

Classroom Technology: Stepping-stone, or stumbling block?

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When students rely too heavily on technology for homework and assignments, could this actually create more problems than solutions?

At first, I wasn't sure why it bothered me so much. It was a small thing, perhaps just a result of distraction, or momentary lapse. I could possibly have been reading way too much into otherwise insignificant things. While all that may be true, it still bothered me. Why? I saw it happen far too often in the classroom.

I remember shopping for a few things at Canadian Tire, and while at the checkout counter my total came to \$9.02. Where I'm concerned, the fewer the coins in my wallet the better, so I paid with a \$10-bill and two pennies. By accident, however, hidden underneath one of the pennies was a dime. Before I could point out the error, the money was in the hands of the cashier. I watched her quickly enter into the cash register the amount received: \$10.12. Then, to my curiosity, I observed her place the \$10-bill, two pennies, and the dime in the register, and retrieve a *totally different* dime to return to me with a loonie as my change. I kept asking myself, *why give me a different dime?*

I read a lot into occurrences like this, because for me, it means the realization of a growing fear of mine that students are relying more and more on technology to do the thinking for them. The idea of *mental math* not only seems no longer appealing, but an activity to be feared. If this continues, it will result in more and more students who are disinterested in mental math, afraid to work with integers without the use of a calculator, and unwilling to attempt approximating fractions into percentages. For them, these tasks and more are now reserved for the calculator alone.

This problem is amplified in subjects like *Computer Science*. At a workshop some years back, a university professor shared his concerns, finding that too many students were attempting to create programs without a full understanding of how their own solutions operated. This problem was attributed to a lack of problem-solving skills, and I agree with this analysis from my own experiences. I have encountered a number of students who try to employ "hit-and-miss" approaches to programming. Using this type of philosophy is like solely relying on the grammar and spell check of Microsoft Word to produce a well-written essay.

Don't get me wrong! The use of technology is not *evil*, nor should it be banned from the classroom. The whole point of involving technology is to develop tools to help solve problems as quickly and efficiently as possible. At the same time, we must keep this same fact in perspective, realizing that technology is *only a tool*. As such, our curriculum should never place so much emphasis on technology, so that students might believe that once they've mastered the technology, they've mastered the subject. *A hammer does not a carpenter make.*

Students need to realize that technology is there to help them solve the problem, but the onus is still on them to discover how to apply it to the problem. For this to happen, they must understand how to solve the problem *without* technology. In my math classes for example, I may

use graphing software to introduce several different types of functions, to create a visual association with equations. This is only an introduction. However, their next step after starting with the technology, is to verify the results by hand. After this is mastered, students would be given similar graphs to sketch *without* the use of technology, *solely by hand*. Once this is reinforced and mastered, students can then continue using technology only on questions that *merit* its use, such as applications of real-world examples, or computations involving statistics with long numbers. This way an understanding of the core concepts is preserved, and the technology remains a *tool* to help this process.

I've adopted this method in both mathematics and computer science, and I am pleased with the results, and feel that this method of integrating technology may be beneficial to a wide range of other disciplines as well. In the social sciences when comparing statistics, introducing mini-activities involving Microsoft Excel and creating charts might help provide meaningful visual associations for the students to learn from. Inspiration Software enables students to directly convert a mind map into an ordered skeleton outline for their essays.

As educators, we must discourage students from deferring to technology, and instead help them to see technology as simply tools to help the development of the most powerful system ever created: *the human mind*.