Engaging Students Through Math Exploration

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The Agenda

1) Welcome and Introduction
2) Connections to Principles to Actions and LESRA
3) History, Purpose and Future of Student Explorations in Mathematics
4) Explore Student Explorations in Mathematics (SEM)
5) Additional Exploration Activities for the Math Classroom
6) Bucky the Badger
Why should students explore?
Introduction
## Beliefs about Teaching and Learning

<table>
<thead>
<tr>
<th>Unproductive Beliefs</th>
<th>Productive Beliefs</th>
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<tbody>
<tr>
<td>Students can learn to apply mathematics only after they have mastered the basic skills.</td>
<td>Students can learn mathematics through exploring and solving contextual and mathematical problems.</td>
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Support Productive Struggle in Learning Mathematics

<table>
<thead>
<tr>
<th>What are <em>teachers</em> doing?</th>
<th>What are <em>students</em> doing?</th>
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<tbody>
<tr>
<td>Helping students realize that confusion and errors are a natural</td>
<td>Struggling at times with mathematics tasks but knowing that</td>
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<td>part of learning, by facilitating discussions on mistakes,</td>
<td>breakthroughs often emerge from confusion and struggle.</td>
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<td>misconceptions, and struggles.</td>
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<td>Giving students time to struggle with tasks, and asking questions</td>
<td>Helping one another without telling their classmates what the</td>
</tr>
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<td>that scaffold students’ thinking without stepping in to do the</td>
<td>answer is or how to solve the problem.</td>
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<td>work for them.</td>
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LESRA Framework

Launch

Apply

Explore

Reflect

Summarize
Effective Explorations

- Teacher Tracks Successes and Struggles of Students
- Students are Asking Questions of Each Other and Not Just the Teacher
- Teacher is **Constantly** Making Instructional Decisions
- Students are Persevering in Problem Solving
- Students are Recording Solution Paths in Their Notes
Student Explorations in Math

@SEM_at_NCTM

www.nctm.org/sem
Purpose of SEM

The purpose of *Student Explorations in Mathematics* is to stimulate and promote students’ interest in and enjoyment of mathematics.

The publication is one with which students can personally identify and which serves as a vehicle to demonstrate that mathematics is both an interesting, unique field of study and a vital tool in real-world applications.
The History of SEM

1954 - 1981 → Mathematics Student Journal
“to help high school boys and girls better understand that the development of mathematics is one of the greatest achievements of civilized man.”

1982 - 2009 → Student Math Notes
Old-school handout mailed with the NCTM News Bulletin

2009 - 2015 → Student Explorations in Mathematics
Online-only. Stand alone publication. Available to NCTM members.

2015 →
The Big Question
The Question

What is the average number of baseballs used during a nine-inning MLB game?
What’s a number that you know is too low?
Why?
The Question

What’s a number that you know is too high? Why?
What did you guess?
The Answer

Between 8 - 10 dozen or 96 - 120 baseballs.

Mean = 108 baseballs
It’s a Hit! The Math of Baseball
It’s a Hit! Questions

Let’s complete #2, #6a, and #9.
(#6a - assume you only know the 90 ft basepaths)

For #9, go to exploratorium.edu/baseball/reactiontime.html
Follow up to It’s a Hit!

- Can you locate the misconception in #2?
- How might approaches vary for #6a?
- What could we do with the data from #9?
Act One - Leave no one out. The first act should impose as few demands on the students as possible - either of language or math.

Act Two - Develop new tools. Look for resources. Create discourse.

Act Three - Resolve the conflict. Set up an extension.

https://docs.google.com/spreadsheet/ccc?key=0AjIqyKM9d7ZYdEhtR3BJMmdBWndM2YWxWYVM1UWowTEE#gid=0