Mathematics for ELs: Foundational Skills for Equity, Access, and Academic Achievement

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Collaborative Mathematics ensures access and equity

ACTIVITY: “Here and There and Everywhere”

- Players run, skip, hop, or walk around singing “Here and There and Everywhere”
- The lead says “Freeze” and a number, for example “Freeze three”
- Participants stop and listen for instructions.
- The lead says “Melt” and the group continues moving and singing “Here and There and Everywhere until “Freeze #” is called again.
Quick Write – Handout #2

Handouts, Page 1.
Write 5 adjectives that describe ACCESS
__________________________________________
__________________________________________

Write 5 adjectives that describe EQUITY
__________________________________________
__________________________________________

People Search – True or False

1. ELs catch up in mathematics when they become English Proficient (T/F)
2. ELs need a strong command of English to be placed in higher levels mathematics courses (T/F)
3. Mathematics and ELD/ ELA are given the same priority (T/F)
4. ELs should wait to attempt word problems until they master academic English (T/F)
5. All math learners are language learners (T/F)

Find five friends to sign off on your answers. Justify your answers.
THINK-SHARE-COMPARE
Review about interest rates

--Number off by 1-4.
--Stand and find others with your same numbers. Four members to a group.
--Steps:
Read and reread the problem.
Identify what the problem is asking.
Identify word or phrases that need clarification.
Discuss possible steps for solving the problem, ‘guess’ what the correct answer might be.

1. Rising interest rates are beneficial to:
A. Businesses buying new equipment or building new facilities.
B. People buying a new home.
C. Savers and lenders.
D. Consumers with credit card balances.

2. John is buying a car: one costs $20,000 and the other $18,000. If sales tax is 8 percent and he is financing the entire purchase at 10 percent simple interest for one year, what is the actual difference in cost of these two cars?

A. $2000   B. $2160   C. $2360   D. $2376
1. Draw a large circle on your Post-It chart paper and divide it into four parts, and then into four equal parts again = 8 parts.

2. Each member of the group works on two adjacent parts of the circle to do two different assignments. Label them A and B.

3. For problem #1, students work individually and put their answer on slice “A”. When finished, they rotate to the position on the left so that others can review and add comments to the other person’s answer.

4. For problem #2, students may work in pairs and then rotate to the left to compare and comment on answers.
CCSS for Mathematical Practice

1) Make sense of problems and persevere in solving them.
2) Reason abstractly and quantitatively.
3) Construct viable arguments and critique the reasoning of others.
4) Model with mathematics.
5) Use appropriate tools strategically.
6) Attend to precision
7) Look for and make use of structure.
8) Look for and express regularity in repeated reasoning.

These are the 8 national standards for mathematical practice essential to develop and foster mathematical understanding, expertise, skills, and knowledge.

ACTIVITY

1. Discuss what mathematical functions, formulas, or procedures students need to know to graph the problem.

2. Identify what words or phrases EL students would need to understand in order to solve the problem.

3. Identify instructional strategies teachers can use to help ELs.

Example: Finding a Linear Model for a Data Set 8. SP3

Given data from students’ math scores and absences, make a scatter plot. Informally fit a line to the graph, and determine an approximate linear function that models the data. What would you expect to be the score of a student with 4 absences?

Solution:

<table>
<thead>
<tr>
<th>Absences</th>
<th>3</th>
<th>5</th>
<th>1</th>
<th>1</th>
<th>3</th>
<th>6</th>
<th>5</th>
<th>3</th>
<th>0</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math scores</td>
<td>65</td>
<td>50</td>
<td>95</td>
<td>85</td>
<td>80</td>
<td>34</td>
<td>70</td>
<td>56</td>
<td>100</td>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>Absences</td>
<td>2</td>
<td>9</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Math scores</td>
<td>71</td>
<td>30</td>
<td>95</td>
<td>55</td>
<td>42</td>
<td>90</td>
<td>92</td>
<td>60</td>
<td>50</td>
<td>10</td>
<td>80</td>
</tr>
</tbody>
</table>

Teacher Instructions:
Students may use graphing software to find a line of best fit. Such a line might be \( y = -8x + 95 \).

Student, interpret this equation as defining a function that gives the approximate score of a student based on the number of absences to have a score applying the formula \( y = -8(4) + 95 = 63 \).
Sources re Effective Practices For ELs

- Integrating the CA ELD Standards into K-12 Mathematics and Science Teaching and Learning. (WestEd 2015)
- Principles of Instruction: Research-Based Strategies That All Teachers Should Know. (Barak Rosenshine, Spring 2012)
- California’s Social and Emotional Learning Guiding Principles. (CDE 2018). CaliforniaSEL@cde.ca.gov.

Rosenshine’s 10 key Principles based on research strategies from:
- Cognitive science,
- Observations of experienced master teachers,
- Cognitive supports to help students learn complex tasks, and
- Cognitive supports to help ELs acquire academic language, and transfer complex skills and information.

Crosswalk of relationship between CCSS Math Standards and SEL

Text Complexity: students will experience longer periods of engagement with text. They will need self-control to persist with the text, and self-management to stay motivated and engaged over time.

Engage in Academic Discourse and Problem Solve Around a Text: students will need to use social awareness to take others’ points of view, as well as relationship skills to work collaboratively.

Modeling with Mathematics: students will need to analyze problems in real contexts. This will require that students use social awareness to understand the needs of the individuals and groups.

Reflective and Improvement Processes: students will need to use decision-making skills to responsibly solve problems, as well as use self-management skills to persevere in the process and monitor progress towards final completion.
How many squares do you see?

1. Work individually to count the number of squares you see.

2. After two minutes, find your AVB and discuss how many TOTAL squares there are and explain how you got your answers.

3. Share out with the larger group.