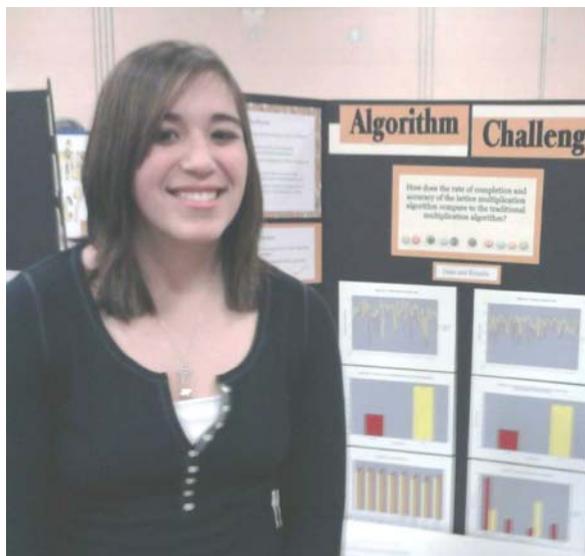




2010 MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

A Program from The Foresight Project Inc; www.theforesightproject.org



Region III: Southwestern
Massachusetts

Melanie A. Santos: Taunton High
School, Taunton

*Climate Science Award "Lattice
Multiplication Algorithm Vs.
Traditional Multiplication
Algorithm"*

About me:

I am a sophomore at Taunton High. I live with my parents, my 12 year old sister, and my cat, Winston.

I am an avid musician. I have been playing piano since I was 6. I play trumpet in the school band, and I taught myself to play guitar. I am also a multi-sport athlete. I play on the THS volleyball and softball teams (pitcher and 1B). I also play travel softball.

I enjoy reading, Sudoku, swimming, DDR (Dance Dance Revolution), and traveling. My favorite place to visit is the southwest. I plan on going to college for a dual-major in music and math. I want to teach high school math.

My Project:

I became interested in this topic after helping my mom grade some class papers. She is a fourth grade inclusion teacher and she was telling me about how her students were excited to do lattice multiplication. I also remembered having past conversations with my classmates about which method they preferred and how their preferences varied. Math is so important in everyday life and multiplication proficiency is essential. I wondered if I could prove that one method was better than the other.

Algorithm Challenge

The question that I wanted to answer was: "How does the rate of completion and accuracy of the lattice multiplication algorithm compare to the traditional multiplication algorithm?"

Algorithms are the set of steps through which a mathematical computation can be solved. There are several multiplication algorithms, but two common ones are the traditional and lattice algorithms.



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While lattice uses a straightforward three step process, the traditional multi-step algorithm remains the workhorse of multiplication problem solving, especially in mathematics education. This experiment was designed to determine if lattice is a preferred method to use among sixth grade students.

It was hypothesized that problems solved using the lattice method would have improved accuracy and a higher rate of completion in comparison to the traditional algorithm. A sample of sixth grade students at two different Taunton Middle schools completed an experimental computation test and survey. Each student completed a series of multiplication problems using the control (traditional) algorithm and the experimental (lattice) algorithm. Students were given 10 minutes to complete as many problems, in a sequential order, as they could. The test results were analyzed using an Excel spreadsheet.

In the 70 student sample, students solving problems with the lattice method improved accuracy 6.39% to 13.81%, depending on the subgroup. The rate of problem completion when using lattice improved an average of 2-3 more problems within the 10 minute time limit. This experiment suggests that the lattice method is a preferred algorithm, specifically with younger students and students who have not mastered multiplication facts.

[Editors note: A good explanation of the lattice multiplication algorithm can be found at <http://mathforum.org/library/drmath/view/52468.html>. New mathematical approaches, including matrix and non-linear analysis will be critical in putting a “face” on the models for understanding the dynamics of interactive (“entangled”) systems.]