage.org)