

**Empire State STEM Learning Network
Finger Lakes STEM Hub**

Testimony to the New NY Education Reform Commission
October 22, 2012

Good day. I am Kate Bennett, president of the Rochester Museum and Science Center since 1996. Thank you for this opportunity to speak with you about recommendations for education reform that can support economic development, produce career-ready graduates and meet the 21st Century needs of our learners.

The Museum is in the midst of its centennial celebration and has a deep history of educational partnerships with school systems throughout the region, Monroe #1 BOCES, the Genesee Community Charter School, The Rochester Business Hall of Fame, NASA, NSF, and the Water Education Collaborative. Many of our programs are geared to connect to the families where attitudes are fostered. I have seen firsthand the importance of collaboration to benefit youth. We are eager to do more.

The Finger Lakes STEM Hub

The Rochester Museum & Science Center (www.rmssc.org/) is proud to serve as the steward of the Finger Lakes STEM Hub, a regional hub of the Empire State STEM Learning Network (<http://www.empirestem-fl.org/>), a statewide community collaborative co-sponsored by SUNY and Battelle, through which we are connected to state STEM networks across the nation. Our mission is to be a catalyst for collaboration among various entities to advance the interdisciplinary teaching and learning of science, technology, engineering and mathematics (STEM) disciplines for sustained economic vitality. I come before you today as a representative of the Finger Lakes STEM Hub.

In order to achieve our mission, we have a 26-member Board of Champions advising us from regional business, education, community organizations and government agencies. The initiatives of the STEM Hub are carried out by a Steering Committee whose work groups are focused on goals leading to professional learning, student impact and community awareness and involvement. Examples of two initiatives underway include a student video creation contest to illustrate what STEM means to the student and a STEM day of sharing for elementary teachers at the state conference for science teachers (STANYS) to be hosted in Rochester this November.

Regional Economic Development Needs

We come to you knowing the unmet economic need of our state for skilled workers to support an evolving workplace that demands higher level skills and STEM abilities. The NYS Department of Labor website indicates that STEM workers earn almost twice the average salary of all workers in the state (http://www.labor.ny.gov/stats/PDFs/87.6stem_cen.pdf). Additionally, the Occupational

Supply and Demand System

(http://www.occsupplydemand.org/OSD_SelectOcc.aspx?chk=2&ST=ZZ) on the same website shows that careers with the greatest employment growth projected through 2018 are primarily in STEM fields. Examples of these high-demand careers are: Biomedical Engineers, Biochemists, Biophysicists, Physicians Assistants, Environmental Engineering Technicians. In the Finger Lakes Region, the top economic development opportunities for job growth include: Advanced Manufacturing, Food and Beverage, Optics/Phototonics/Imaging, Life Sciences, Research and Development and Software.

21st Century Learning Needs

A new learning environment is evolving. We need to overcome the disconnect that students experience between a static, structured, contained system versus students' need for a more cyber-connected, dynamic, interactive condition. Douglas Kellner (<http://pages.gseis.ucla.edu/faculty/kellner/essays/newmedianewliteracies.pdf>) writes about the restructuring of education for the new millennium by calling this era of technology infusion the "Great Transformation".

In addition to requiring a new, more fluid and real-world learning context for students, the learning skills we expect of them must also change. Among the 21st Century survival skills advocated by Tony Wagner in his book, The Global Achievement Gap, are:

- Critical Thinking and Problem Solving
- Collaboration across Networks and Leading by Influence
- Agility and Adaptability
- Initiative and Entrepreneurialism
- Effective Oral and Written Communication
- Accessing and Analyzing Information
- Curiosity and Imagination

While the creation of a 21st Century learning environment and the teaching of 21st Century skills belong in the hands of teachers, communities and parents in support of students, many states have enacted powerful policy reform to expedite this reform movement. The State Leaders Action Guide of the Partnership for 21st Century Skills (<http://www.p21.org/storage/documents/stateleaders071906.pdf>) identifies the necessary initiatives that state policymakers must commit to, including: creating an active coalition on the reform among business, education, non-profits and community organizations; collaborate with educators (including the State Education Department and Board of Regents) and provide them with the tools and professional development to achieve the reform.

The international rankings of U.S. student performance in math, science and reading continue to cause consternation, particularly in the lower performance of U.S. students after Grade 4 in math (<http://nces.ed.gov/fastfacts/display.asp?id=1>). The Teacher Education and development Studies in math provide policy guidance on increasing standards for preservice and inservice programs for teacher

(http://www.iea.nl/fileadmin/user_upload/Publications/Electronic_versions/TEDS-M_International_Report.pdf). TEDS-M also found evidence that countries paying their math teachers commensurate with math and science professionals had higher math achievement results

([http://www.iea.nl/fileadmin/user_upload/Press_Releases/TEDS M 2008/TEDS-M_CostStudy_PressRelease.pdf](http://www.iea.nl/fileadmin/user_upload/Press_Releases/TEDS_M_2008/TEDS-M_CostStudy_PressRelease.pdf)) Our students in NYS deserve the most qualified teachers, especially in primary grades for math where general certifications are no longer sufficient.

STEM learning is an example of the type of learning that occurs in a 21st Century learning environment. STEM integrates learning across content areas, provides problems to solve and projects to complete similar to those in the real world and challenges students to inquire, research and create. It demands the application of new 21st Century literacies and skills. It promotes a high quality education by preparing students for their future workplace and global environment.

Reform Recommendations:

In order to accelerate and enhance the development of STEM as an economic catalyst and a means to providing students with a high-quality education, we recommend the following:

1. Enable Stronger Collaboration

- a. Provide incentives for the coordination of Regional Economic Development Councils with the various STEM Hubs throughout New York State. The economic development-related mission of both entities would be better served if ongoing planning and deployment is mutually coordinated.
- b. Adapt the structure of public education for STEM by removing legislated barriers that constrain the Big 5 public school systems from accessing various BOCES instructional resources and career and technical education services as well as update inflexible, outdated Co-ser (cooperative service agreement) procedures for approval.
- c. Provide incentives for career mentoring programs in order to expose students to real world applications of their STEM learning.
- d. Align the education reform agenda with research by providing resources to researchers to work with teachers on case studies and research reports that can be applied in the teaching field.

2. Provide Flexibility in Accountability

- a. Support the Board of Regents' consideration of alternative pathways for Regents diplomas that replace current Regents exam requirements for Career and Technical Education (CTE) and STEM requirements.
- b. Increase integrated credit in CTE and STEM.

- c. Provide waivers to school districts or an approval process for alternative exams when a school district demonstrates that a rigorous STEM course is provided to its students.
- d. Align state assessments to support STEM and CTE standards.
- e. Increase preservice and inservice teacher education, especially for PreK-Grade 6 and provide adequate compensation and certification systems for STEM teachers.

3. Promote Awareness and Community Involvement

- a. Provide incentives for after-school and out-of-school STEM learning experiences for children and families made available through museums, afterschool programs, distance learning, and others.
- b. Assist the Empire State STEM Learning Network with the resources to create a broad-scale awareness campaign of STEM careers, STEM learning and the link between STEM and economic vitality.
- c. Assist BOCES with the resources to enhance public awareness and the image of career and technical education options for students.

4. Build on Successful Models and Programs

These are some examples of the successful 21st Century collaborative learning models available in the Finger Lakes Region:

Rochester Institute of Technology offers a Science and Technology Entry Program – STEP (<http://www.rit.edu/academicaffairs/k12/step-about.php>) that provides academic enrichment and STEM career exploration to high school seniors through hands-on experiences, mentoring, tutoring and leadership training. In 2011-12, 283 students were enrolled in STEP. Of the 60 seniors served in 2012, 98.3% graduated , 83% went on to college and 63.2% enrolled in a STEM major. The University is also part of the national Project Lead the Way Program (www.rit.edu/emcs/pltw/studentparents_overview.php) partnering with local high schools to provide project-based learning in pre-engineering. Graduates of PLTW select engineering majors at five to ten percent the rate of the general population of high school graduates.

The University of Rochester offers a “Get Real! Science” Program (<http://www.warner.rochester.edu/pages/getreal/Teachers/index.html>), a 15-month teacher preparation program based on an inquiry learning approach. It includes a summer program for students and a professional research component. 100% of teacher graduates of the most recent cohort received teaching jobs with 60% working in high need settings.

Monroe Community College is already among the top associate’s degree producers in the United States. They offer a host of technical degree and certificate programs, partner with the Rochester City School District on the Early College International High School, and offer all high school

students in the county the opportunity to accelerate their college degrees through dual enrollment. An evaluation of the “Focus on Inquiry” project to provide professional development to Rochester City teachers on science inquiry found that 78% of teachers rated the program highly in improving their students’ achievement.

Finger Lakes Community College has a unique Instrumentation and Control Technologies Program to fill the skills gap for jobs in precisions optics, precision manufacturing and green technologies.

Genesee Community College reaches younger students through a Math/Science Enrichment Program leading to college credit for students in Grades 7 and 8.

Wayne-Finger Lakes BOCES offers a rigorous CTE program including training in renewable energy, engineering technology, training in geothermal, solar and wind energy, and home energy analysis. Currently, 60% of students in the program continue on for post-secondary training in their field of studies.

Rochester Museum & Science Center leads the Science Co-Explorers empowers early-childhood educators to implement developmentally appropriate science. 100% of the participating UPK teachers from the RCSD increased their comfort level, knowledge, skills, and positive attitude toward science.

The message we want to underscore today is that exemplars for reform already exist. It is the reform agenda obligation to bring these exemplars to scale through state sponsorship for the benefit of the youth and future of New York State.

The Finger Lakes STEM Hub stands ready to assist the Commission with any further information that may be needed for your deliberations.

Thank you for your service to the Commission and to the people of New York State, particularly to our learners and our future.

Empire State STEM Learning Network
Finger Lakes Regional Hub
Partner Organizations

School Districts

Rochester City School District
Brighton Central School District
Naples Central School District
Palmyra-Macedon Central School
District
Honeoye Falls-Lima Central School
District
Hilton Central School District
Greece Central School District
East Rochester School District

BOCES Districts

Monroe-2 Orleans BOCES
Wayne-Finger Lakes BOCES
Monroe 1 BOCES
Genesee Valley Educational
Partnership

Higher Education

SUNY College at Brockport
Nazareth College of Rochester
Rochester Institute of Technology
Genesee Community College
Monroe Community College
University of Rochester
SUNY College at Geneseo
Empire State College
Cornell University
Colgate Rochester Crozer Divinity
School
Wells College
Houghton College

Government

NYS Department of Labor

Community Organizations

Rochester Museum and Science
Center
New York State United Teachers
Science Teachers Association of New
York
New York State Science Educational
Leadership Association
Association of Mathematics Teachers
in the Rochester Area
Greater Rochester Quality Council
Monroe County School Boards
Association
Rochester Business Alliance

Business

BioDrill Technical Solutions, Inc.
Eastman Kodak Co.
Siemens Industries, Inc.
VWR Education
Xerox
M&T Bank
Time Warner Cable
M/E Engineering
WorldLeaders
Klein Steel

Hub Steward

Rochester Museum & Science Center

Board of Champions

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Daniel White, District Superintendent, Monroe #1 BOCES

Joseph Marinelli, District Superintendent, Wayne-Finger Lakes BOCES

JoAnne Antonacci, District Superintendent, Monroe 2-Orleans BOCES

Bill Destler, President, Rochester Institute of Technology

Daan Braveman, President, Nazareth College

Chris Dahl, President, State University of New York, Geneseo

James Sunser, President, Genesee Community College, State University of New York

Anne Kress, President, Monroe Community College, State University of New York

Jonathan Franz, Dean, Genesee Valley Center, Empire State College, State University of New York

Lisa Marsh Ryerson, President, Wells College

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Stephen Philip Johnson, Vice President of Government and Community Relations, Cornell University

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Sandra Parker, President and CEO, Rochester Business Alliance

Scott Knaub, Area Vice President, Time-Warner Cable WNY

Daniel Burns, Rochester Region President, M&T Bank

Mike Colyer, CEO, VWR Education

Rick Dastin, President, Xerox Enterprise Business Group

Joe Klein, CEO, Klein Steel

Allen G. Casey, President, M/E Engineering

Karen Benjamin, Co-founder and Partner, WorldLeaders

Matthew Augustine, President and CEO, BioDrill Technical Solutions, Inc.

Carol Wilke, Chair, Greater Rochester Quality Council

Jody Seigle, Executive Director, Monroe County School Boards Association