

A Guide to Making Math Come Alive

In The Middle School Classroom

The Math Alive concept provides teachers with innovative and simple ideas by which they can invigorate students' interest in mathematics. The idea is driven by the need to present and teach the subject in new ways that seamlessly incorporates a student's world into classroom learning. Math Alive allows for the introduction into the classroom familiar elements from every aspect of a student's life or items that they are familiar with. Therefore, the idea for this math instructional device is to give teachers a practical tool that can assist them in making their classrooms alive for their students. This is especially effective in classrooms that are diverse in multiple ways. In this design there are an infinite amount of opportunities to provide "on ramps" for the multicultural classrooms.

According to Childers-McKee, "Teachers have more diverse classrooms today. We don't have students sitting in front of us with the same background or experience, so instruction has to be different," she says. "It needs to build on individual and cultural experiences and their prior knowledge. It needs to be justice-oriented and reflect the social context we're in now. That's what we mean when we talk about culturally responsive teaching."

Math Alive is specifically geared towards students who are performing at and below grade level. The program will use manipulatives, tools and other resources to model mathematical concepts. The modelling will allow the students to move from abstract mathematical concepts to hands-on practical understanding. Students are often lost when mathematical instruction becomes too lecture-like. Mathematical concepts that are modeled often awakens an understanding that a lecture can never do. For example, using simple masking tape, a sharpie and the lines on the classroom floor (1 foot square tiles) brings the two dimensional abstraction of a coordinate plane totally alive .

The project is innovative because it uses ordinary items to explain math concepts. Manipulatives, ordinary items like beans and rice grains, coffee grounds, the classroom floor and the classroom ceiling etc. Additionally, abstract but familiar terms like CO₂ and H₂O (Carbon Dioxide and Water) are used to develop the concept of ratios. The molecules can be broken down into constituent parts and described as ratios (Carbon to Oxygen etc). The concept of scaling, through Math Alive, has been explained by maps and atlases. Fractions have come alive through the division of raw pasta. Musical notes on a sheet of the students' favorite song can be used to engage them in a discussion about percentages.

The Math Alive classroom will integrate traditional math manipulatives along with familiar items that students are accustomed to using in order to bring the classroom alive through differentiated instruction. The Math Alive classroom is divided into five stations where the students rotate in groups every 15 minutes. The stations are as follows: Collaboration Corner; Life Lab; Partner Place; Testing Tepee; and Tech Table. The Collaboration Corner allows students to model a mathematical concept using only the specific supplies or space that they are assigned. For example, how can you use 5 grains of rice (using all of the grains) and a sharpie to model the ratio of 1000 boys to 1500 girls? Use the floor, masking tape and a sharpie to model data from a ratio table. In the Life Lab students will explore mathematical concepts through themes that are related to existence and life. A stethoscope can be used in the Life Lab to measure the pulse rate of each student in that group. Molecular models can be used to demonstrate the concept of ratios. At the Partner Place Center students will, with one partner, work on mathematical problems that are relevant to the lesson for that day. The Testing Tepee provides an assessment opportunity for each student based on the topic that is being taught. Lastly, the Tech Table affords each student an opportunity to use technology (Khan Academy or Explore Learning etc) to enhance or clarify what they have learnt for that day. Our block schedule allows for the 5 rotations of 15 minutes. Simultaneously I am able to provide direct instructions to smaller groups of students.

1. (The coordinate grid floor challenge) Using the entire floor as a coordinate plane and play a competitive game with all of the groups. The floor will become a grid of our neighbourhood (Our School will be the origin) that the students will be challenged to locate their homes.
2. (The bowtie pasta and rice Grain Challenge) Use a designated amount of bowtie pasta and rice grains to model ratios in the school's population (Boys to girls, girls to boys, teachers to students, students to teachers etc.)
3. The pedometer (also stethoscope for pulse) challenge allows students to track their steps over the course of a day. Then they will be challenged to determine how many miles they walked and the length of each step. The data will be checked for reasonableness. The data from each group will be tabled and plotted.
4. The body weight and eating challenge. Use spaghetti pasta to model the percentage of body weight that certain animals eat each day.
5. The thermometer challenge will allow students to get a practical sense of negative and positive integers. This challenge will allow students to track temperatures in diverse temperature locations and press them to find the absolute value between the locations.
6. The distributive property challenge. Use math manipulatives to accurately describe and demonstrate the underpinnings of the distributive property.
7. The manipulative challenge. Use manipulatives to creatively model the fundamental concept of expressions and equations. Students will be challenged to uncover the guiding principles of expressions and equations.
8. The One and two step equation challenge. Use actual numbers and letters that students can manipulate to create and solve one, two and multi-step equations. This will allow students to

physically move and manipulate the pieces of the equations.