



Science, Technology, Engineering and Math (STEM) Innovation Initiative

Technical Advisors Meeting
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STEM Innovation Initiative

- Theory of Action and Our Approach
- Desired Outcomes
- Proposal: Washington STEM Center
- Washington STEM Center: Proposed Strategies
- Proposed Tactics/Next Steps

Theory of Action and Our Approach

Theory of Action

If policies, programs and resources in Washington are prioritized, less fragmented and more effectively focused in support of STEM disciplines, and

If Washington educators are given high-quality STEM training, materials and assistance, and

If students in Washington are given support to deepen their math and science skills and understand opportunities connected with STEM careers through lab-schools and other rigorous math and science experiences,

Then STEM achievement in Washington will increase, the state's innovation "pipeline" will be enhanced, and citizens will be better positioned for economic prosperity.

Our Approach

Informed by best practices and research in WA

- High-impact **WA math and science programs** (e.g. LASER, MESA, NCOSP and Transition Math Project, among others) offer lessons learned for design, implementation and evaluation
 - **Strengths:** Complimentary focus on capacity-building, strong cross-sector partnerships, room for innovation (e.g. senior year “bridge” math class), impressive top performers
 - **Challenge:** How best to scale up and integrate efforts across STEM disciplines
- When asked about **key barriers to accelerating student achievement**, principals, teachers and district leaders consistently identified:
 - The lack of a coherent system for supporting the entry, development and retention of quality staff
 - The lack of coherence across multiple initiatives or programs to sustain an orderly, organized strategy for school change (NWREL 2008)
- Recent survey results show that **elementary Science teachers do not perceive that Science achievement is a priority** at the district- or state-level (CSTP)

Our Approach

Informed by best practices and research in other states

- **Ohio, Texas, Georgia, Alabama and Arizona** provide high-profile examples of statewide STEM initiatives Washington could emulate
 - Most of these states focus on developing a network of STEM schools and regional centers that provide technical assistance to schools and districts
 - The Gates Foundation provides significant support for STEM efforts in Ohio and Texas; Battelle provides significant support to the Ohio STEM initiative
 - These initiatives are all fairly nascent and have not yet shown impact data, but are considered promising
 - The costs of these efforts range from \$32-130 million in public and private funds depending on the size of the state and scope of the initiative



Desired Outcomes

What Will Look Different in the Classroom?

- **Widespread use of inquiry-based teaching that results in:**
 - **Highly engaged students** eager and confident to pursue STEM fields
 - **Teachers that are more comfortable and confident** with STEM curriculum
 - **Higher math and science achievement** and **significant progress on closing achievement gaps**
- **Increased teaching capacity through:**
 - **More teachers** with strong backgrounds in math and science
 - **Better teacher recruitment, preparation, training and mentoring** programs
 - **Widely available rigorous curricula** and other materials
 - **Improved evaluation and compensation** systems
- **Increased innovation in STEM education leading to:**
 - **Innovative STEM school models and programs** are created and/or scaled up
 - **Regional cross-sector partnerships** connected to local industry provide rigorous, hands-on STEM curriculum, projects and internship opportunities

Desired System Level Outcomes

2010: 460 more math and 400 science teachers recruited; proactive strategy in place for attracting and retaining best and brightest into teacher profession by 2012

2013: 85 percent of middle and high school math and science teachers have “in-field” degrees

2018: At least 5-10 key districts have implemented radically new teacher evaluation and compensation system

Teachers



2013: 85 percent of students successfully complete math and science requirements and graduate college-ready

2014: 20 percent more low-income and minority students enter and succeed in college-level STEM disciplines

2016: Washington students score in the top 20 percent nationally in math and science

Students

* Numeric targets are tentative. PFL is conducting research to determine appropriate numeric targets.

Proposal:

Establish a State Center to
design and deliver
a coherent and innovative
Washington STEM strategy

Proposed Washington STEM Center

- Establish a new 501c3 organization to significantly accelerate gains in math and science achievement

Rationale :

- Fragmented direction from multiple governing agencies and the legislature; erratic categorical funding streams; and lack of urgency (in science in particular) has led to lackluster student outcomes in math and science
 - Equity and access to rigorous high quality curriculum and instruction remain obstacles for recruiting and retaining more high-poverty, minority students into STEM fields
 - Washington needs a comprehensive statewide STEM strategy to bring a sense of focus and urgency to these issues
- Effective, visible, nimble, and well-resourced, with power to act:
 - Board members - top leaders from business and education
 - World-class staff
 - Strong group of technical advisors
 - Fueled by mix of private and public dollars (federal, state and local)



Washington STEM Center:

Proposed Strategies

Washington STEM Center: Proposed Strategies

1. **Expand and improve new teacher recruitment and support:** Accelerate efforts to recruit and support a talented and diverse teaching corps, and support with higher-quality professional development.
2. **Strengthen supports for existing teachers:** Create and provide improved curriculum and materials tied to state standards. Develop strategies for assisting struggling students, and improving Superintendent and Principal support for STEM curriculum. Redefine how we evaluate and reward teachers.
3. **Stimulate innovation through regional partnerships and new school models:** Empower new school models, consortia and knowledge sharing through regional partnerships and investments.
4. **Link to economic development:** Explore linking regional STEM partnerships to regional economic and industry strategies.
5. **Deploy complimentary advocacy effort:** Advocate for ambitious state and local STEM policies and more effective use of public funds.

Strategy #1

**Expand and improve new teacher
recruitment and support**

Strategy #1: Expand and improve new teacher recruitment and support

- Accelerate efforts to recruit and support a talented and diverse teaching corps, and support with higher-quality professional development.
- Retain the nationally well respected New Teacher Project to research, design and implement a recruitment campaign for undergraduates and career-changers. Explore partnership with Teach for America.
- Identify and advocate for strategies that address recruitment strategies in small, rural and isolated districts (e.g. leveraging adjunct community college faculty, parapro pipelines, distance learning, etc).
- Support flexible routes to teaching among mid-career changers.
- Strengthen preparation programs for teacher candidates.
- Implement structured two-year support program for new teachers. Rethink teacher tenure.

Strategy # 2

**Strengthen supports for
existing teachers**

Strategy #2: Strengthen supports for existing teachers

- Create and provide improved curriculum and instructional materials tied to state standards; ensure they are widely available to teachers, principals, coaches and other instructional aides. Provide incentives for their use.
- Identify gaps in service delivery and inefficiencies related to training, materials and technical assistance.
- Explore new models for evaluating and compensating effective teaching.
- Improve Superintendent and Principal leadership for STEM curriculum and teaching strategies.
- Design and implement targeted strategies for helping struggling students be successful in STEM related fields, especially high poverty, minority students.

Strategy #2: Strengthen supports for existing teachers

Proposed Technical Assistance Model

- STEM Center staff would strengthen support and collaboration among existing providers
- Identify any service delivery gaps; provide direct technical assistance to schools and districts where and when necessary
- Focus on addressing issues most problematic to science and math education including the shortage of teachers and capacity building assistance
- Focus of technical assistance is on achieving STEM targets, such as
 - 85% percent of students successfully pass math and science WASL, complete course requirements and graduate High School college- and work-ready
 - 20% more low-income and minority students enter and succeed in college-level STEM disciplines

Strategy #3

Stimulate innovation through regional partnerships and new school models

Strategy #3: Stimulate innovation through regional partnerships and new school models

- **Develop competitive RFP process (voluntary) to make grants to stimulate regional partnerships and new school models**
 - Fund locally-driven consortia of colleges/universities; community/technical colleges; school districts and ESDs; STEM industry partners; evidence-based programs.
 - Define non-negotiables for submitting an application for funding (i.e. rigorous data and evaluation systems, local matching funds).
 - RFP process will strongly encourage innovations such as:
 - scalable STEM school models designed to serve underrepresented students
 - new ways of delivering teacher professional development that leads to significantly more students achieving state standards in math and science and graduating college ready
 - value-added or growth-model data systems to measure student progress and teacher effectiveness
 - Grants will be made for five-year, renewable periods.
 - Regional partnerships will draw upon the economic competitive advantages of the local region (e.g. health care in Spokane, research and new product development in Richland, renewable energy in Moses Lake)

Strategy #3: Stimulate innovation through regional partnerships and new school models

- **Working together, the STEM Center and regional partnerships will form a statewide network that will:**
 - Provide direct assistance and support for students and teachers
 - Identify, reflect and share best practices
 - Improve teacher recruitment, preparation, support, evaluation and compensation
 - Align and scale up existing efforts; seed and scale new efforts
 - Balance local needs for flexibility with a coherent statewide strategy



Strategy #4

Link to economic development

Strategy #4: Link to economic development

- Explore linking regional STEM partnerships to regional and industry strategies (e.g. Governor Gregoire’s six “innovation zones;” industry efforts).
- Look for additional opportunities to tie STEM efforts to state and regional economic needs through close partnerships with Economic Development Councils, local Chambers of Commerce and other statewide STEM related associations like AeA, Tech Alliance, WBBA, etc.
- Use Leadership Advisory Group to engage STEM industry leaders in the design and ongoing operation of Washington’s new STEM Center.



Strategy #5

Deploy complementary advocacy effort

Strategy #5: Deploy complementary advocacy effort

- Advocate for ambitious state and local STEM policies and more effective use of public funds.
- Led by existing or new organization (possibly the STEM Center or RT/PFL).
- Focused on STEM policy and prioritizing existing federal, state and private expenditures.
- Lobbying and communications
- State and regional focus

Proposed Next Steps

Proposed Tactics/Next Steps

Next 6 months:

- Convene technical advisors to solicit feedback (December)
- Convene Leadership Advisory Group (January)
- Contract with The New Teacher Project to study barriers and propose solutions to recruiting effective math and science teachers, and pilot a recruitment campaign (Winter)
- Develop a coherent and sustainable STEM strategy (Winter)

Next 12 months:

- Design STEM Center organizational structure and strategy
- Form governing board
- Launch STEM center

Discussion Questions

- What's the right balance between specializing in separate disciplines (math, science) or focusing on stronger integration across all STEM areas?
- What specifically needs to be done to build science competence and comfort level among elementary teachers?
- What are the best ways to improve the effectiveness of middle and high school math and science teachers, especially among those lacking full credentials in the subjects they teach?