

Essential Learning Skills in the 21st Century

The STEM Context

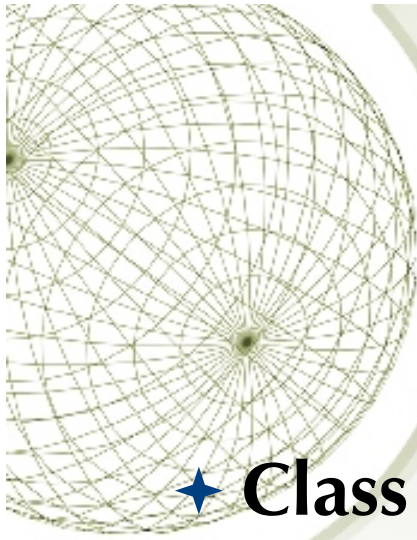
Gloucester Public Schools

January 25, 2011



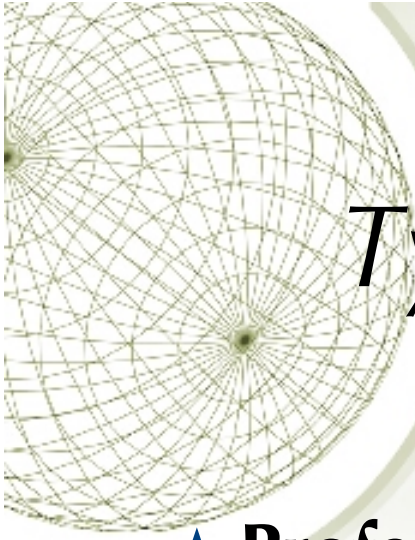
The MA STEM Paradox

- **Country's leading knowledge & information based state economy**
- **4th & 8th grade students lead the country in math & science performance**
- **High school seniors in last decade chose STEM post-secondary majors at less than national average**



Typical student experience

- ★ **Class work unrelated to real world examples**
- ★ **Too little inquiry-based, project-based learning**
- ★ **Rigorous STEM study not begun early enough**
- ★ **Seldom hear about STEM careers or meet STEM professionals**



Typical educator experience

- ★ **Professional Development seldom focuses on motivating students about STEM**
- ★ **Little opportunity to become inspired by STEM work environments with STEM professionals**
- ★ **Not enough STEM preparation for elementary educators**



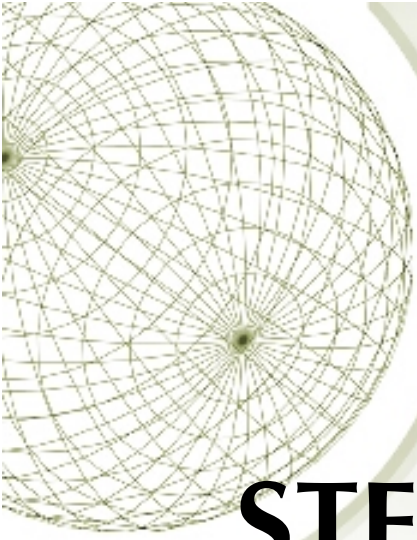
What employers say...

Receive many requests for \$ but few to build effective/strategic partnerships

**Have to choose from “1K points of Light” -
-not vetted best practices**

Sometimes develop curriculum, offer to schools with little continuing support

Sponsor STEM conferences & other special events--no continuity



*But what parents
typically don't say..*

**STEM is important for all
students, not just scientists or
engineers**

We need a change in culture



The standards

★ MA has frameworks in

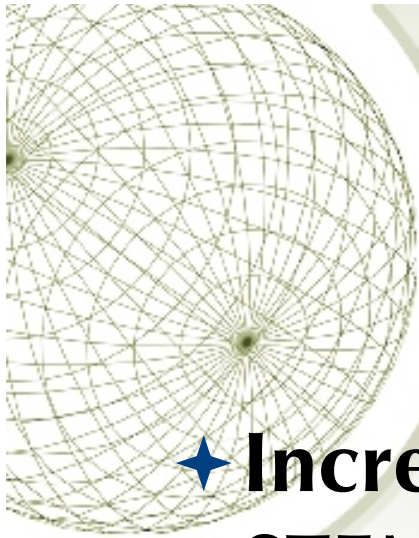
- Science and Technology/Engineering
- Technology for students
- Mathematics



State STEM plan

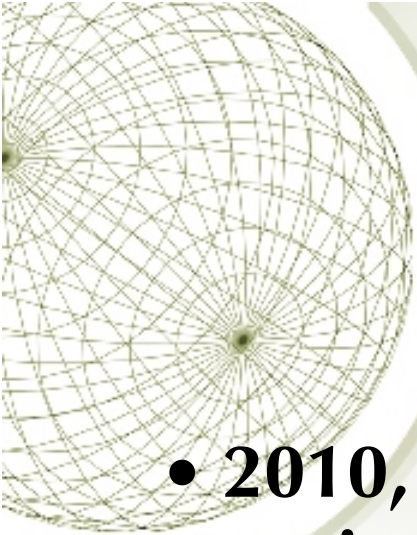
★ **Released on Sept 28, 2010 at STEM Summit**

★ **Available at**
www.mass.gov/governor/stem



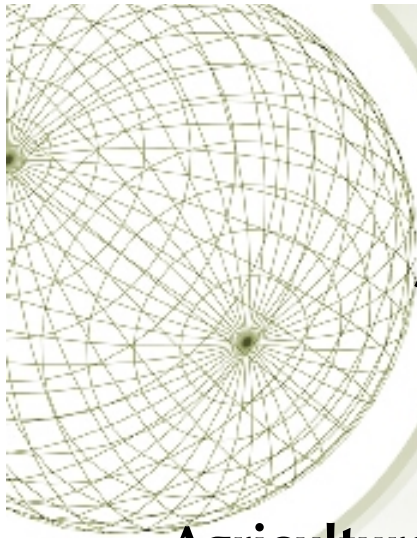
Goals from MA State Plan

- ★ **Increase number of MA students for STEM careers**
- ★ **Increase number of qualified STEM teachers in MA**
- ★ **Improve STEM programs in all MA schools**



Recent progress

- **2010, SAT test takers planning on STEM majors from public & non public schools:
17,503 or 28.6% of test takers**
- **1999 (baseline year) the number was
12,480 or 25.6% of test takers**



SAT STEM major definition

**Agriculture, Agriculture Operations and Related Sciences,
Architecture and Related Services,
Biological and Biomedical Sciences,
Computer and Information Sciences and Support Services,
Engineering and Engineering Technologies/Technicians,
Health Professions and Related Clinical Services, Health Professions
and Related Clinical Services,
Mathematics and Statistics,
Natural Resources and Conservation,
Physical Sciences**



New MA goal

- ★ **2016 goal of 35% requires 1,000 more than 2010 (w. 10%+ fewer HS graduates by 2016 than 2010)**
- ★ **If 371 MA high schools, we need between 11 and 15 more students following the STEM careers**
- ★ **GHS has 1052 students...1.4% of students**



STEM figures in RTTT in MA

- ★ **Expose/prepare more students to/for rigorous curricula & college-level work in STEM fields (early exposure) for career readiness**

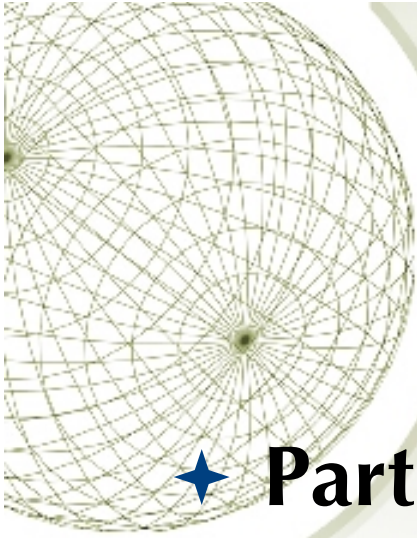
See Foundation for the Future at

<http://www.ikzadvisors.com/specific-projects/foundation-for-the-future-report/>



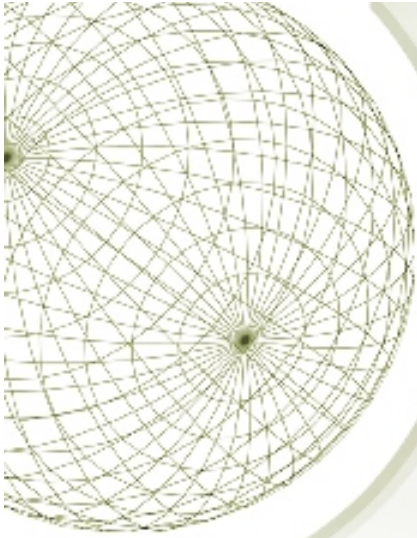
STEM figures in RTTT in MA

- ★ **Six STEM Early College High Schools (ECHS)—400 students-3 on 4 year campuses & 3 on Community College campuses**
- ★ **Develop online courses for mentors of STEM field teachers**



More RTTT

- ★ **Partner with UTeach**
- ★ **Expand proven models of effective educator preparation (residency- style models) to expand the supply of effective STEM educators**



STEM Schools in MA

★ Approximately 26 (including charters)

<http://www.ikzadvisors.com/resources/>

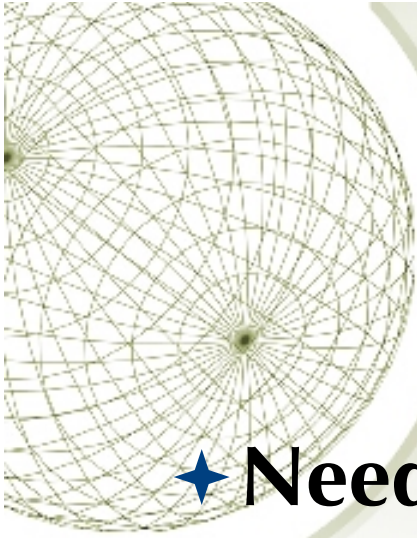
More to come...



It will help to have an
inventory/matrix/warehouse

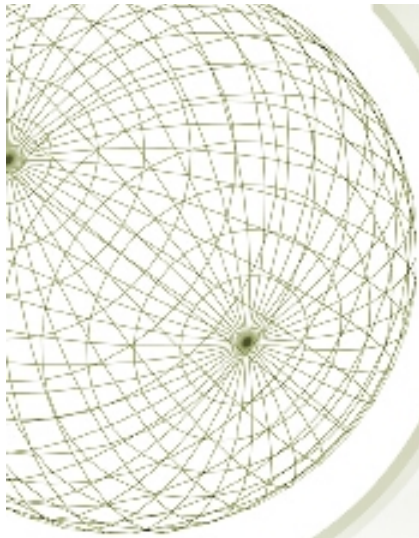
- ★ Of current offerings, in all categories, tied to the K-20 warehouse of student data
- ★ Enabling conclusions about cause & effect e.g. what characteristics of programs lead to increased student STEM success

<http://www.doe.mass.edu/infoservices/dw/>



The “inspiration gap”

- ★ **Need both motivation and expertise**
- ★ **Educators hold the key...**
 - ★ **Proper preparation**
 - ★ **Integration in curriculum**
 - ★ **Evaluation (formative & summative)**



In his words...

“We must amplify efforts to bring STEM to life with a new focus on hands-on learning through engaging, content-rich curricula that emphasize the application of knowledge to current, real world challenges...”



In his words...

...Classrooms must be vibrant environments that encourage creativity and exploration. We must capture the interest of students, provide them with a solid base of knowledge and then teach them how to think and act like scientists..."

Secretary Paul Reville, September 30, 2010



*Deciding what **more** to do. 1*

- ★ Look at available data warehouses

- ★ <http://www.doe.mass.edu/infoservices/dw/>

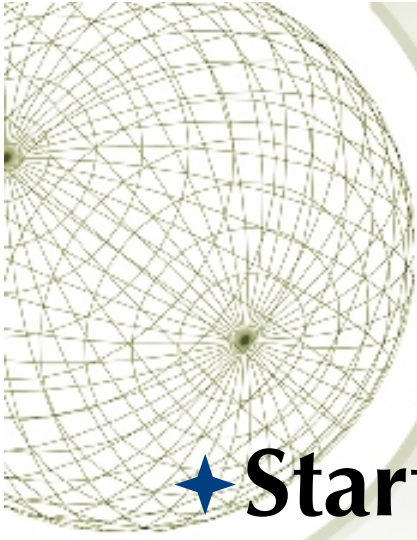
- ★ Build *more* 'Strategic' Partnerships

- ★ Select *other* vetted best practices



Deciding what more to do.2

- ★ **Innovate aligned with state goals**
- ★ **Address educational, workforce & economic development challenges**
- ★ **Establish measurable objectives & outcomes**



Deciding what to do.3

- ★ **Start early...PreK?**

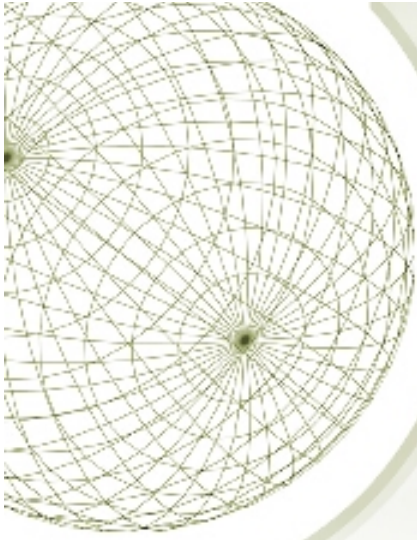
- ★ **Align internally & externally**

- ★ **Do not reinvent a point of light!**



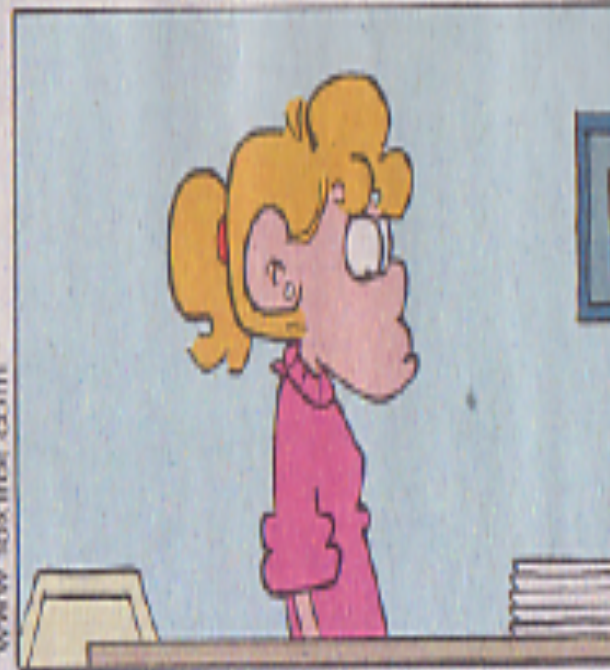
From your website

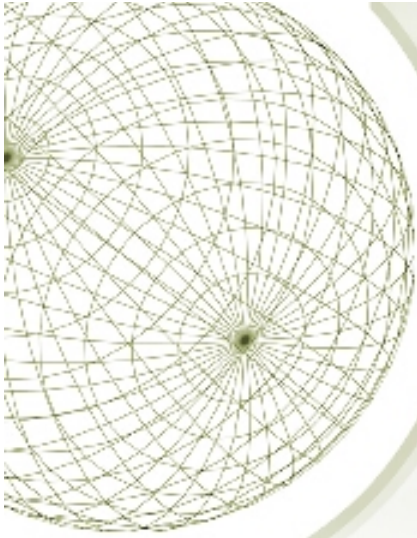
- ***Interactive Math Program at GHS***
- ***Instructional Technology - Success Maker, Study Island***
- ***SEA Initiative with MIT and GEF***
- ***Field Studies in K-6***
- ***Science Technology and Engineering Lab at O'Maley***
- ***Physics through Robotics at GHS***



What you should have...

A STEM Plan for the Gloucester Public Schools

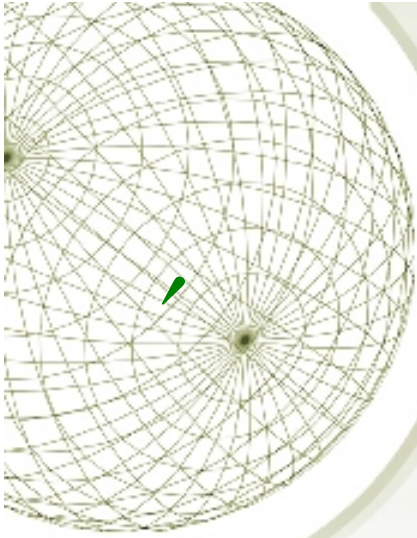




Have you seen these?

<http://www.flixxy.com/technology-and-education-2008.htm>

<http://www.2minutes.com/>



IKZ Advisors STEM Education & Leadership

Science, Technology, Engineering, Mathematics
617-642-4733

ikz1@verizon.net

www.ikzadvisors.com