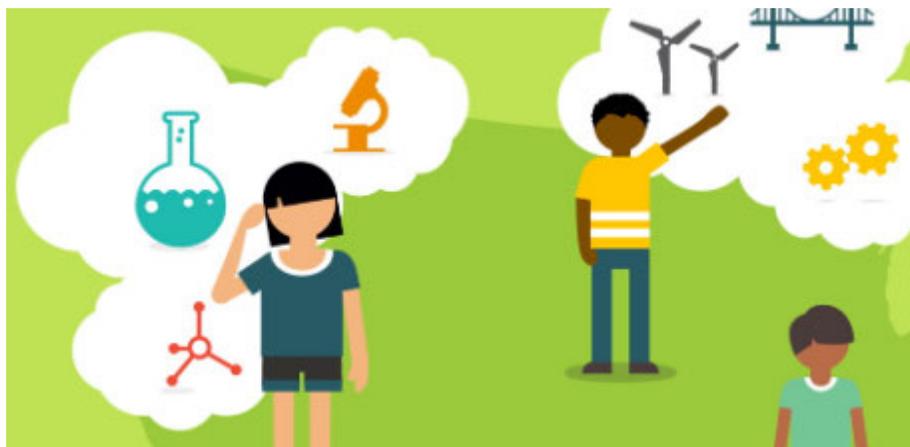


5 Ways to Disrupt STEM



Really building proficiency to fill the STEM pipeline with qualified people.

GUEST COLUMN I by Vernon Johnson



The demand for professionals in science, technology, engineering and mathematics (STEM) continues to outpace the supply of trained workers and professionals. A [report](#) by the President's Council of Advisors on Science and Technology (PCAST) estimates there will be 1 million fewer STEM graduates over the next decade than U.S. industries will need.

To complicate matters, many teachers feel hesitant about teaching science, especially at the elementary level where most do not have specialized education or training in science. Even at the secondary level, roughly [30 percent](#) of chemistry and physics teachers in public high schools did not major in these fields and have not earned a certificate to teach those subjects, according to the National Center for Education Statistics.

A report by the President's Council of Advisors on Science and Technology (PCAST) estimates there will be 1 million fewer STEM graduates over the next decade than U.S. industries will need.

The [U.S. Department of Education](#) has set a priority to increase the number of students and teachers who are proficient in STEM. But are our schools and teachers ready? How can we help them "fill the pipeline," to inspire and equip more students with the knowledge and skills to become college and career ready in STEM?

Technology can help bridge the gap. The approach, however, can't be business-as-usual. It must be disruptive to improve and get beyond the old way of doing things.

Here are five ways we can disrupt the status quo — and change how teachers teach and students learn STEM today.

1. Involve teachers in STEM product development on an ongoing basis.

While many STEM curriculum programs claim to be created “by teachers, for teachers,” few continue to involve working classroom teachers in their ongoing development. Yet, who better to suggest how to improve and enhance a program than the teachers who use it every day?

At [my company](#), teacher input is as vital to us today as it was when expert teachers worked alongside Rice University professors and our company to build [STEMscopes™](#) almost ten years ago. For example, within STEMscopes, we offer a teacher feedback tool so teachers can continually suggest updates that will make their lives easier while enhancing students’ learning. Last year, we made more than 6,000 changes to our digital preK-12 STEM curriculum based on teacher feedback alone. In addition, each summer, we host a five- to six-week “writing camp,” where we invite a few hundred teachers from across the country to develop new content for STEMscopes.

This close collaboration with teachers is what allows us to build and continually improve a digital STEM curriculum tool that meets their daily instructional and assessment needs.

1. Provide ongoing support for teachers.

When adopting any new edtech program, implementation support is paramount for using the program to its best advantage. That’s why every STEMscopes product includes embedded support for teachers, such as professional development videos, how-to guides, and best practices, to help them continuously improve how they teach science *and* use the program. By modeling hands-on, inquiry-based strategies, teachers can develop an understanding of the program’s structure, resources, and assessments, as well as how to provide interactive, engaging, technology-focused lessons.

In addition to online resources, we also have a [professional development](#) site with a menu of courses and trainings, hands-on investigations, ready-made lessons, instructional practice tips, and videos featuring STEM professionals talking about the skills students need to pursue STEM careers.

1. Take the guesswork out of teaching the Next Generation Science Standards (NGSS).

For teachers who haven’t taught science before, the NGSS can seem intimidating. Even for teachers who have experience teaching science, the NGSS require significant changes in the classroom. This is why it’s critical to provide a curriculum that it built from the ground up to the NGSS, so teachers can implement lessons without having to worry about if they meet the new standards or not.

1. Start early.

The [Federal STEM Education 5-Year Strategic Plan](#) referenced a [report](#), published by Robert H. Tai *et al.* in *Science* magazine in 2006, which indicated that “students who report early expectations for a career in science are much more likely to complete a college degree in a STEM field than students without those expectations. This

suggests that early exposure to science topics, at middle grades or below, may be important for a student’s future career aspirations.”

Indeed, we believe that STEM should start early, with age-appropriate expectations that embrace learning by doing. [STEMscopes™ Early Explorer](#), designed for students ages three through five, was built from the ground up to Head Start, and state and national preK and kindergarten guidelines. It is also scaffolded to prepare students for NGSS kindergarten standards. This standards-based approach allows students to get a jump-start on learning key concepts — and experiencing how much fun STEM can be. Further, by making STEM accessible and easy for preschool teachers to implement, time spent on STEM instruction increases significantly. In a 2015 [study](#), preschool teachers reported spending an average of 36 minutes per day on STEM instruction, compared to the national average of 1-3 minutes spent on math and science in preschool classrooms.

1. **Make it affordable.**

A typical science textbook can cost \$75 or more. While e-textbooks on tablets can cost 50 to 60 percent less, they’re still not cheap. Choosing a STEM curriculum, however, should be about the quality of the curriculum for students and teachers, rather than the cost. It is possible to offer high-quality content, which can be used in the classroom as a core or supplemental curriculum, at an affordable price. For example, STEMscopes is priced at \$5.45 to \$5.95 per student per year, which is less than the cost of two Happy Meals. This means school and district leaders can make purchasing decisions based on the content, rather than the price and if they can afford it or not.

Even if students choose to pursue other college majors or careers, STEM competencies are increasingly required for workers within and outside STEM occupations. Across the college and career spectrum, it’s increasingly important to equip students with the knowledge and skills to solve problems individually and collaboratively, to gather and evaluate evidence, and to make sense of information. Students can learn these skills — and more — studying STEM.

To ensure students are college and career ready, we must enhance their engagement in STEM and inspire them to excel. Doing that requires disruptive innovations and technologies in our classrooms. If what schools were doing before was working, then the STEM pipeline would be full of qualified workers. It isn’t and it hasn’t been for years. It’s time to try something different, and to give teachers and students the tools they need to truly change teaching and learning.

—

A former educator, building level administrator and superintendent, Vernon Johnson is the president and CEO of Accelerate Learning.

Share this: