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Mr. Bell, You Are Destroying Our Children!

David Rock  
*Columbus State University*

Is technology the wave of the future? Society says "YES" when it is convenient and educators respond with a multitude of answers. The use of technology in today's classroom has become a controversial curricular topic for those inside and outside the classroom. Why?

I am sure that many of the same arguments used today against the use of technology in P-12 education are similar to those used during the past 100 years. Imagine the thousands of educators a hundred years ago that said, "The use of this new invention will destroy the writing ability of our children. There will be no need to write letters. Our children will become lazy because they will prefer using this telephone device rather than being polite and properly visiting their neighbors." I am sure that Mr. Bell was extremely concerned that he was destroying the future of America with his invention of the telephone.

This logic must also dictate that the world's writing skills have been diminished by the invention of the printing press. What kind of person would even think of using such a tool? We should hand write our books and periodicals. Unfortunately, the printing press and typewriter led to the computerized word processor which unfortunately contains a spell-checker, thesaurus, and grammar-checker. What a disaster! I have listened to many complaints about word processors from many English teachers. These educators object to the use of a computer spell checker and thesaurus. "The students become lazy and reliant on a computer. They don't have to worry about spelling a word correctly because the computer will do it for them." Being a mathematics teacher, I must ask this question of language arts educators: If using these technological devices is such a crutch, then what is using a printed dictionary or thesaurus? Each stores a plethora of information and is used for the same purpose. The major difference is that the computer devices are less cumbersome and much quicker. Computer grammar-checkers require the user to make grammatical choices for corrections. The user is still required to comprehend the computer's suggestions. The computer is simply easier and faster to use. Some teachers feel that students should be required to use a computer to type a paper, but not be allowed to use the other associated applications.

What about technology in the mathematics curriculum? Why do mathematics educators feel that the use of the calculator in the mathematics curriculum would create a necessity for students to have this tool for all mathematical needs? Many teachers are afraid of the "crutch" syndrome. They are terrified that our students will never learn to think mathematically due to the use of the calculator as a crutch! I am a little confused by this argument. If you pick up almost any mathematics text, you will find thousands of paper and pencil crutches! Every algorithm and formula is a crutch. The formula for finding the area of a rectangle:

\[ A = L \times W \]

where \( A \) is the area, \( L \) is the length and \( W \) the width, is a crutch. How many people actually know what the area of a rectangle truly represents? What about F.O.I.L. (First.Outer.Inner.Last), the classic algebra...
acronym, which is used to multiply the terms of two binomials:

1st binomial 2nd binomial = First terms + Inner terms + Outer terms + Last terms

\[(B + 2)(3B + 7) = (B \times 3B) + (2 \times 3B) + (B \times 7) + (2 \times 7)\]

where B and 3B are the first terms of each binomial, 2 and 3B are the inner terms, B and 7 are the outer terms, and 2 and 7 are the last terms of each binomial. Are we saying that \(A = L \times W\) and F.O.I.L are acceptable crutches because they are memorized, paper and pencil crutches? Are these strategies better than using a calculator because "that is the way I learned it 30 years ago." The "If it was good for me then, it is good for you now" syndrome is prevalent in many educational settings. One of the greatest mathematicians, Archimedes, constructed and completed a multitude of mathematical problems in the sand. Let's just go back to writing in the sand as the Pythagoreans did. It was great for them!

The reality is the use of the calculator in the mathematics curriculum is a must. Not only should the students have the calculator available for use, but calculator instruction is imperative, as well. Students should be required to master addition, subtraction, multiplication, and division of real numbers. Then the student should be instructed on how to use the calculator as a mathematics tool. When properly used, the calculator is faster and more accurate than most humans. Why do we subject our children to mathematics without this tool? Is it because some educators are afraid that our students will lose their power to think? A meta-analysis study of the impacts of calculators by Hembree and Dessart (1986) reveal that heavy use of calculators in early grades does not diminish computational ability and often enhances problem-solving skills and concept development.

In the first version of the National Council of Teachers of Mathematics (NCTM) standards in 1989, NCTM strongly emphasized the development of critical thinking and problem solving skills (NCTM Curriculum and Evaluation Standards for School Mathematics. (1989) p. 6). The use of the calculator will not hamper the power to think, but decrease the time wasted to complete the needed computational tasks. Problem solving skills can be enhanced by technology rather than slowed by computational distractions that are not the meat of the problem being solved. Why is a calculator used as a tool in most science classrooms? In the science classroom, the goal is to assist the student in solving scientific problems when given the proper tools. Inquiry based instruction is not hampered by technology. Educators do not seem to have complaints about technology used in science! In the mathematics classroom, we have the tools, but some feel that it will be detrimental to the students if they use these tools. In 1989, NCTM stated that calculators should be available to students in all grade levels where applicable in the curriculum (NCTM Curriculum and Evaluation Standards for School Mathematics. (1989) p. 19, 68, and 124). There seems to be a contradiction here. The use of calculators in the mathematics curriculum has been emphasized as a classroom tool for the past 18 years yet it is still a heated topic in many schools at a multitude of levels. This debate encompasses not only the use of calculators but how and when to use this technology in the classroom. Should we slow down the learning of our students or foster their development with the best tools available? Maybe educators should rethink the direction of mathematics education. The calculator debate has spanned the eighties, nineties and into the 21st century. We have now entered the technological age of the PC,
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Internet, cell phones, iPods, video communication, etc. The calculator is simply and mini-mini-mini computer. Students now have access to computers, software, and the Internet to use symbolic-manipulators and two and three dimensional graphers. The potential to change mathematics education is staggering. The methods and strategies of mathematics instruction do not keep pace with the movement or quickly follow the direction of the development of new technology. Technology as a teaching and learning tool is here and our students must be properly trained on the appropriate and needed uses of technology for the real world! The calculator and computer are the slate and pencil of the nineties. Do we need to debate the usage of the computer in the classroom as well? The technology is here.

Many schools have the hardware and even the software to effectively teach mathematics in the classroom. The dilemma surrounds the retraining of our teachers. Teachers are human and therefore afraid of change. Teachers are forced to develop an expertise in a foreign area. With the use of a computer students can accurately construct a rectangular prism and measure its volume. The learner can manipulate the dimensions of the prism and dynamically observe how the transformations affect the prism’s volume. The learner is allowed to discover the mathematical relationships through their own experiences. We have the power to demonstrate in minutes what used to take days. When our students leave high school, these tasks will take mere seconds with newer technology that they will be expected to use. Is the mathematics curriculum slowing down the mathematic education of our students? Are we giving the learner the best possible opportunity to comprehend the optimum amount of mathematics?

I contend that it is our job as educators to look to the future. Our students have the availability to use micro-personal-computers that fit in the palm of their hand. These mini computers can even connect to the Internet via wireless technology. Are schools ready for this new advancement? Much of this technology is common in the business world of today. Are we ready to embrace and use new technology for instruction and learning in our classrooms.

I leave you with one final thought: In the average household, are there more calculators (no matter how small) or telephones? I think there are more telephones. Should we wait around until we have more computers in the home than telephones? For some of us, this has already happened. If you have used Skype (skype.com), you understand what I am suggesting. With an Internet computer and a webcam, you can use this free application to call anyone in the world for free. With the webcam, your call is both audio and video. The future is here.

References


Dr. David Rock is currently Dean of the College of Education at Columbus State University. He received his B.S. in
Mathematics from Vanderbilt University, M.A. in Mathematics Education from the University of Central Florida, and Ed. D. in Curriculum and Instruction from the University of Central Florida. David has taught mathematics in Florida and Mississippi at the middle and high school level. He was a professor at The University of Mississippi and the University of Massachusetts Dartmouth. He has conducted a multitude of educational workshops and seminars at local, state, and national conferences in which his goal is to increase interest and enthusiasm of the teaching and learning of mathematics. He is the developer of White House Math Challenge [www.whitehouse.gov/kids/math] and the CSU Internet Math Contests [www.colstate.edu/mathcontest], which encourages students to utilize the Internet to solve challenging mathematics problems from across the globe. David has also co-authored 15 books including Teaching Secondary Mathematics (2006), Scratch Your Brain Where It Itches (2001, 2006, 2008), and Teaching K-6 Mathematics (2003).