# S<sup>2</sup>TEM SC Innovation Configuration Maps Total Instructional Focus – Instructional Support

**Standard:** A network of instructional support in STEM education is a system facilitated by knowledgeable leaders, who lead the school community in acquiring and maintaining resources and maximizing learning time for all STEM instruction whether tested or not.

Total Instructional Focus - Instructional Support							
Sustaining	Fully Implementing	Refining and Expanding	Progressing	Getting Started			
<b>Desired Outcome 10.1</b> : Assets and conditions that are vital to STEM instruction are created, acquired, and maintained.							
Assesses and continuously improves conditions, equipment, materials, and resources that support optimal STEM learning in traditional and non- traditional learning environments	Maintains conditions that supports optimal STEM learning and continues to collect observational data in school-wide learning environments	Uses equipment, materials and resource inventories assessments, inventories, and observational data from the core group to Creates & Plans conditions to support STEM learning school-wide	Develops conditions that support STEM learning (Core Group) Continues to Observe conditions that support STEM learning in the classrooms of the core groups	Observes conditions that support STEM learning based on research and data for optimal STEM learning (Informal & Individual)			
Unitizes non-traditional assets (i.e. non-school personnel, business and industry sites, offsite equipment/ materials /resources) as needed for conditions that support optimal STEM learning	Continues to assess and upgrade equipment, materials and resources as needed for conditions that support optimal STEM learning	Collects Observational Data for conditions that support optimal STEM learning School Wide	Assesses equipment, materials and resources needed to support STEM learning	Inventories equipment, materials and resources that support STEM learning within the classrooms			
Creates appropriate, effective and on-going learning opportunities for promoting conditions that support STEM learning in traditional and non- traditional learning environments (School Community – Formal)	Participates in planned appropriate, effective learning opportunities which create school conditions that support STEM learning (Whole School - Formal)	Provides opportunities for learning about conditions that support STEM learning (LT & Core Group - Formal)	Plans opportunities for learning about conditions that support STEM learning (LT & Formal)	Observes opportunities for learning about conditions that support STEM learning (LT & Formal)			
Continues to create opportunities and access to non-traditional instruction (guest speakers, field trips, industrial equipment use etc.)	Creates opportunities and access to non- traditional instruction (guest speakers, field trips, industrial equipment use etc.)						
Plans for the continued recruitment of highly qualified STEM teachers	Recruits highly qualified STEM teachers	Develops a plan for identifying highly qualified STEM teachers.	Assesses recruitment practices as they relate to the need for high quality STEM teachers	Recognizes the need for highly qualified STEM teachers			

Total Instructional Focus - Instructional Support								
Sustaining	Fully Implementing	Refining and Expanding	Progressing	Getting Started				
<b>Desired Outcome 10.2:</b> Classrooms, labs, media centers and common spaces are equipped for 21st century individual and collaborative								
learning. NOTE: Unless denoted in parenthesis, these actions refer to all STEM school stakeholders.								
Sustains technologies based on the growing	Continues to assess and upgrade technology that	Provides technology that reflects the needs of	Develops a technology plan for addressing the	Assesses technology needs of learners				
needs of learners in a	reflects the needs of	learners in a digital age	needs of learners in a	(LT formally and				
changing digital age	learners in a digital age		digital age (LT formally)	informally)				
Sustains supplies that support teaching and learning the STEM curriculum	Continues to assess and upgrade materials and supplies to support teaching and learning the STEM curriculum	Provides materials and supplies to support teaching and learning the STEM curriculum	Develops a plan for the inventory, maintenance and acquisition of materials and supplies that supports teaching and learning the STEM curriculum (LT formally)	Assesses materials and supplies that support teaching and learning the STEM curriculum (LT formally, other stakeholders informally)				
Assesses and continuously provides the support needed to address the unique learning needs of individuals in the STEM school community	Meets unique learning needs of individuals in the STEM school community, including students, staff and parents by proving materials, resources and individual support	Creates a plan of support to address the unique learning needs of individuals in the STEM school community including the development of physical spaces, acquisition of materials and resources, and providing personal learning strategies to students, staff and parents	Assesses learning needs of individuals in the STEM school community, including students, staff and parents	Recognizes that the members of the STEM school community (students, staff, parents, etc.) have individual needs				
Sustains partnerships and resources <i>(i.e. time,</i> <i>personnel, materials,</i> <i>supplies, technology,</i> <i>sites etc.)</i> needed to better serve the surrounding community <i>(i.e. businesses,</i> <i>institutions of higher</i> <i>learning and community</i> <i>organizations)</i>	Continues to add partnerships and resources <i>(i.e. time, personnel, materials, supplies, technology, sites etc.)</i> needed to better serve the surrounding community <i>(i.e. businesses, institutions of higher learning and community</i> <i>organizations)</i>	Provides networking opportunities within the STEM Community to form partnerships and acquire resources ( <i>i.e.</i> <i>time, personnel,</i> <i>materials, supplies,</i> <i>technology, sites etc.</i> ) needed to serve the surrounding community ( <i>i.e. businesses,</i> <i>institutions of higher</i> <i>learning and community</i> <i>organizations</i> )	Plans for the acquisition of partnerships and resources <i>(i.e. time, personnel, materials, supplies, technology, sites etc.)</i> needed to serve the surrounding community <i>(i.e. businesses, institutions of</i> <i>higher learning and</i> <i>community organizations)</i>	Recognizes a need for the acquisition of partnerships and resources ( <i>i.e. time,</i> <i>personnel, materials,</i> <i>supplies, technology,</i> <i>sites etc.</i> ) to serve the surrounding community ( <i>i.e. businesses,</i> <i>institutions of higher</i> <i>learning and community</i> <i>organizations</i> )				

Total Instructional Focus - Instructional Support							
Sustaining	Fully Implementing	Refining and Expanding	Progressing	Getting Started			
Desired Outcome 10.3: Equitable time is devoted to all STEM instruction whether "tested" or NOT.							
Ensures with automaticity, the effective and efficient use of time as an instructional resource during both traditional and non-traditional learning opportunities.	Facilitates the implementation of promising strategies that create opportunities for students to utilize concepts, to collaborate with peers, to solve problems and to design innovations as well as maximize instructional time without adding to the school day	Creates strategies such that the breadth and depth of educational experiences are encouraged to thrive while maximizing instructional time in all classes.	Expands the traditional school day to provide for greater depth of learning in core classes and enrichment in the arts and sports.	Recognizes that the resource of time must be strategically managed.			

S<sup>2</sup>TEM SC Innovation Configuration Maps Bibliography

# Bibliography

#### 1. STEM for All

http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/stem-execsum.pdf

National Research Council of the National Academies. Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics .2011. National Academies Press Washington DC. <u>www.nap.edu</u> Accessed August, 2012

### 2. Innovation

Boss, Suzie. *Bringing Innovation to School: Empowering Students to Thrive in a Changing World.* Bloomington, IN: Solution Tree, 2012. Print.

Wagner, Tony. "Educating the Next Steve Jobs." *Wall Street Journal* (April 13, 2012): <<u>http://online.wsj.com/article/SB10001424052702304444604577337790086673050.html</u>>.

#### 3. Data

Bernhardt, Victoria. *Data Analysis for Continuous School Improvement*. Larchmont, NY: Eye on Education, 2004. Print.

### **Institute of Education Sciences**

http://ies.ed.gov/ncee/wwc/pdf/practice guides/dddm pg 092909.pdf

### 4. Collaboration

Bryk, Anthony and Schneider, Barbara. "Trust in Schools: A Core Resource for School Reform." <u>http://www.ascd.org/publications/educational-leadership/mar03/vol60/num06/Trust-in-Schools@-</u><u>A-Core-Resource-for-School-Reform.aspx</u>

Covey, Stephen.. The Speed of Trust. New York: Free Press, 2006. Print.

Garmston, Robert and Wellman, Bruce. *Adaptive Schools: A Sourcebook for Developing Collaborative Groups*. Norwood, MA: Christopher Gordon Publishers, 2009. Print

### 5. Continuous Learning

Talbert, Robert, mathematics professor http://chronicle.com/blognetwork/castingoutnines/2012/06/13/continuous-learning-instead-oflifelong-learning/

Costa, Arthur and Garmston, Robert. *Cognitive Coaching: A Foundation for Renaissance Schools*. Norwood, MA: Christopher-Gordon Publishers, 2002. Print.

Costa, Arthur. School as a Home for the Mind: Creating Mindful Curriculum, Instruction, and Dialogue. Thousand Oaks, CA:Corwin Press, 2008. Print

### 6. Engaged Community

Dufour, Rick. "Developing a Shared Vision. ASCD Express.2007. Accessed at <a href="http://www.ascd.org/ascd-express/vol5/510-video.aspx">http://www.ascd.org/ascd-express/vol5/510-video.aspx</a>

National Standards for Family School Partnerships: An Implementation Guide. PTA.org. Accessed at <u>http://www.pta.org/2757.asp</u>

# 8. Curriculum

Burns, Rebecca, and Drake, Susan. *Meeting Standards through Integrated Curriculum.* Alexandria, VA: ASCD. 2004. Print.

Common Core State Standards. http://www.corestandards.org/

Figliano, F. (2007, November). Strategies for Integrating STEM Content, A Pilot Case Study. Virginia Polytechnic Institute and State University

Harden, R.M.(2000). The integration ladder: a tool for curriculum planning and evaluation. Blackwell Science Ltd, MEDICAL EDUCATION

Lantz, H. B. (2009). Science, Technology, Engineering, and Mathematics (STEM) Education: What Form? What Function? <u>www.currtechintegrations.com</u>

Learn NC – Interdisciplinary Teaching. UNC School of Education http://www.learnnc.org/lp/pages/5196

Moore, T. J., Wang, H., Roehrig, G. H., Park, N. S. (2011). STEM Integration: Teacher Perceptions and Practice. University of Minnesota, Journal of Pre-College Engineering Education Research

Morrison, J.(2006). Attributes of STEM Education. Teaching Institute for Excellence in STEM

National Science Board. A National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, Engineering, and Mathematics Education System. 2007. National Science Foundation. <u>http://www.nsf.gov/nsb/documents/2007/stem\_action.pdf</u>. Accessed October, 2012.

Success at the Core. Four Questions About Curriculum Alignment. Vulcan Productions. 2010. <u>http://successatthecore.com/handouts/pdf/module7handout2.pdf</u>. Accessed September 2012.

#### 9. Professional Learning

National Research Council of the National Academies. Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics .2011. National Academies Press Washington DC. <u>www.nap.edu</u> Accessed August, 2012

Shulman, Lee. Pedagogical Content Knowledge. <u>http://www.leeshulman.net/domains-pedagogical-content-knowledge.html</u> Accessed September, 2012.

WestEd and National Commission on Teaching and America's Future. STEM Teachers in Professional Learning Communities: From Good Teachers to Great Teaching. 2010. http://www.wested.org/online\_pubs/resource1097.pdf Accessed June 2012.

#### 10. Assessment

Jacobs, Heidi H., et al. *Curriculum 21: Essential Education for a Changing World*. Alexandria, VA: ASCD, 2010. Print

Lantz, Hayes B. Science, Technology, Engineering, and Mathematics (STEM) Education What Form? What Function? 2009. <u>http://www.currtechintegrations.com/pdf/STEMEducationArticle.pdf</u>. Accessed June, 2012.

Stiggins, Rick, et al. *Classroom Assessment for Student Learning: Doing it Right – Using it Well.* Upper Saddle River, NJ: Pearson Education, Inc., 2007. Print.

### **11. Instructional Support**

National Research Council of the National Academies. Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics .2011. National Academies Press Washington DC. <u>www.nap.edu</u> Accessed August, 2012

National Center on Time and Learning. Why Time Matters. <u>http://www.timeandlearning.org/why-time-matters</u> . Accessed October, 2012.

# Also Consulted:

Arizona Dept of Ed – STEM Immersion Matrix – assessment tool http://s3.amazonaws.com/hoth.bizango/assets/10649/SFAz-MCESA\_STEM\_Immersion\_Matrix.pdf

Colorado Department of Educations Race to the TOP – STEM Integration http://www.cde.state.co.us/RTTT/STEM.asp

Fogerty's 10 levels of integration - http://oregonstate.edu/instruction/ed555/zone3/tenways.htm

Integrating Technology and the national S.T.E.M. standards - <u>http://www.tsaweb.org/stem-integration</u>

Loepp, Franzie L. Models of Curriculum Integration - <u>http://scholar.lib.vt.edu/ejournals/JOTS/Summer-Fall-1999/PDF/Loepp.pdf</u>

Math and Science Connections - <u>http://www.nativeaccess.com/teachers/teaching-links/science-and-</u> math-connections

Models of Integration - http://www.schoolandbeyond.org/sblstrategy3.html

North Carolina STEM Rubrics - https://www.ncstem.org/stem-strategy/attributes-rubric.html

Teaching Today (McGraw Hill) – The basics – How to and Why Integrate - <u>http://teachingtoday.glencoe.com/howtoarticles/curriculum-integration</u>

Texas High School Project T-STEM Initiative (2010). Texas Science Technology Engineering and Mathematics Academies Design Blueprint, Rubric, and Glossary. Available from: <u>http://ntstem.tamu.edu/Academies/blueprint.pdf</u>