



S²TEM SC Innovation Configuration (IC) Map

Total Instructional Focus Engaged STEM School Community

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White Paper: Engaged STEM School Community

An Engaged STEM **School Community** is one in which all **stakeholders** create, embrace, and enact the school's STEM vision. All members of the community share responsibility for the success of each student.

Collaborative Leadership, Shared Vision

Effective STEM schools are anchored by leaders who cultivate a culture of collaboration. The National Research Council's report, *Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics*, suggests that school leadership is the driver for change. The report states, "Principals must be strategic, focused on instruction, and inclusive of others in the leadership work." Coordinating a **STEM leadership team** in which all **stakeholder** groups have representation is a path to ensuring that the school's vision for STEM education is developed and embraced by all.

Students as Partners

An Engaged STEM **School community** collaboratively develops a plan to engage students as active partners in their own success. This is accomplished through opportunities for students to set goals and receive support in implementing and monitoring progress. Intentional outreach is extended to students who are underrepresented in STEM fields. STEM challenge opportunities are available to nurture and further students' natural gifts, interests and abilities. In addition, early identification and intervention strategies ensure students receive scaffolded support such as mentoring, tutoring and counseling as needed for success.

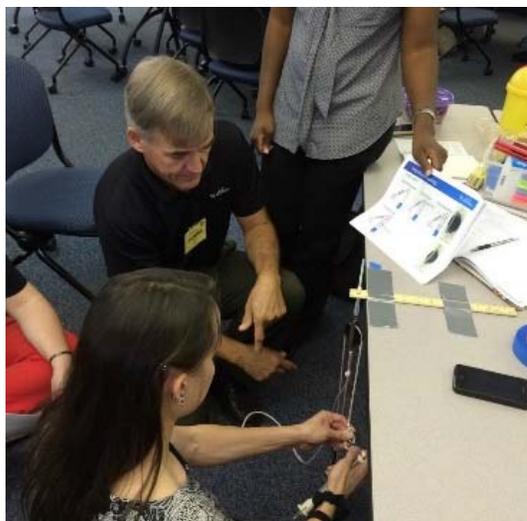
Collaboration with Parents

Multiple, ongoing and interactive modes of communication are employed by effective STEM schools to keep parents informed of ways they can support their students' academic progress and encourage exploration, critical thinking and innovation. Opportunities for parental engagement include sharing specialized career expertise, helping facilitate a hands-on classroom exploration, chaperoning a field trip or tutoring a small group of students. Since the majority of a student's time is spent outside of school, it is vital that parents share responsibility for high student performance within the formal school setting as well as engage students in informal learning opportunities within and beyond the community (i.e. STEM festivals, museums, science center activities).

Strategic Alliances

The STEM school works to build **strategic alliances**, who help build and sustain a thriving **STEM learning ecosystem** (i.e. in and out of school formal and informal service providers, non-profits, institutions of higher education, businesses, and community organizations) providing learning opportunities for both educators and students. **Strategic alliance** partnerships enable learners to apply knowledge and skills to real-world settings through job shadowing, internships and service projects. Learners benefit from onsite and virtual career talks and site visits. These alliances provide personnel resources for activities such as mentoring, tutoring, counseling and co-teaching, as well as financial support to fund scholarships, resource acquisition, grants and incentives for teacher and student innovations.

The Engaged STEM **school community** makes available STEM learning opportunities that give learners insight into the nature, challenges and excitement of STEM careers. These opportunities prepare students for success in studies at institutions of higher education, and place students in roles they will assume as productive 21st century citizens.



Theory in Action - Business and industry engineers partner in the iSTEM Innovation Program to provide STEM professional learning experiences for school-based STEM Leadership Teams.
<http://www.s2temsc.org/igravestem.html>

IC Maps Purpose

According to Shirley Hord (2006), “Innovation Configuration Maps, or IC Maps, provide a description of what a specific educational innovation “looks like” when well implemented. It provides a mental image of an innovation in operation and “vision” toward which the user is moving. Thus, the IC map provides a tool that shares information and helps individuals and organizations figure out where they are and what they need to do to move toward implementation.” S²TEM Centers SC has created an IC map for Characteristics of High Functioning STEM schools and schools wanting to become more STEM-Minded.

The desired outcome is stated on the left. Decreasingly desirable levels along the continuum are to the right. *Sustaining* signifies the ideal and highest quality of implementation and reflects the processing of all actions through a data-informed, evidence-based continuous improvement process.

STEM schools aligned with the criteria identified in the IC maps will progress toward developing students with world class knowledge, world class skills, and life and career characteristics as defined by the Profile of the SC Graduate.

PROFILE OF THE South Carolina Graduate

WORLD-CLASS KNOWLEDGE

Rigorous standards in language arts and math for career and college readiness

Multiple languages, science, technology, engineering, mathematics (STEM), arts and social sciences



WORLD-CLASS SKILLS

Creativity and innovation

Critical thinking and problem solving

Collaboration and teamwork

Communication, information, media and technology

Knowing how to learn

LIFE AND CAREER CHARACTERISTICS

Integrity • Self-direction • Global perspective • Perseverance • Work ethic • Interpersonal skills

© SCASA Superintendents' Roundtable

Adopted by: SC Arts Alliance, SC Arts in Basic Curriculum Steering Committee, SCASCD, SC Chamber of Commerce, SC Coalition for Math & Science, SC Commission on Higher Education, SC Council on Competitiveness, SC Education Oversight Committee, SC School Boards Association, SC State Board of Education, SC State Department of Education, TransformSC Schools and Districts



IC Maps Format

Overarching Standard for the respective IC Map.

Standard: Professional learning for STEM educators: is a system of continuous improvement that increases educator effectiveness in preparing students for success in college, careers, and citizenship; it is data informed, research based, aligned with the school’s mission, vision, and goals for STEM education and sustained by skillful leaders.

Desired Outcome(s) are listed in each IC Map as statements of STEM school characteristics as related to the Overarching Standard (shown above).

PL1 = Professional Learning Map, 1st Desired Outcome

Words defined in the glossary are highlighted in blue

Title of IC Map (i.e. Professional Learning)

Total Instructional Focus – Professional Learning

Sustaining Fully Implementing Refining and Expanding Progressing Getting Started

Desired Outcome PL1: Professional learning is the collective responsibility of all STEM educators and is the result of active engagement in a STEM professional learning community (PLC). It is a system of continuous improvement aligned with the school’s/district’s mission, vision, and goals for STEM education.

PL1.Leaders1: Support faculty and staff in setting and implementing professional learning goals

<p>Model and employ with fidelity ALL essential elements of a continuous improvement process school wide including:</p> <ul style="list-style-type: none"> identifying STEM goals planning implementing gathering evidence self-assessing adapting <p>Support and maintain commitment to personal and PLC learning of faculty and staff through observation, reflecting conversations, and feedback as aligned with the school/district goals for STEM education.</p>	<p>Model and employ the essential elements of a continuous improvement process school wide including:</p> <ul style="list-style-type: none"> identifying STEM goals planning implementing gathering evidence self-assessing adapting <p>Support commitment to personal and PLC learning of faculty and staff through observation, reflecting conversations, and feedback as aligned with the school/district goals for STEM education.</p>	<p>Provide ongoing support to faculty and staff as they work toward their individual and PLC STEM focused goals for professional growth through observation, reflecting conversations, and feedback.</p>	<p>Support faculty and staff as they work toward their individual and PLC STEM focused goals for professional growth through observation and feedback.</p>	<p>Collaborate with faculty and staff as individual STEM focused goals for professional growth are set.</p>
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Indicator by Role for the Desired Outcome (i.e. PL1), then the Role described (i.e. Leaders), then a number to represent which indicator is being outlined (i.e. 1) NOTE: Roles include Leaders, Teachers, Students, and Strategic Alliances.

5 Implementation Levels on the continuum from Getting Started to Sustaining. Read the map from right to left.

Within the white cells are descriptors for each of the 5 levels on the continuum.

IC Map: Engaged STEM School Community

Standard: An Engaged STEM School Community is one in which all stakeholders create, embrace, and enact the school’s STEM vision. All members of the community share responsibility for the success of each student.

Total Instructional Focus – Engaged Community

Sustaining

Fully Implementing

Refining and Expanding

Progressing

Getting Started

Desired Outcome EC1: Engaged STEM school communities are anchored by strong leaders who collaborate with all stakeholders to develop awareness and understanding of STEM throughout the school community and build a representative STEM leadership team (SLT)

EC1.Leaders1: Build support through actions designed to develop awareness and understanding of STEM

<p>Utilize all available resources to explicitly support the continual alignment between current practice and new research to support STEM education.</p> <p>Ensure that key leaders articulate and demonstrate support for STEM within their sphere of influence (e.g. at meetings of chambers of commerce, civic organizations, corporate boards, school boards, PTA, etc.).</p> <p>Secure and sustain explicit support for STEM with all stakeholders throughout the school community.</p>	<p>Collaborate with key leaders to compile a foundational body of research related to high functioning STEM schools and the need for STEM education.</p> <p>Promote the sharing of the foundational body of research with those within key leaders’ sphere of influence.</p> <p>Secure explicit support for STEM with key leaders throughout the school community.</p>	<p>Solicit additional insights, research and data from key leaders. (e.g., research and data related to business and industry needs from graduates, higher education concerns, student and parent perceptions).</p> <p>Incorporate knowledge gained from key leaders into research base that is shared.</p> <p>Provide opportunities, tools, and resources (digital and print) for stakeholders to share their new learning with those within their sphere of influence.</p>	<p>Share research and data on high performing STEM schools with key leaders.</p> <p>Facilitate dialogue with key leaders focused on the positive attributes of STEM identified in research.</p> <p>Address with key leaders concerns and perceived barriers to implementation of STEM educational practices such as scheduling, resources, home support, etc.</p>	<p>Facilitate dialogue designed to generate enthusiasm and inspire key leaders at all levels within the school community to embrace STEM. Key leaders include:</p> <ul style="list-style-type: none"> • district, • school board, • community, • business, • higher education, • teachers, • PTA /PTO, and • students
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Sustaining		Fully Implementing		Refining and Expanding		Progressing		Getting Started	
<p>Desired Outcome EC1: Engaged STEM school communities are anchored by strong leaders who collaborate with all stakeholders to develop awareness and understanding of STEM throughout the school community and build a representative STEM leadership team (SLT)</p>									
<p>EC1.Leaders2: Work with all stakeholders to build the STEM Leadership Team (SLT)</p>									
<p>Maintain, through a continuous improvement process, a system that identifies, plans, and implements a structure that ensures:</p> <ul style="list-style-type: none"> • roles and responsibilities, • timeline for service on SLT, • maximum number of members, • the SLT maintains balanced stakeholder representation, • recruitment of new members when a vacancy occurs, and • vetting and training of new members. 	<p>Design a system that ensures:</p> <ul style="list-style-type: none"> • roles and responsibilities, • timeline for service on SLT, • maximum number of members, • the SLT maintains balanced stakeholder representation, • recruitment of new members when a vacancy occurs, and • vetting and training of new members. 	<p>Foster the STEM Leadership Team's understanding of</p> <ul style="list-style-type: none"> • collaborative norms, • principles of effective meetings, • gaining community support, • iterative processes, and • research on effective STEM schools <p>Engage in the team's initial work which includes but not limited to collaboratively:</p> <ul style="list-style-type: none"> • assigning team roles and responsibilities; • preparing for the team's work in engaging the school community in developing a shared mission, vision, and goals for STEM; and • developing a communication plan. 	<p>Identify, through a collaborative process, a STEM Leadership Team (SLT) made up of representatives from all stakeholder groups to engage in developing the STEM vision, mission, and goals.</p> <p>Specify makeup of STEM Leadership Team to include representatives from all stakeholder groups; representatives should be:</p> <ul style="list-style-type: none"> • influential within their groups, and • clear communicators to bring ideas from their constituent groups to the SLT and vice-versa. 	<p>Conduct a series of information meetings to increase broader community's understanding of STEM.</p> <p>Ensure key leaders and stakeholders with influence at all levels of the school community are included in the meetings.</p>					
<p>EC1.Leaders3: School leaders and STEM Leadership Team (SLT) Develop Shared Vision and Mission for STEM education</p>									
<p>Communicate progress continuously and interactively; use solicited input from community stakeholders and strategic alliance partners to make appropriate revisions and refinements to mission and vision, and goals.</p>	<p>Solicit feedback and input from greater community on STEM mission and vision.</p> <p>Revise vision and mission based on community feedback and input.</p>	<p>Conduct a series of information meetings to increase broader community's understanding of STEM and the school's mission and vision for STEM teaching and learning.</p> <p>Invite all stakeholders including parents, students, staff, community leaders, and school and district leaders.</p> <p>Provide resources for individual further investigation.</p>	<p>Communicate shared STEM vision and mission to the STEM school community.</p>	<p>Engage school community in the development of a shared vision, mission, and goals for STEM teaching and learning that:</p> <ul style="list-style-type: none"> • keenly focuses on student success, and • reflects the self-interest of all stakeholder groups. 					

Sustaining		Fully Implementing	Refining and Expanding	Progressing	Getting Started
<p>Desired Outcome EC1: Engaged STEM school communities are anchored by strong leaders who collaborate with all stakeholders to develop awareness and understanding of STEM throughout the school community and build a representative STEM leadership team (SLT)</p>					
<p>EC1.Leaders4: School leaders and STEM Leadership Team (SLT) Engage community to develop long range goals and plans</p>					
<p>Employ a continuous improvement process to ensure fidelity of implementation of the plan and cyclical revision of STEM vision, mission, and goals.</p>	<p>Develop long range plan, goals and an implementation plan that links activities to vision and mission (may include professional learning plan, professional learning opportunities, class offerings, student support, change support systems).</p> <p>Communicate vision, existing state, goals, and implementation plan with STEM school community stakeholders.</p>	<p>Compare vision and mission to current reality based on assessment.</p> <p>Identify gaps between vision, mission, and current reality.</p>	<p>Analyze data collected through assessment activities including</p> <ul style="list-style-type: none"> surveys of stakeholders, student achievement data, workforce data, community needs, demographics, and assessment of district successes, problems and processes of school community. 	<p>Conduct assessment activities by collecting various community and school based data including</p> <ul style="list-style-type: none"> surveys of stakeholders, student achievement data, workforce data, community needs, demographics, and assessment of district successes, problems and processes of school community. 	
<p>EC1.Teachers1: Gain, demonstrate, and share personal and collective understanding of STEM</p>					
<p>Share up-to-date STEM research with those within their sphere of influence (colleagues, parents, neighbors, friends, etc.) and with faculty SLT representative(s).</p> <p>Align current practice with new research and apply to:</p> <ul style="list-style-type: none"> collaborate with students, leaders, fellow teachers, and strategic alliances to create a classroom environment that inspires innovation; plan and implement standards-based, problem-based lessons; identify and accommodate students' unique talents, abilities and needs; and participate in STEM professional learning experiences and apply learning. 	<p>Analyze foundational research base and compare analysis to current practice and new research findings from the field of STEM education.</p> <p>New research may include:</p> <ul style="list-style-type: none"> site visits, action research, classroom implementation of STEM activities by volunteers who share results with staff, and observations and interviews of students and staff. <p>Share current STEM research with those within their sphere of influence (colleagues, parents, neighbors, friends, etc.) and with faculty SLT representative(s).</p>	<p>Contribute to the research base on STEM education with insights from personal and professional learning.</p> <p>Share STEM research with those within their sphere of influence (colleagues, parents, neighbors, friends, etc.) and with faculty SLT representative(s).</p>	<p>Identify from research and data key characteristics of highly functioning STEM schools and the need for STEM education.</p> <p>Provide informed ideas for faculty representative(s) to share with SLT.</p>	<p>Dialogue to gain understanding of STEM education research.</p> <p>Select faculty representative(s) to serve on SLT.</p>	

Sustaining		Fully Implementing		Refining and Expanding		Progressing		Getting Started	
<p>Desired Outcome EC1: Engaged STEM school communities are anchored by strong leaders who collaborate with all stakeholders to develop awareness and understanding of STEM throughout the school community and build a representative STEM leadership team (SLT)</p>									
<p>EC1.Students1: Gain, demonstrate, and share personal and collective understanding of STEM</p>									
<p>Pose STEM course offerings in collaboration with peers, teachers, and strategic alliances.</p> <p>Demonstrate commitment to their own learning by participating actively in:</p> <ul style="list-style-type: none"> • setting long and short term academic and personal goals and self-assessing progress towards meeting goals, and • seeking support in reaching and exceeding goals from teachers, parents, and strategic alliances. 		<p>Participate actively in pilots of STEM course offerings and provide feedback on the learning experience, knowledge, and skills gained to teachers and SLT.</p>		<p>Share research and information from the SLT with family, peers, and community members.</p>		<p>Collaborate with peers to conduct research on STEM education and STEM careers in order to provide informed ideas for student body representative to share with SLT.</p>		<p>Select student body representative(s) to actively serve on SLT.</p>	
<p>EC1.Strategic Alliances1: Advance STEM education by gaining, demonstrating and communicating understanding of STEM</p>									
<p>Align current practice and new research to support STEM education in meeting the needs identified by strategic alliances within and beyond the STEM school community (e.g., Workforce, local, and global needs).</p> <p>Initiate partnerships with STEM educators to meet the needs of both the school and the partner.</p> <p>Sustain support for STEM education through long and short term planning for active engagement and continuous analysis of results.</p>		<p>Analyze foundational research base for ways to support schools with information and resources that enhance the schools' ability to meet the needs of their strategic alliances and the workforce.</p> <p>Compare analysis to current industry and workforce practices and new research findings from the field of STEM education.</p> <p>Build support for STEM education within their sphere of influence.</p>		<p>Contribute actively to the research base on STEM education with unique insights, workforce needs data, and experiences.</p> <p>Share STEM education research with those within their sphere of influence (e.g., colleagues, employees, neighbors, friends, etc.).</p>		<p>Identify research on the efforts of high performing STEM schools in meeting the needs identified by strategic alliances (e.g. workforce needs, higher education performance).</p>		<p>Select representative(s) to serve on the SLT</p> <p>Explore, through active dialogue, the successes and challenges of K-12 schooling in meeting the needs identified by strategic alliances (e.g., workforce needs, higher education performance).</p> <p>Engage in collaborative dialogue to gain understanding of STEM education research.</p>	

Sustaining		Fully Implementing		Refining and Expanding		Progressing		Getting Started	
<p>Desired Outcome EC2: Engaged STEM school communities are fully engaged in building and sustaining strong strategic partnerships (i.e. students, parents, staff, in and out of school formal and informal service providers, non-profits, institutions of higher education, industrial companies, businesses, and community organizations) to propel the unique interests, attitudes, confidence, and 21st Century and world class skills of students.</p>									
<p>EC2.Leaders1: School leaders and STEM Leadership Team (SLT) Collaborate with community to build partnerships</p>									
<p>Align partnership goals with the education goals of the school.</p> <p>Maintain ongoing evaluation of partnerships through a continuous improvement process.</p> <p>Establish a formal and written management structure and identify a point person to manage partnerships to ensure accountability, provide quality control, and monitor alignment with partnership goals.</p> <p>Manage staff transitions. (When partners have key staff changes).</p>		<p>Assess the strengths and weaknesses of the partnership.</p> <p>Assess the impact of partnership on academic, social, and physical wellbeing of students.</p>		<p>Ensure a shared vision of success and support for all partners:</p> <ul style="list-style-type: none"> • define short and long range goals of partnership including expected outcomes; • draft a partnership proposal and submit it to your potential partner; • train all key personnel in their partnership roles and responsibilities; • write descriptions of roles and responsibilities, accountability measures and guidelines for responsibilities of educators and partners; and • communicate with all stakeholders frequently about partnership plans and activities. 		<p>Establish common ground, begin with an open and frank discussion of values, goals, and needs; respect and reflect the culture and goals of both the educator and partner as related to STEM.</p> <p>Assess potential contributions of partners and match with identified needs (i.e., tutoring, mentoring, technical support, facilities, etc.).</p> <p>Provide opportunities for private and public recognition of all stakeholders.</p>		<p>Seek new partners.</p> <p>Research potential partners who may be able to meet identified critical needs.</p> <p>Talk with potential partners about how community's STEM mission, vision, and goals may align with their individual or organizational goals.</p>	

Sustaining		Fully Implementing		Refining and Expanding		Progressing		Getting Started	
<p>Desired Outcome EC3: Communication among stakeholders promotes knowledge of STEM practices, purposes, and progress and is interactive and ongoing.</p>									
<p>EC3.Leaders1: School leaders and STEM Leadership Team (SLT) Develop ongoing and interactive communication structures</p>									
<p>Maintain an interactive and ongoing system of communication among stakeholders that ensures the availability of:</p> <ul style="list-style-type: none"> • information on current STEM events and research, • regular progress reports on STEM initiatives and programs, and • opportunities and methods for stakeholders to provide input and feedback on STEM programs and initiatives. 		<p>Conduct analysis of communication system to determine if desired results are being achieved.</p> <p>Use the analysis to improve communication structure.</p>		<p>Set up accessible tools to disseminate information about STEM (i.e., school newsletter, school website, local news, local newspaper, social media).</p> <p>Update information frequently.</p> <p>Develop an interactive and ongoing system of communication among stakeholders that promotes knowledge of STEM purposes, practices, and progress towards STEM programs and initiatives.</p>		<p>Continue dialogue with all stakeholders about STEM practices and purpose.</p> <p>Provide further information to increase community knowledge.</p>		<p>Engage in formal and informal dialogue about what STEM is and its promised impact on student learning outcomes with members of school community including but not limited to:</p> <ul style="list-style-type: none"> • students, • parents, • staff, in and out of school formal and informal service providers, • non-profits, • institutions of higher education, • industrial companies, businesses, and • community organizations. 	
<p>EC3.Leaders2: School leaders and STEM Leadership Team (SLT) Embed collaborative practices into the life of the school</p>									
<p>Develop and implement an ongoing process for sustaining collaborative practice such that, when leadership, partners, staff and/or student transitions occur productive dialogue/collaboration practices continue.</p>		<p>Monitor progress and refine practice towards proficiency in the use of productive processes and structures.</p>		<p>Teach, model, and practice the selected process for productive dialogue/collaboration throughout the STEM school community.</p>		<p>Adopt a process for productive dialogue that includes collaborative norms such as pausing, paraphrasing, probing, posing questions, putting ideas on the table, paying attention to self and others, providing data.</p>		<p>Recognize the need for processes and structures for productive dialogue/collaboration.</p>	

Glossary

Collaborative Norms The capacities and skills that guide productive dialogue and discussion in collaborative groups. Each group member agrees to the norms and governs himself or herself accordingly. <http://www.thinkingcollaborative.com/norms-collaboration-toolkit/>

Collective Responsibility The attitudes and beliefs that all stakeholders in the school community share the responsibility of ensuring high levels of learning for every child and that they use their communal strengths to prepare students for success within and beyond K-12 schooling.

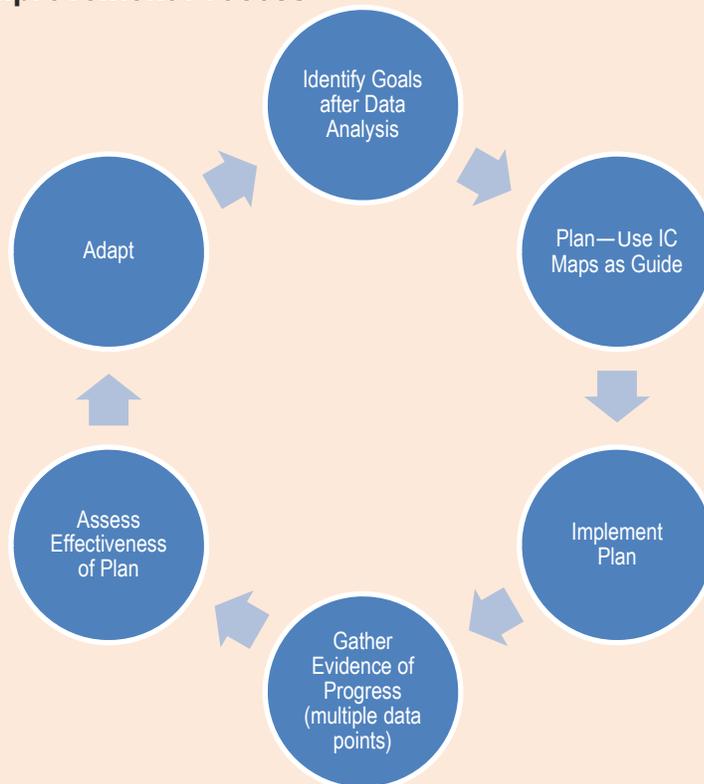
Continuous Improvement Process A data-informed, active and ongoing process in which self-directed learners at all levels of the school identify, plan, implement, monitor, and refine goals. This approach applies to the continuous learning and growth of students, faculty, staff, leaders, organization, and community.

Examples of Continuous Improvement Processes

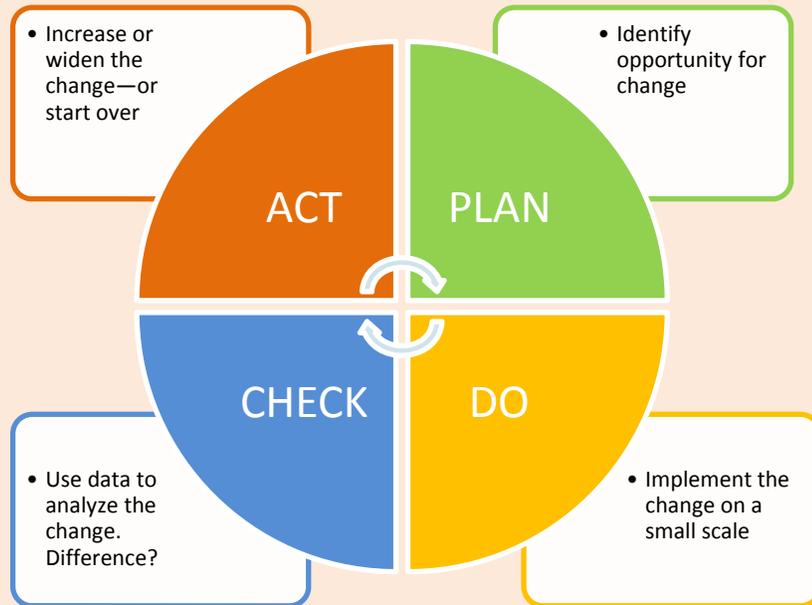
(NOTE: These are a few examples; not an exhaustive list):

Example 1

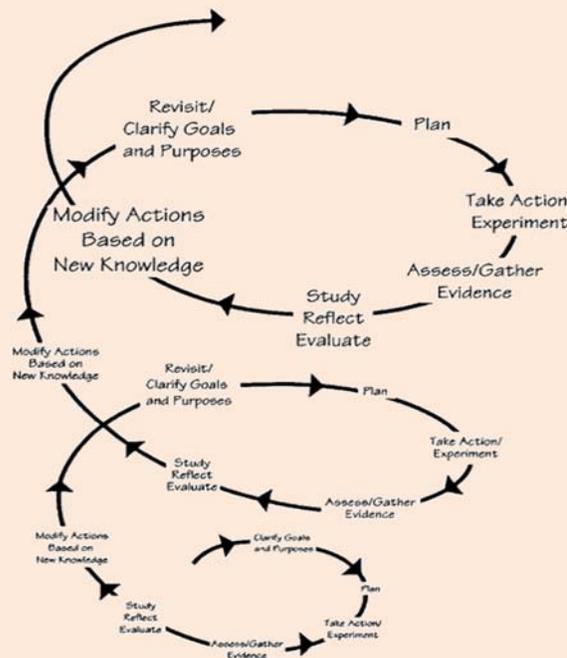
Continuous Improvement Process



Example 2
Continuous Improvement Process



Example 3
Feedback Spiral



(Costa & Kallick, Assessment in the learning organization, 1994)

Gatekeeping Processes Processes (multiple measures) that are the entry requirements for STEM courses of study.

Intra-disciplinary Processes, methods, and language within a single discipline.

Interdisciplinary Processes, methods and language from more than one discipline.

Professional Learning Community (PLC) A group of educators who engage in job-embedded, collaborative learning; together, participants develop professional and student learning goals, and monitor progress towards meeting those goals through a **continuous improvement process**.

School Community The collective group of **stakeholders** reflecting the environment in which the STEM school operates including the cultural norms, political influences, economic resources, and education levels.

Self-Directedness Being guided by oneself to set challenging goals, develop a plan of action, persevere in the face of challenges, and accurately assess progress and performance based on evidence.

SMART Goals **Framework for goal setting. SMART goals should be:**

S = Specific
M = Measurable
A = Attainable
R = Results-based
T = Time-bound

Stakeholder An individual or group with an interest in the success of a school in fulfilling its mission, includes but not limited to parents, students, faculty and staff, businesses, institutions of higher education and community organizations.

STEM Leadership Team (SLT) A team representing the diversity of the community, consisting of school/district leaders and representatives from all **stakeholder** groups. The SLT will lead in the development and implementation of the STEM mission, vision, and goals ensuring that all **stakeholder** ideas and concerns are represented. SLT members should be influential within the groups they represent and able to articulate with clarity communication from their constituent groups to the SLT and vice-versa.

STEM Learning Ecosystem A network of in-and-out of school STEM learning opportunities that work together to deepen students' STEM understandings; the system may be comprised of STEM learning experiences made available by schools, afterschool providers, universities, museums, science centers, community organizations, and families.

"This phrase," according to the National Academy Press publication, *Identifying and Supporting Productive STEM Programs in Out-of-School Settings*, "refers to the dynamic interaction among individual learners, diverse settings where learning occurs, and the community and culture in which they are embedded. STEM learning ecosystem includes all of a community's STEM-rich assets, which include:

- *designed settings*, such as schools, clubs, museums, and youth programs;
- *naturalistic settings*, such as city parks, waterways, and forests and deserts;
- *people and networks of people*, such as practicing STEM professionals, educators, enthusiasts, hobbyists, and business leaders who can serve as inspiration and role models; and
- *everyday encounters* with STEM, such as on the internet, on television, on the playground, or during conversations with family members and other young people."

<http://www.nap.edu/catalog/21740/identifying-and-supporting-productive-stem-programs-in-out-of-school-settings>

STEM Literacy	<p>The knowledge, skills, attitudes, and capacities to:</p> <ul style="list-style-type: none"> • integrate transdisciplinary concepts purposefully and strategically in the design and implementation of innovative solutions (explanations, products, processes) to complex, real-world, personal, local, and global challenges • think critically and flexibly • refine designs through an iterative process (e.g. engineering design process/continuous improvement process)
Strategic Alliance(s)	<p>An individual or group of stakeholders who may be outside of the day to day work of schools, but who engage in ongoing active partnership with schools in developing and implementing a shared mission, vision and goals for STEM education. Strategic alliances may include but are not limited to businesses, institutions of higher education, community and civic organizations.</p>
Transdisciplinary	<p>Student driven approach to teaching and learning in which students, guided by their own questions, design solutions to solve complex, real world problems by calling upon the knowledge, skills, and processes of multiple disciplines as they need them.</p>
World Class Knowledge	<p>(Source: Profile of the South Carolina Graduate)</p> <ul style="list-style-type: none"> • Rigorous standards in language arts and math for career and college readiness • Multiple languages, science, technology, engineering, mathematics (STEM), arts and social sciences
World class skills	<p>(Source: Profile of the South Carolina Graduate)</p> <ul style="list-style-type: none"> • Creativity and innovation • Critical thinking and problem solving • Collaboration and teamwork • Communication, information, media and technology • Knowing how to learn

Bibliography

- AdvancED®. (2015). STEM certification: An overview of the STEM standard and indicators. Alpharetta, GA. Retrieved from AdvancED: http://www.advanc-ed.org/sites/default/files/documents/state-resources/STEM%20Standard_web-ready.pdf
- Bernhardt, V. (2004). *Data analysis for continuous school improvement*. Larchmont, NY: Eye on Education.
- Boss, S. (2012). *Bringing innovation to school: Empowering students to thrive in a changing world*. Bloomington, IN: Solution Tree.
- Bryk, A., & Schneider, B. (2003, March). Trust in schools: A core resource for school reform. *Educational Leadership*, 60(6), 40-45.
- Burns, R., & Drake, S. (2004). *Meeting standards through integrated curriculum*. Alexandria, VA: ASCD.
- Bybee, R. W. (2010, September). Advancing stem education: A 2020 vision. *Technology and Engineering Teacher*, 70(1), 30-35.
- Bybee, R. W. (2013). *The case for STEM education*. Arlington, VA: NSTA Press.
- Carnevale, A. P., Smith, N., & Melton, M. (2011). *STEM report executive summary*. Georgetown University Center on Education and the Workforce. Retrieved from <https://cew.georgetown.edu/wp-content/uploads/2014/11/stem-execsum.pdf>
- Carraway, A., Rectanus, K., & Ezzell, M. (2012). The do-it-yourself guide to STEM community engagement. Retrieved from <http://www.ncpublicschools.org/docs/stem/resources/diy-guide.pdf>
- Costa, A. (2008). *School as a home for the mind: Creating mindful curriculum, instruction, and dialogue*. Thousand Oaks, CA: Corwin Press.
- Costa, A., & Garmston, R. (2002). *Cognitive coaching: A foundation for renaissance schools*. Norwood, MA: Christopher-Gordon Publishers.
- Costa, A., & Kallick, B. (1994). *Assessment in the learning organization*. Alexandria, VA: ASCD.
- Costa, A., & Kallick, B. (2004). *Assessment strategies for self-directed learning*. Thousand Oaks, CA: Corwin Press.
- Covey, S. (2006). *The speed of trust*. New York: Free Press.
- Deming, W. E. (n.d.). *The plan, do, study, act (PDSA) cycle*. Retrieved from W. Edwards Deming Institute: <https://www.deming.org/theman/theories/pdsacycle>
- Dufour, R. (2007). *Developing a shared vision*. ASCD Express. Retrieved from <http://www.ascd.org/ascd-express/vol5/510-video.aspx>
- DuFour, R., Dufour, R., Eaker, R., & Many, T. (2006). *Learning by doing: A handbook for professional learning communities at work™*. Solution Tree Press. Retrieved from <http://www.allthingsplc.info/about>
- Fulton, K., & Britton, T. (2011). *STEM teachers in professional learning communities: From good teachers to great teaching*. Washington, D.C.: National Commission on Teaching and America's Future and WestEd.
- Garmston, R., & Wellman, B. (2009). *Adaptive schools: a sourcebook for developing collaborative groups*. Norwood, MA: Christopher-Gordon Publishers.

- Hamilton, L., Halverson, R., Jackson, S., Mandinach, E., Supovitz, J., & Wayman, J. (2009). *Using student achievement data to support instructional decision making (NCEE 2009-4067)*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://ies.ed.gov/ncee/wwc/publications/practiceguides/>
- Honey, M., Pearson, G., & Schweingruber, H. (Eds.). (2014). *STEM integration in K-12 education: Status, prospects, and an agenda for research*. Washington, D.C.: The National Academies Press. Retrieved from http://www.nap.edu/catalog.php?record_id=18612
- Jacobs, H. H. (2010). *Curriculum 21: Essential education for a changing world*. Alexandria, VA: ASCD.
- Lantz, H. B. (2009, September 3). Science, technology, engineering, and mathematics (STEM) education what form? What function? Retrieved from <http://www.currtechintegrations.com/pdf/STEMEducationArticle.pdf>
- Learning Forward. (2011). Standards for professional learning. Retrieved from <http://learningforward.org/standards-for-professional-learning#.VfjgM5eyimV>
- Leonard, J. (2012, April 12). Civic awareness and civic literacy [Blog post]. Retrieved from Skill Pages Youth Employment Blog: <http://skillspages.com/blog/?p=732>
- National Center on Time & Learning. (2012). *Why time matters*. Retrieved from <http://www.timeandlearning.org/why-time-matters>
- National Science Foundation. (2007). A national action plan for addressing the critical needs of the U.S. science, technology, engineering, and mathematics education system. Retrieved from http://www.nsf.gov/nsb/documents/2007/stem_action.pdf
- Outlier Research and Evaluation, University of Chicago. (n.d.). STEM school study. Retrieved from <http://outlier.uchicago.edu/s3/>
- Profile of the SC graduate. (n.d.). Retrieved from <http://www.eoc.sc.gov/Home/Profile%20of%20the%20Graduate/Profile%20of%20the%20SC%20Graduate.pdf>
- Shulman, L. (n.d.). Professional education. Retrieved from <http://www.leeshulman.net/domains/>
- South Carolina academic standards and performance indicators for science. (2014). Retrieved from http://www.ed.sc.gov/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
- South Carolina college-and career-ready standards for mathematics. (2015). Retrieved from <http://www.ed.sc.gov/agency/ccr/Standards-Learning/documents/SCCCRStandardsforMathematicsFinal-PrintonOneSide.pdf>
- Stiggins, R., Arter, J., Chappius, J., & Chappuis, S. (2007). *Classroom assessment for student learning: Doing it right – using it well*. Upper Saddle River, NJ: Pearson Education, Inc.
- Successful K-12 STEM education: Identifying effective approaches in science, technology, engineering, and mathematics*. (2011). Washington, D.C.: The National Academies Press. Retrieved from <http://www.nap.edu/catalog/13158/successful-k-12-stem-education-identifying-effective-approaches-in-science>
- Traphagen, K., & Traill, S. (2014). *How cross-sector collaborations are advancing STEM learning. The Noyce Foundation*. The Noyce Foundation. Retrieved from <http://www.samueli.org/stemconference/documents/stem%20learning%20ecosystems.pdf>

Vasquez, J. A., Sneider, C., & Comer, M. (2013). *STEM lesson essentials: Integrating science, technology, engineering, and mathematics*. Portsmouth, NH: Heinemann.

Wagner, T. (2012, April). Educating the next Steve Jobs. *Wall Street Journal*. Retrieved from <http://online.wsj.com/article/SB10001424052702304444604577337790086673050.html>