



STEM Teaching & Learning in the 21st Century

What do you need to consider?

**Ayer Public Schools & Shirley School District
October 8, 2010**



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 choose STEM post-secondary majors at less than national average**



Is this your experience?

For Students

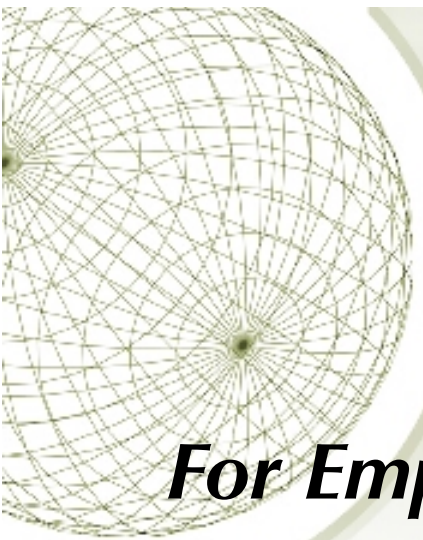
- ★ **Class work unrelated to real world examples**
- ★ **Too little inquiry-based, project-based learning**
- ★ **Rigorous STEM study not begun early enough**
- ★ **Seldom hear about STEM careers or meet STEM professionals**



Is this your experience?

For Educators

- ★ **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**



Have you heard this?

For Employers

- ★ **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**



The standards

★ MA has frameworks in

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

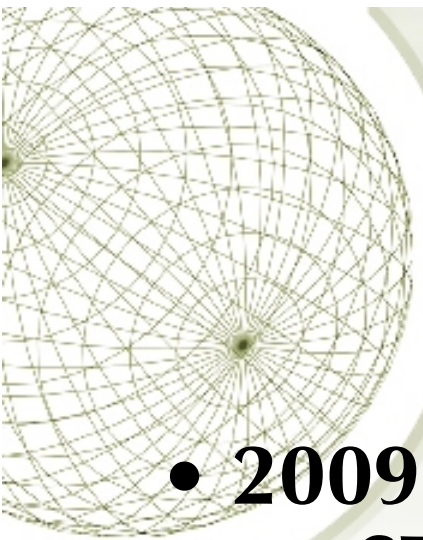
And now the Common Core (LA & Math)



State STEM plan

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

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



Recent progress

- **2009 to 2010, SAT test takers planning on STEM majors from public & non public schools up from 13,392 in 2009 to 17,503 in 2010.**
- **Increase of 30.7%. Nationally, the increase for these same six groups was 18.4%.**



Recent progress. 1

★ **Among the competitor states the increases:**

NC 14.9%

VA 18.9%

CA 21%

PA 13.1%

NJ 21.1%

NY 24.8%

CT 24.1%.



Recent Progress.2

- ★ **In 2003, the STEM Collaborative, set a goal for 2010 of having 26% of the SAT test takers plan on STEM majors.**
- ★ **The 2010 percentage is 28.6% which we can declare a victory! (Recession may have helped)**



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.1

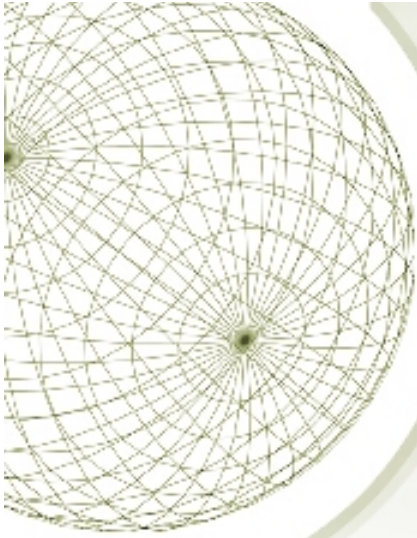
- ★ **Six STEM Early College High Schools (ECHS)—400 students-3 on 4 year campuses & 3 on Community College campuses**
- ★ **Develop online courses for mentors of STEM field teachers**



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/>

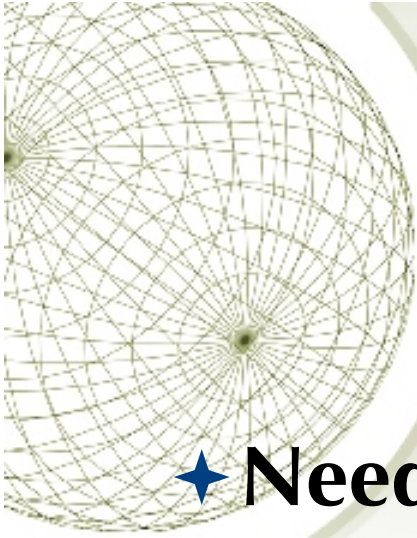
More to come...



It will help to have an
inventory/matrix/warehouse

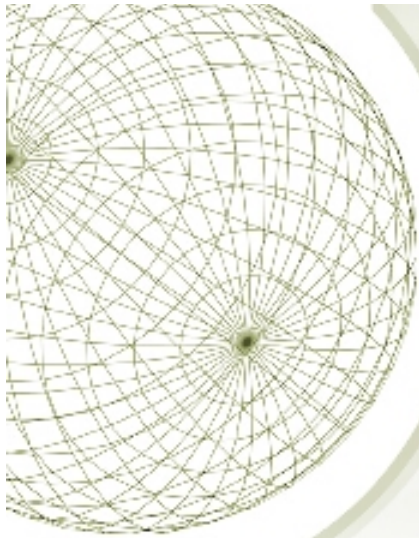
- ★ Of current offerings, in all categories, tied to the K-20 warehouse of student data
- ★ Enabling conclusions about cause & effect e.g. what characteristics of programs lead to increased student STEM success

<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...

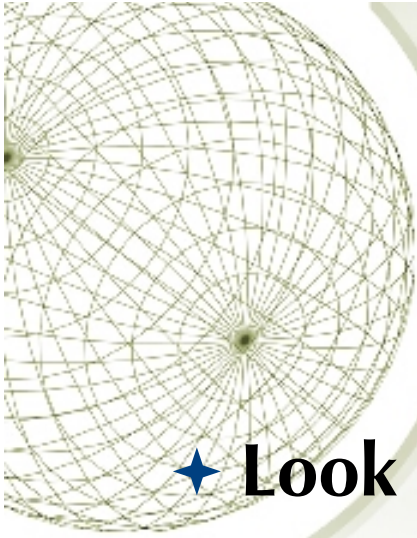
“We must amplify efforts to bring STEM to life with a new focus on hands-on learning through engaging, content-rich curricula that emphasize the application of knowledge to current, real world challenges...”



In his words... 1

...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 to do. 1

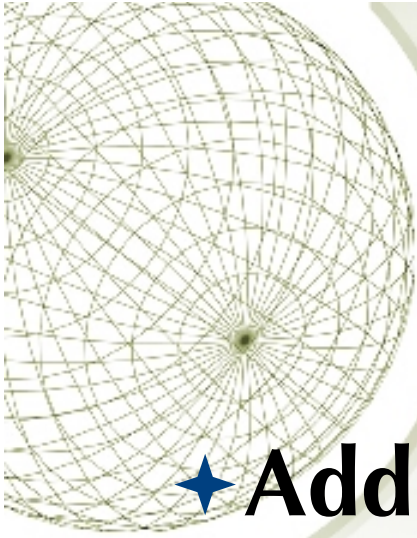
- ★ **Look at available data warehouses**

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

- ★ **Build 'Strategic' Partnerships in your region**

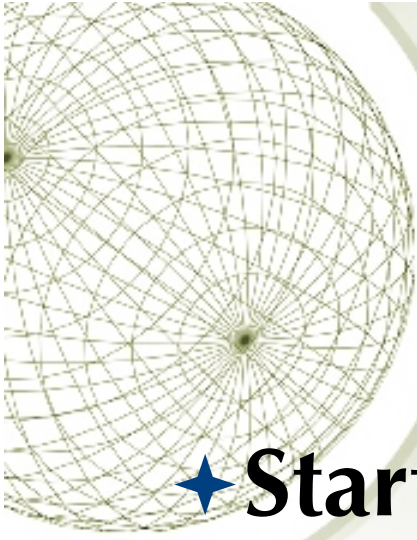
- ★ **Select vetted best practices**

- ★ **Innovate aligned with state goals**



Deciding what to do.2

- ★ **Address educational, workforce & economic development challenges**
- ★ **Establish measurable objectives & outcomes**



Deciding what to do.3

- ★ **Start early...**

- ★ **Align internally & externally**

- ★ **Do not reinvent another 1K point of light!**