

Topic/Objective	Name: Valerie Watts
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Conrad Wolfram: Teaching Kids Real Math with Computers
<https://www.youtube.com/watch?v=60OVlfAUPJg&t=1037s>

Essential Question/Theme: Why should computers be used to teach math?

Questions/Key Ideas	Notes
<p>Stakeholders recognize that there is a problem with math education.</p> <ul style="list-style-type: none"> • Are differing points of view preventing real reform? <p>Math is critically important to numerous aspects of modern living.</p> <ul style="list-style-type: none"> • How do we teach math in a way that connects math to the real-world? • How do we break away from the focus on manual calculations? <p>Math education is trapped by how math was done in the past.</p> <ul style="list-style-type: none"> • How can we break this cycle? 	<ul style="list-style-type: none"> • Problem with math in schools: <ul style="list-style-type: none"> ○ Learners: disconnected/uninterested/find math hard. ○ Teachers: frustrated. ○ School boards: teachers don't know enough. ○ Government: don't know how to fix it but know math is important to the economy. • Why teach math? <ul style="list-style-type: none"> ○ Technical jobs. ○ Everyday living-need to be quantitative. ○ Logical thinking. • What is math? <ul style="list-style-type: none"> ○ Pose the right question. ○ Real world-math formulation. ○ Computation. <ul style="list-style-type: none"> ■ Stop teaching calculating, start teaching math. ■ 80% of time spent teaching computation by hand. ■ Computers do this better-use computers for computation and spend more time conceptualizing problems (the other steps). ○ Math formulation-real world; verification. • Myths about math. <ul style="list-style-type: none"> ○ Math=Calculation <ul style="list-style-type: none"> ■ Math is much more than calculations. ■ Calculating is a limiting step-liberate math from calculating. ■ Calculating is the machinery of math <ul style="list-style-type: none"> • Automation allows us to avoid this chore. ■ Only teach hand calculations when necessary or practical (i.e. mental arithmetic). ○ Computers dumb down math. <ul style="list-style-type: none"> ■ Belief that computers are just mindless button pushing; by hand calculations are more intellectual. ■ Computers can make math more conceptual. ○ Hand calculating teaches understanding. <ul style="list-style-type: none"> ■ Understanding procedures and processes is important; can be taught with programming. ■ Programming engages students; a good way to see if

<p>Computers can transform how math is taught in schools.</p> <ul style="list-style-type: none"> ● More practical problems. ● More conceptual problems. ● Real-world problems. <p>Reform math curriculum to computer based math.</p> <ul style="list-style-type: none"> ● Transform economy. ● Engage students. ● Real-world. 	<p>students understand math is to have them write a program to do it.</p> <ul style="list-style-type: none"> ● Why use computers to teach math? <ul style="list-style-type: none"> ○ Separate the basics of what you are trying to do from machinery of how it gets done. <ul style="list-style-type: none"> ■ Automation allows you to make this separation. ■ Use the best tool available to teach the basics. ○ Computers allow students to complete more complex/harder to calculate problems. <ul style="list-style-type: none"> ■ Problems in the real world are more complex; not the simple dumbed down problems seen in school math. ■ Engineering/science are enhanced by using computers; not conceptually reduced. ■ Real questions from everyday life. ○ Make math more practical and more conceptual. <ul style="list-style-type: none"> ■ Open up to more problems/possibilities. ■ Students get more intuition and more experience with harder problems. ○ Reorder the curriculum. <ul style="list-style-type: none"> ■ Order has been based on difficulty of calculations; computers allow reordering based on difficulty of concepts. <ul style="list-style-type: none"> ● Calculus taught late because of hard calculations but concepts are easy for younger students to understand. ● Critical reform-computer based math. <ul style="list-style-type: none"> ○ Move the economy and society forward. <ul style="list-style-type: none"> ■ Country that does this first will leapfrog others in achieving an improved economy/new outlook. ■ Move from a knowledge economy to computational knowledge economy (high level math integral to what everyone does). ○ Engage more students. ○ Bridge chasm between school math and real-world math. ○ Rebuild math curriculum to incorporate computers at every level.
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<p>Summary</p> <p>Math is critically important to numerous aspects of modern society, but math education is not preparing students for the way math is used in the real-world. Current math education is based around teaching students to do manual calculations on simple, impractical problems, which limits the type, nature, and level of difficulty of the problems. Computers can transform how math is taught, allowing for students to work on more practical, more conceptual, and more challenging problems.</p>
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