

Research Roundtable

Private investment in STEM education



The US and Canada, like many countries around the world, are investing heavily in STEM education to ensure their economies remain competitive in the years to come. In this roundtable discussion, *International Innovation* asks education experts and featured researchers how the private sector might contribute to STEM education initiatives

Q. What role, if any, should business play in STEM education? Are external partnerships needed to support state-wide initiatives?



James Brown
(STEM Education Coalition):

Business and industry partners can play a hugely beneficial role in education reforms, but it is important to put their contribution in the right context. Employers with large technology workforces can often bring incredibly valuable resources to the table, benefiting schools, teachers, parents and students. Nevertheless, it is also important to understand the limits of business engagement. Even though investments

made by business are often very large in absolute financial terms, the sheer scale of public investments in education are almost always much larger. Total US investment in K-12 education is roughly US \$600 billion annually, so to have a lasting impact strategies must be built around a substantial business investment in STEM education coupled with meaningful changes in overall policy. Often, the best role for business partners is to act as a catalyst for new and innovative reform efforts with the goal of fostering their adoption at much larger scales through policy changes.

Dr Brad Hoge
(University of Houston-Downtown):

Having worked with numerous business partners through Houston Urban Network for Science, Technology, Engineering, and Mathematics (HUNSTEM), Texas Business and Education Coalition (TBEC), Science & Engineering Fair of Houston (SEFH), and Greater Houston Partnership (GHP), I can safely say that business support for STEM education is crucial to recruit more students into STEM fields and increase STEM literacy in general. Business partnerships can brand STEM as an exciting opportunity for students, by promoting career awareness and demonstrating job satisfaction among STEM professionals. This branding role is particularly important at the national and state levels, but hands-on intervention at a local level is probably the most valuable contribution to STEM education that business can make.



Judging school science fairs, visiting classrooms, participating in the development of informal science projects, and sponsoring STEM events are some of the ways this can be achieved.

I would like to call on business and industry leaders to contribute more. Much intervention is targeted at high school and college, which is important, but not enough focus is given to elementary and even pre-school students and teachers. At these levels teachers are often tentative about teaching STEM subjects, which can discourage students from developing an interest in these subjects. Interventions at this point can support teachers and keep students excited about STEM. More on this subject can be found at HUNBlog: <http://hunblog.typepad.com/hunblog/2013/07/a-business-solution-for-education.html>.



Dr Marilyn Barger
(Center of Excellence, Hillsborough Community College – Brandon Campus):

The role of the private sector in STEM education is to support academic efforts, as business needs logical and technically competent employees in positions of responsibility. However, if the concept of a STEM professional comes into focus then the expectation of specific businesses to support that STEM pathway increases dramatically.

What is a STEM professional? That person is not a chemist, a mathematician, an engineer, a doctor or anyone else who has had STEM courses as a component of their career preparation. Nor is it a teacher of or professor in a STEM topic. The STEM professional might be any of the above if that person addresses, on a regular basis, issues and tasks that require an integrated knowledge base that is drawn from all of the STEM disciplines. Technicians responsible for the operation of complex manufacturing systems are an excellent example of STEM professionals. Businesses that require that expertise need to be totally immersed in STEM college programmes with their time, talent and resources. This will ensure the development of talent that can apply systems-level thinking and integrated strategies to problem solving and design.

**Wendy Kopp
(Teach For All):**

I've seen first hand the important role the business community can play. We need corporate leaders making the case that we simply must prioritise education – our economic prosperity depends upon it. We've seen that corporate leaders can help governmental officials understand the kind of change that's needed. Moreover, alongside education and governmental leaders they've been key to providing the support that social enterprises like ours need to help our public systems improve.



**Chantal Pouliot, PhD
(Laval University):**

It is very important to ask questions about STEM education. Many people, organisations and government representatives support business involvement in STEM education. Others are highly critical of this movement – I'm one of those people. 'Traditional' teaching of STEM can be understood as education shaped by national and international economic preoccupations, in which students and teachers are seen

as human capital and workforce. For many researchers in the fields of science studies, feminist studies and science education, neoliberal educational practices contribute to racial, class, gender and social inequities and have little concern for promoting equitable social relations and environmental wellbeing.

Nevertheless, I am conscious that my answer may be understood as an overly critical view of business partnerships in STEM education. More details about this position and about alternative ways of teaching STEM can be found in the very well written work of Clayton Pierce, *Education in the Age of Biocapitalism, Optimising Educational Life for a Flat World*, Palgrave Macmillan, 2013) and in the forthcoming book *Activist Science & Technology Education* (Eds. Bencze & Alsop, Springer, 2014).

**Professor Linda Vanasupa
(California Polytechnic State University):**

Partnerships are required for any benevolent systemic change; whether the results are benevolent, however, depends on the paradigms that underlie them. The origin of current business-university symbiosis is an objectivist worldview where maximisation and consolidation of profit for its stakeholders is the primary purpose. This results in a factory model of education in which graduates are viewed as products to be consumed by industry. Students often begin engineering majors with aspirations to serve society in diverse ways, but graduate resigned to their debt-based reality of indentured servitude to this profit-driven system.

As gravely predicted by Eisenhower, the nation's scholars are also captive to the needs of the military-industrial complex, secured through federally funded research. Not only do these dynamics amplify human suffering and environmental degradation on a planetary scale, they serve to disable our ability to systemically address them. We believe, then, that the role of business is: to serve global peace and prosperity by creating social value that honours all stakeholders; to challenge conservative STEM pedagogies that prioritise technical training at the expense of one's humanity; and to call for and support education models that free people to be their whole selves.



**Dr Kimberley R Cousins
(California State University, San Bernardino):**

Perhaps the greatest impact external partnerships can have is at the local and regional level. Local businesses have a responsibility to participate in STEM education in their regions; likewise they benefit both directly and indirectly from taking an active role. Partnerships between STEM employers and college and universities provide benefits to students, by offering networking internship opportunities and helping them to prepare for employment. Feedback from employers and employed alumni can serve as valuable input for STEM educators for assessment and improvement of programmes. Businesses benefit from these STEM partnerships by securing a needed stream of properly prepared new employees.



**Professor Marilyn P Carlson
(Arizona State University):**

There are many examples of businesses initiating extracurricular events or competitions that spark students' curiosity, creativity and interest in STEM fields. However, it is not the responsibility of businesses to assure that all students receive quality STEM instruction. The district and school administrators set in motion actions to assure that their teachers are prepared to implement new

national and state initiatives. They determine teacher professional development, the processes for selecting textbooks, and typically choose the department chair. These are the three variables that ultimately determine the quality of instruction and amount of student learning.

Pathways research has revealed how strong school leaders, quality professional development and quality curriculum can play an important role in transforming instruction and student learning. If curriculum and instruction does not demand that students engage in inquiry and meaning making that leads to deep understanding of mathematical and scientific ideas, and the ability to apply these ideas to solve novel problems, these abilities do not emerge in students.

The work to improve STEM education in our nation's schools is so daunting that all qualified partners can contribute. I am aware of instances of large businesses contributing funds to improve local schools, but how administrators decide to use those funds is what ultimately determines whether they impact the quality of teaching and amount of student learning.

**Dr Jason Steffen
(Northwestern University):**

The future of most business ventures will be increasingly dependent upon technology and problem solving skills. So, I believe it is in their best interest to actively promote STEM education. One part that they can play is to improve the way they communicate the skills that they are looking for as well as the need for studying STEM fields. Businesses can also provide internships and networking opportunities for high school, college and graduate school students where they can put some of their skills into practice.

