## A Vision for Redesigned High Schools

## Investing in STEM Education:

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**Why is STEM important?**

Educating more students in the disciplines of Science, Technology, Engineering, and Mathematics is increasingly seen as an effective way for America to remain competitive in the 21st century innovation-based economy. Currently, America is facing a critical talent gap in the fields of science, technology, engineering, and mathematics, the global "language" of invention and innovation. STEM graduates possess not only the valuable skills of problem solving, logical thinking, and innovating, but the ability to enter college-level courses without first needing remediation. Graduates' ability to solve complex problems, strengthened by a strong academic STEM curriculum, translates across disciplines, including those outside of the scientific and technological fields. Benefits also accrue from the fact that STEM education does not target only the brightest students and those in wealthy schools. STEM schools are most often public schools, recruiting students from varied socio-economic backgrounds and with admission based largely on the child's desire to achieve. A STEM agenda, thoughtfully pursued, thus holds the promise of preparing students to thrive in school, and emerge college and career ready.

**What are Ohio's STEM innovations?**

Under the direction of Governor Ted Strickland the state of Ohio has strengthened its P-16 approach to STEM education, following an initial thrust in this direction from the business community. In 2005, the Ohio Business Roundtable and its non-profit affiliate, the Ohio Business Alliance for Higher Education and the Economy, adopted the goal of doubling the number of baccalaureate degrees awarded in STEM by 2015, with a particular emphasis on increasing the minority and low income graduate numbers. Gov. Strickland then gathered key policy, business, education, and philanthropic partners to structure Ohio's STEM advancement. An early success of their work was winning a two-year, $500,000 grant from the National Governor's Association to construct a regional STEM Center. This regional STEM Center in Dayton, Ohio, focuses on teacher professional development, curriculum design, and overall STEM support for the Dayton region. The center collaborates with the existing Miami Valley Career Technology Center by targeting two flourishing economic clusters of power/propulsion and advanced manufacturing technologies. Future regional STEM centers in Ohio will be modeled on the Dayton regional center.

Bi-partisan legislative leadership has played a critical role in supporting the STEM agenda. Ohio's commitment to statewide STEM education resulted in more than $200 million being allocated in the FY 2008-2009 Biennial Budget. Included in this STEM legislation, Am. Sub. H.B. 119, is:

- $6 million to develop five new regional STEM-based schools for students in grades 6 through 12.
- $7 million for strengthening existing STEM Programs of Excellence serving students in grades K through 8.
- $42 million for building student and teacher capacity in STEM through supplemental programs, professional development, and state education aid.
- $50 million to increase the number of STEM researchers and scientists at the post-secondary level.
- $100 million for postsecondary scholarships to attract undergraduates into the STEM majors.

H.B. 119 charges the Ohio Partnership for Continued Learning STEM Subcommittee with selecting the new STEM schools and Programs of Excellence. The Ohio Partnership for Continued Learning is a collaboration between the Governor's office, the Department of Education, and the Board of Regents to coordinate and advance Ohio's P-16 agenda.

The biennial budget also directs the STEM Subcommittee to select an Ohio-based nonprofit intermediary "to support the strategic and operational coordination of public and private STEM education initiatives." Battelle, the world's largest non-profit independent research and development organization, was chosen to manage the Ohio STEM Learning Network (OSLN). The privately supported, non-profit initiative, OSLN, was launched on January 20, 2008, with the core objective of magnifying the impact the platform STEM school is having in each region. The five regional STEM schools chosen are located in Cleveland, Akron, Columbus, Dayton, and Cincinnati. A celebrated pre-existing STEM high school in Columbus, Metro High School, opened in 2006 with funding from Battelle. Metro High will serve as a partner and advisor in opening the Columbus school, emphasizing Ohio's core vision for STEM education as "small schools with big footprints."

**Challenges Encountered?**

One difficulty Ohio faces is providing equal funding for all five regions. Neither the Northwest nor the Southeast STEM regions were awarded high schools within the H.B. 119 funding, making implementation of the regional hub model difficult. Also, where existing high schools have been granted state STEM funding, as is the case in Cincinnati's Hughes Center, shifting curriculum away from current effective models has met with some resistance from school board members. Some question why Hughes' previously successful communications program must be abandoned as the high school reorganizes toward a STEM-centered curriculum. There are also concerns of exclusivity among the new STEM high schools if entrance requirements are mandated. Finally, there is always the need to attract more quality STEM teachers to Ohio. Under Ohio's STEM legislation, incentives, such as alternative teacher licensure programs, STEM teacher signing bonuses, and loan-forgiveness, are receiving state funding.

**The Way Forward**

Ohio has embarked on an ambitious STEM agenda. With only one of the five STEM high schools funded by H.B. 119 currently operating, efforts are concentrated to open the remaining schools for Fall 2009. In total over 120 local partners from K-12 education, higher education, and business organizations have joined with these regional schools. In the coming years, it will be essential for bipartisan leadership and public-private partnerships to continue collaborating to ensure successful operation of the STEM initiatives.