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MEMORANDUM

TO: Members, Utah State Board of Education

FROM: Brad C. Smith
Chief Executive Officer

DATE: June 18-19, 2015

INFORMATION: STEM Schools Designation Rubric

Background:

In order to support local initiatives that are attempting to meet the requirements of STEM education in Utah, the Utah Legislature is supporting designation of STEM schools. Utah Code 63M-1-3204 states in part that: *"The STEM Action Center as funding allows shall: work cooperatively with the State Board of Education to designate schools as STEM schools, where the schools have agreed to adopt a plan of STEM implementation in alignment with criteria set by the State Board of Education and the board . . ."* The Board approved the ten foundational elements of STEM Schools Designation in August 2014.

Key Points:

- The rubric developed is aligned with the elements approved by the Board in August 2014.
- The rubric has gone through a public review for approval in May 2015.
- The rubric has been presented to the STEM Action Center Board for review and comment.

Anticipated Action:

This is an informational item to update the Board on the development of the rubric for STEM Schools Designation that aligns with the previously approved elements.

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STEM Schools Designation for Utah



Prepared by the

Utah State Office of Education

June 18-19, 2015

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STEM SCHOOLS DESIGNATION FOR UTAH



Utah STEM Action Center with the Governor's Office of Economic Development
In partnership with the
Utah State Office of Education



Utah STEM Schools Designation

Purpose:

Utah's STEM definition - "STEM education is the intentional inclusion of science, technology, engineering, and mathematics, and their associated practices, to create a student-centered learning environment in which students investigate, engineer solutions to problems, and construct evidence-based explanations of real-world phenomena."

The Utah STEM Schools Designation program was developed to define the criteria and elements necessary for a school to create a comprehensive STEM learning environment for their students. The STEM schools designation program will allow schools to engage in discussions with faculty and community partners around STEM education as a lens for strong instruction for students to prepare them for college and career readiness. The designation also serves as an indicator for members of the public who are looking for STEM school experiences in Utah K-12 education. Schools that have identified a passion for STEM education will benefit from the opportunity for both reflection and recognition through this program.

In order to support local initiatives that are attempting to meet the requirements of STEM education in Utah, the Utah Legislature is supporting designation of STEM schools. Utah Code 63M-1-3204 States in part that:

"The STEM Action Center as funding allows shall: work cooperatively with the State Board of Education to designate schools as STEM schools, where the schools have agreed to adopt a plan of STEM implementation in alignment with criteria set by the State Board of Education and the board;"

STEM Schools Criteria:

The following criteria are proposed to evaluate STEM schools for designation:

- i. Curriculum: Problem-Solving Rigorous Learning (7 Elements including *Problem-Solving Learning*, *Student Cooperation*, and *Engineering Design Process*)
- ii. Leadership (4 Elements including *Career Exposure* and *STEM Instructional Leadership Team*)
- iii. Assessment (2 Elements including *Student Learning Outcomes* and *Use of Assessment to Inform Instruction*)
- iv. Professional Learning (3 Elements including *Staff Engagement in Relevant Professional Learning Opportunities* and *Staff Reflect on Their Work*)
- v. Teaching (4 Elements including *Teacher Differentiation of Instruction Based on Learning Needs* and *Staff Spreads Practices*)

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- vi. Student Engagement and Equity (7 Elements including *Student Autonomy* and *Extracurricular Activities*)
- vii. Community (3 Elements including *Family Involvement* and *Service Learning*)
- viii. Facilities (2 Element including *Technology Use* and *Allocation for Physical Resources to Support STEM Learning for Students*)
- ix. Strategic Alliances (3 Elements including *Partners Support Instruction* and *Provide Resources and Staff Establishes and Maintains Partnerships*)
- x. Advancement and Sustainability (2 Elements including *Development of a Five-Year Plan on Goals and Benchmarks for Community Strengths*)

The rubric articulates how each criteria will be evaluated at one of four levels of implementation. Schools will provide evidence and artifacts in a portfolio model with accompanying narrative for each of the elements in alignment with their implementation.

Non- Existent = 0 points	Developing = 1 point	Existing = 2 points	Exemplary = 3 points (In addition to all 'Existing' indicators)
The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document. A school is able to indicate a maximum of five elements for the "Developing" implementation level, as we recognize that change takes both time and resources.	These indicators articulate the evidence that this element exists within the school community. All indicators must be met to qualify for the "Existing" implementation.	These indicators articulate the evidence that this element is exemplary at the school community. All indicators must be met in addition to all the indicators in the existing category to qualify for "Exemplary" implementation.

Designation Levels:

Each school will indicate a level of implementation for all of the proposed elements. The STEM School Designation award levels will be granted at the following point values:

Designation	Point Range
No STEM School Designation for schools that are still in development phase of STEM mission and programming	0 points – 69 points
Bronze STEM School Designation	70 points – 80 points
Silver STEM School Designation	81 points – 90 points
Gold STEM School Designation	91 points – 99 points
Platinum STEM School Designation	100 points and above

Pilot Year Timeline:

Release of Utah STEM Schools Designation Pilot Program <i>Designation Criteria, Applications, and all supporting documents for the process.</i>
Pre-Assessment Due to STEM Action Center

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<i>The pre-assessment materials will include an application that asks schools to identify stakeholders who will be helping in the application process and complete an initial overview of school evidence for criteria.</i>
Full Portfolio Due STEM Action Center <i>The full portfolio will comprise of the completed rubric with proposed implementation levels accompanied by artifacts, evidence, and a narrative for each element.</i>
Review of Portfolios for STEM Schools by Utah STEM Stakeholders <i>The review of the portfolio will be completed by representatives from multiple STEM stakeholder groups, including K-12 STEM teachers and leaders, USOE, STEM Action Center, Industry partners, etc. Feedback will be given on strengths and areas for improvement.</i>
Site Visits Scheduled and Completed for Schools seeking Gold or Platinum STEM School Designation <i>Site visits will be day long visits of review teams looking at evidence in alignment with portfolio and will consist of observation and interviews.</i>
STEM School Designation Awards Ceremony

This would be an annual application cycle that would be available to schools each school year. Once awarded, the designation would be active for 3 years before a school would need to reapply to maintain or ascend to a new designation level.

The designation will be noted with STEM designation seal to be available for the school to use in promotional materials. In addition the school would be listed as a designated STEM school on the STEM Action Center website for community reference. At this time, there is no additional funding to be awarded for STEM School Designation.

Future Goals for the STEM Schools Designation Program:

1. Review community feedback from pilot year to improve upon rubric, application, and process.
2. Look at development of specific rubrics for elementary and secondary level schools.
3. Work with an external evaluator to look at STEM school outcomes for both academics, attitudes, and interests.

DEFINITION OF STEM FOR UTAH

UTAH's STEM definition: "STEM education is the intentional inclusion of science, technology, engineering, and mathematics, and their associated practices to create a student-centered learning environment in which students investigate, engineer solutions to problems, and construct evidence-based explanations of real-world phenomena."

Science, Technology, Engineering, and Mathematics (STEM) education is critical to ongoing economic success in Utah. Nationwide, growth in STEM careers outpaces that of any other occupational category. STEM occupations grow more quickly than the economy as a whole and provide opportunities at all levels of education. In addition STEM careers offer higher beginning salaries and more career earning potential than most other fields. Today's careers require STEM skills at all levels of employment, from service industries to engineering. Young adults who do not possess high-level skills in mathematics, science, and technology are at a significant career disadvantage, not only because of the tremendous opportunities for high-wage, high-demand STEM careers, but also because these skills are vital for success in other industry sectors. This combination of high need and high opportunity in STEM fields requires us to consider the proper preparation and support for individuals pursuing STEM studies.

STEM education is best sustained by supporting both individual content areas and integrated experiences. Mathematics and science build the foundation for students to apply learning in technology and engineering coursework. Integrated coursework and projects can be used to support both the academic Core Standards and the Career and Technical Program Standards. Furthermore, all four content areas work together as students engage in design challenges, laboratory experiences, and internships with rapidly growing STEM companies. STEM education requires an integrated learning approach where engineering is valued as more than activities in academic courses, where technology is seamlessly integrated throughout, and where there are high expectations for achievement in mathematics and science.

STEM education in Utah must support the critical competencies of knowledge, skill, ability, work interest, and work values. Coursework in mathematics and science builds content knowledge and skill fundamental to STEM, while coursework in subject areas such as language arts and social studies provides opportunities to improve processing, research, and communication skills that support STEM fields. In Utah, STEM includes health courses, both because of the considerable applications of STEM to health careers, but also because of the health science research supporting wellness as a building block to brain function. Problem-solving is critical to STEM success and should be evident in all classrooms. Career and technical studies in specific fields such as engineering or technology provide opportunities for students to apply knowledge and skills while building work interest. Each individual STEM field enhances the others. Finally, the entire school community works together to promote work values that include recognition, achievement, security, and responsibility.

The Utah State Office of Education (USOE) and the STEM Action Center with the Governor's Office of Economic Development (STEM AC) are committed to supporting STEM education in Utah by maintaining and improving the K-12 education system while collaborating with higher education and industry. It is the responsibility of public schools to provide foundational knowledge and skill along with associated experiences in

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career and technical studies. The USOE and the STEM AC work with higher education to develop and sustain up-to-date STEM competencies and research-based instructional strategies for incoming and practicing teachers. Both offices identify and promote effective programs that will build student interest in STEM fields and that supports those programs whenever possible. In order to continue this effort, additional support for ongoing professional development and replication of promising practices is necessary.

The STEM Schools Designation is designed to provide a framework of best practices in STEM education to support schools who have an interest in utilizing a STEM lens to frame their curriculum and instruction. The STEM Schools Designation also helps schools identify areas of strength and areas for continued growth and development to support strong STEM instruction. Finally, the STEM Schools Designation helps inform community stakeholders about the engagement and goals of STEM education specific to our K-12 public and charter schools in the Utah system of education.

WHERE ARE THE "S," "T," "E," and "M" IN STEM?!

As you look through the ten elements and the STEM school components, you may notice what seems like a lack of items that relate specifically to the S.T.E. and M. (science, technology, engineering, and math) disciplines. In the research base developed by Outlier Research with the University of Chicago around STEM schools, and in conversations with Utah STEM school leaders and teachers, it has become increasingly evident that "STEM" doesn't mean only these disciplinary subjects. When we ask about the missions and goals of their schools, teachers often describe the importance of things like engaging students with real-world problems, preparing them for the workforce, and developing them as critical thinkers and active citizens.

The STEM disciplines themselves manifest in a variety of ways in the inclusive STEM high schools that participate in the S3 study. The instructional practices and culture in these schools are often equally, if not more, important to their STEM identity than specific quantitative data around the number of STEM courses offered. In many inclusive STEM high schools, the STEM disciplinary focus is more subtle, and the school's self-identification as "STEM School" comes more directly from a focus on pedagogy and the school culture. In all cases, it is clear that some of the most valued components of STEM schools are not STEM-discipline-specific, but relate to broader, transferrable, lifelong skills.

Many of the ideas and instructional approaches employed by STEM schools predate the STEM movement. Educational philosophers such as Dewey, Piaget, Vygotsky, and Bruner have advocated for inquiry and constructivist approaches for over a century. These thinkers argued for student autonomy, relevance, collaboration with peers, and learning-by-doing. They encouraged educators to view students as active participants in their own learning, and considered citizenship and creative and inventive thinking to be important student outcomes. None of

¹ Outlier Research and Evaluation, University of Chicago. (2015) *STEM Schools Study*. Retrieved from: <http://outlier.uchicago.edu/s3/>

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them called it "STEM," but approaches and end- goals for students advocated by such philosophers are strikingly similar to what STEM school leaders mean when they talk about STEM today.

The STEM School Elements within the STEM Schools Designation for Utah reflect these ideas, as identified by inclusive STEM school educators themselves: embracing problem- and project-based approaches, personalizing students' learning, creating a sense of community and family, equipping students with the skills necessary for college and for the workplace, and connecting with the community.

STEM Schools work to meet these goals through an integrated approach to learning and rigorous coursework in all disciplines. These schools certainly focus on giving their students high quality, challenging coursework in STEM subjects, but also do so in all of the disciplines they teach, and in the context of all of the other things they are working to accomplish. The STEM disciplines are there, but STEM is more than the sum of its S. T. E. and M. parts.

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Curriculum: Problem-Solving Rigorous Learning

STEM Curriculum is selected based on Utah Core Standards. The curriculum has an articulated interconnectedness between science, technology, engineering and math. Curriculum and instruction are coordinated between the various aspects of STEM. Projects form a substantial part of the curriculum.

Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
<p>1. Interdisciplinary Instruction Helps Students Make Interdisciplinary Connections</p> <p><i>There are collaborative team(s) comprised of teachers who teach different disciplines. Students identify ways that disciplines are interrelated, reinforced, and complement one another.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Teachers ask students to think about how the content of the lesson relates to other STEM disciplines. - Students are asked to apply what they learned in another subject to a lesson, assignment, or activity at least once per month. 	<ul style="list-style-type: none"> - Teachers ask students to think about how the content of the lesson related to ALL other disciplines. - Students are engaged in an integrated unit that articulates interdisciplinary connections one or more times per week.
<p>2. Problem-Solving Learning</p> <p><i>Learning is student-led, interdisciplinary, and engaged in real-world content and multiple solutions for student cooperation utilizing STEM knowledge and skills. Problem-solving learning at this school requires a thorough process of inquiry, knowledge building, and resolutions. Curriculum includes projects, often interdisciplinary and ranging from short- to long-term, which are focused on solving an authentic problem.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Problem-solving learning (short-term) is evident in lessons/activities at least once per month in the STEM curriculum. - Problem-solving learning in projects (long-term) is evident in the STEM curriculum at least three times per year. - Students are required to do research for problem-solving learning at least three times per year. 	<ul style="list-style-type: none"> - Problem-solving learning in short-term projects is evident in lessons/activities at least once per week in the STEM curriculum. - Problem-solving learning in long-term projects is evident in the STEM curriculum at least five per year and three per year in other disciplines. - Problem-solving learning in long-term projects at the school draw from multiple courses or subjects.
<p>3. Student Cooperation</p> <p><i>Students learn from each other and work well together.</i></p>	<p>The school does not include and/or does not have evidence of</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's</p>	<ul style="list-style-type: none"> - Students collaborate and work as teams in STEM disciplines at least once per week. - Student products in STEM 	<ul style="list-style-type: none"> - Students collaborate and work as teams in all disciplines at least once per week.

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	this element in practice at this time.	STEM planning document.	disciplines reflect group learning interactions at least once per month. - Students are engaged in giving and receiving constructive feedback to peers in STEM learning cooperative settings at least three times per year.	- Student products in all disciplines reflect group learning interactions at least once per month. - Students are engaged in giving and receiving constructive feedback to peers in all course cooperative settings at least three times per year. - Students use appropriate technology as available for collaborative work, communication, research and data collection/analysis, in projects and other assessments daily.
4. Connections to the Real-World and Current Events <i>Students make connections between what they are learning and real-world experiences, current events, and/or their daily lives.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Instruction regularly helps students to better understand current events and/or issues. - Students are required to apply knowledge learned in the classroom to conceptual or theoretical real-world scenario at least three times per month in STEM disciplines.	- Instruction consistently helps students to better understand current events and/or issues, including those specific to Utah, the United States, and international communities. - Students are required to apply knowledge learned in the classroom to conceptual or theoretical real-world scenarios at least three times per month in all disciplines.
5. Engineering Design Process <i>The teacher supports students' use of an engineering design process (prototype, test, evaluate, and revise).</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Engineering design process is the focus of science and CTE classroom curriculum at least twice per year. - One problem-solving learning project per year requires development of a product/outcome utilizing the	- The engineering design process is the focus of science and CTE classroom curriculum at least four times per year. - The engineering design process is referenced in all classes as a possible strategy to addressing a problem.

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			engineering design process in most STEM classes.	
<p>6. Standards and Core Course Sequence</p> <p><i>The school takes standards (Utah Core Standards, 21st Century Skills (http://www.p21.org/), etc.) into account in school scheduling/curriculum design/instruction.</i></p>	<p>N/A</p> <p><i>Standards-based instruction aligned to the Utah Core Standards is central to instruction. Schools need to have this element in place to be eligible for STEM School Certification.</i></p>	<p>N/A</p> <p><i>Standards-based instruction aligned to the Utah Core Standards is central to instruction. Schools need to have this element in place to be eligible for STEM School Certification.</i></p>	<ul style="list-style-type: none"> - Utah standards are the central component of all lessons for all classes. - Educators frequently review disciplinary standards for their subject area(s). - The curriculum is vertically aligned within programs, as well as to the current Utah Core Standards. - <i>Secondary schools:</i> The school provides a thoughtful rationale for the core course sequencing. 	<ul style="list-style-type: none"> - Educators frequently review disciplinary standards for subject area(s) specific to their teaching assignment and other subject areas. - Educators utilize additional standard sets, such as 21st century skills, computer science standards, etc., to inform instruction. - Teacher teams vertically plan STEM instruction within schools. - <i>Secondary schools:</i> Students have opportunities to take STEM-based courses beyond the traditional grade-level requirements.
<p>7. Cognitively Demanding Work</p> <p><i>Students use thinking and process skills. This includes considering alternative arguments or explanations, making predictions, interpreting their experiences, analyzing data, explaining their reasoning, and supporting their conclusions with evidence.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Student learning products exemplify at DOK 2-3 level at least once a month. Classroom instruction is predominantly student-centered, and all students are asked to extend and refine their acquired knowledge to routinely analyze and solve problems, as well as create unique solutions. - All students are asked to support their conclusions with evidence. Students are asked to explain their reasoning. - All students are asked to consider and/or define 	<ul style="list-style-type: none"> - Student learning products exemplify at DOK 3-4 level one or more times per month. Classroom instruction is predominantly student-centered, and all students are asked to have the competence to think in complex ways and apply the knowledge and skills they have acquired. Students are asked to create solutions and take action that further develops their skills and knowledge. - All students are asked to support their conclusions with evidence. Students

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			alternative explanations.	are asked to explain their reasoning. - All students are asked to come up with alternative explanations or arguments. All students are asked to make hypotheses or predictions.
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Leadership

The school leadership has created clear definitions and a vision of STEM teaching and learning as it applies in the local school and as informed by state, national, and global efforts. Collaboration exists between community, industry and other education partners. Efforts are made to connect to national and global efforts.

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Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
<p>1. Career Exposure</p> <p><i>Students participate in post-secondary education exposure activities, such as college tours, and in career-readiness experiences, including internships and mentoring. In some cases, experiences may be customized for each student.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Career field experiences are offered to students at least two times per year for authentic learning. - Careers are directly incorporated into the STEM instruction at least once per month. - <i>Secondary Schools:</i> Internships or on-site STEM participation exist for some of the students. - <i>Secondary Schools:</i> All students participate in job-shadowing, field experiences, or other on-site experiences in STEM fields at least once each year. 	<ul style="list-style-type: none"> - Outside-the-classroom learning includes field experience and authentic, contextual learning that directly connects to the in-class curriculum. - Partners help students and teachers understand what is expected of a student planning to enter a career in the partner's field.
<p>2. College and Career Readiness Skills</p> <p><i>Students use the skills of communication, creativity, collaboration, leadership, critical thinking, and technological proficiency.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<p><i>STEM lessons/activities require students to exercise skills they will use in the workplace:</i></p> <ul style="list-style-type: none"> - Lessons/activities require students to demonstrate leadership and responsibility. - Lessons/activities require students to present information effectively and are aligned with the Utah ELA standards for communication. - Lessons/activities require students to exercise time management and organize their work. 	<p><i>ALL lessons/activities require students to regularly exercise skills they will use in the workplace:</i></p> <ul style="list-style-type: none"> - Lessons/activities require students to demonstrate leadership and responsibility. - Lessons/activities require students to present information effectively, and are aligned with the Utah ELA standards for communication. - Lessons/activities require students to exercise time management and organize their work.
<p>3. STEM Instructional Team Leaders Support Instruction</p>	<p>The school does not include and/or does not have evidence of this element in</p>	<p>Work is in progress to develop this element within</p>	<ul style="list-style-type: none"> - A STEM leadership team is in place to ensure continuous STEM program improvement. - Teacher teams address expectations of school set by the leadership team. 	<ul style="list-style-type: none"> - A STEM leadership team is in place to define and monitor and evaluate entire school. - Leadership teams meet regularly to discuss research, best practices,

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<p><i>A portion of school's staff, in addition to administrators, has time designated for instructional leadership and actively supports instruction (e.g., leads professional development, models instruction, gives feedback on instruction, etc.). School leaders ensure that staff members have opportunities to grow in their roles as STEM schoolteachers and leaders.</i></p>	<p>practice at this time.</p>	<p>the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Teams meet regularly to discuss school goals and progress, research, best practices, and opportunities for improvement. - School leaders ensure that teachers have opportunities to see exemplary practice. - Teachers know that it's okay to try new practices. School leaders support teachers when they fail with constructive procedures and feedback. - Utah Effective Teaching Standards and Utah Educational Leadership Standards are involved in planning and framework for leadership development—see http://www.schools.utah.gov/CURR/educatoreffectiveness/Standards.aspx - School leader(s) encourage and support teachers to seek out additional professional learning opportunities beyond school/LEA. 	<p>successes, and opportunities for improvement toward STEM School goals.</p> <ul style="list-style-type: none"> - School leaders model instructional practice, demonstrate and support staff development in high-quality instruction. - School leaders model and support risk-taking and autonomy for staff. - School leaders model and support staff innovation and/or attempting new strategies. - Utah Effective Teaching Standards and Utah Educational Leadership Standards are directly referenced and central to planning, development, and evaluation of leadership efforts—see http://www.schools.utah.gov/CURR/educatoreffectiveness/Standards.aspx
<p>4. Staff Has Sense of School Ownership and Participates in Decision Making</p> <p><i>Staff members behave in a manner that exhibits their responsibility for and commitment to the success of the school. The staff contributes to and has a say in decisions regarding the school. The staff works with independence and self-direction.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - The school leadership engages staff in strategic planning. - The school leadership has an articulated process for staff to give input and feedback. - Decisions are made by greater than 50% of the school's staff. 	<ul style="list-style-type: none"> - The school leadership engages ALL staff members in strategic planning. - The school leadership has an articulated process for staff members to give input and feedback, and responds to feedback in an open setting. - Decisions are made by ALL school faculty and staff members.

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Assessment

Assessments are ongoing, authentic and cross-curricular. They are project-focused and performance-based. Rubrics for projects are provided and articulate with the goals of the assessment. Formative assessment informs summative assessment and teaching efforts.

Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
1. Student Learning Outcomes (SLOs) Process <i>Demonstration that school utilizes SLO process to measure student outcomes and teacher instruction.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	<ul style="list-style-type: none"> - STEM courses utilize SLOs to measure progress toward targets for at least two expected student learning outcomes. - Students are actively informed about mastery expectations and progress. 	<ul style="list-style-type: none"> - 80% of courses utilize SLOs to measure progress toward targets for at least two expected student learning outcomes. - Qualitative assessments exist around student learning outcomes.
2. Use of Assessment to Inform Instruction <i>The teacher uses information on current student understanding to inform and plan future instruction.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	<ul style="list-style-type: none"> - All teachers use multiple indicators of success (e.g., performance assessments, observations, monitoring student dialogue) at least once a week to inform their decisions about instruction (reteach concepts, try an alternative instructional strategy, organize the students differently, provide an alternative example). - Most teachers go back and reteach concepts based on student understanding. - Teachers consistently use observation and monitor student dialogue to assess student learning. 	<ul style="list-style-type: none"> - All teachers use multiple indicators of success (e.g., performance assessments, observations, monitoring student dialogue) almost every class session to inform decisions about instruction (e.g., reteach concepts, try an alternative instructional strategy, organize the students differently, provide an alternative example). - Teachers use observation and monitor student dialogue to consistently assess student learning, and share their data in teacher teams at least once a month.

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Professional Learning

STEM-focused professional learning is fully implemented. Professional development aligns with Utah’s requirements for professional learning ([Utah Code 53A-3-701](#)) and aligns with Utah Core Standards and Utah Effective Teaching Standards. Learning communities and learning networks are integrated into efforts for personal growth and school wide growth.

Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all “Existing” indicators)</i>
<p>1. Staff Engagement in Relevant Professional Learning Opportunities</p> <p><i>The staff participates in internal or external growth and development activities that are beneficial and relevant to their work. Staff members are willing to try new practices and adjust what they do for the greatest benefit for students.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school’s STEM planning document.</p>	<ul style="list-style-type: none"> - Professional development meets ALL of the criteria established in Professional Learning Standards articulated in Utah law 53A-3-701 passed in 2014 http://le.utah.gov/~code/TITLE53A/htm/53A03_070100.htm - School leader(s) make sure teachers have access to STEM professional learning at least once per school year. - Staff members occasionally try new strategies (e.g., instructional, management, stakeholder outreach). - Staff members have clear opportunities to give input about professional development needs and outcomes received at the school. 	<ul style="list-style-type: none"> - Professional development meets ALL of the criteria established in Professional Learning Standards articulated in Utah Code 53A-3-701, passed in 2014 http://le.utah.gov/~code/TITLE53A/htm/53A03_070100.htm - School leader(s) make sure teachers participate in professional learning at least once per month. - Staff members regularly try new strategies (e.g., instructional, management, stakeholder outreach). Some PD experiences or staff collaboration time are structured to focus on new practices.
<p>2. Professional Development Resources</p> <p><i>Resources (both time and funding) are available to help teachers and staff develop and further their skills.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school’s STEM planning document.</p>	<ul style="list-style-type: none"> - School leadership ensures that professional development opportunities are identified and shared. - School leadership makes sure that professional development is high quality. - School leadership supports staff interests in STEM professional learning. - Leaders designate financial and human resources to support staff professional development. 	<ul style="list-style-type: none"> - The leadership obtains grant(s) and/or brings in resources beyond school funding streams to support professional development. - Leaders evaluate the impact of professional development.

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<p>3. Staff Reflects On Their Work</p> <p><i>The staff considers the strengths and weaknesses of their practices and ways they can improve.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Staff members explicitly identify times to consider the strengths and weaknesses of their work. - Staff members document monthly reflections about how to improve their work. 	<ul style="list-style-type: none"> - Staff members develop strategies for improving their work in collaboration with colleagues and administration. - Staff members document weekly reflections about how to improve their work.
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Teaching

Teaching is conducted with a focus on STEM concepts, processes and thinking. Teachers coordinate lessons, ideas and planning among one another with a mechanism in place for doing so in both formal and informal ways. Incentives exist for supporting one another. Correlations among various aspects of STEM are articulated and explicit. The faculty demonstrates content competency in all areas of STEM and have relevant endorsements. Efforts are made to support content sharing.

Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
<p>1. Code of Behavior and Values</p> <p><i>The staff emphasizes and demonstrates code of behavior and values for themselves and students. The staff listens to, supports, and engages constructively with colleagues.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - The student handbook articulates a code of behavior, values, and treatment of one another with trust and respect. - The code is visibly displayed. - Staff and students talk about the code of behavior and values in classes. 	<ul style="list-style-type: none"> - Staff and students talk about it in and outside of class (in hallways and after school activities). - Students use and are assessed on core values in their learning. - A program for recognition of student conduct exists. - STEM career behaviors and skills are embedded into the code of behavior and values.
<p>2. Teacher Differentiation of Instruction Based on Learning Needs</p> <p><i>The teacher customizes instruction based on abilities, learning styles, and developmental levels of the students.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Course pacing of content covered is modified to accommodate for differences among students. - Teachers ensure that rigor is maintained while making lessons accessible for all students. - Teachers adapts curriculum to better fit student learning styles. - Teachers use a range of pedagogical strategies. 	<ul style="list-style-type: none"> - Teacher differentiation incorporates students' real-life applications for outside learning. - Students are able to self-select the differentiation. - Teachers regularly and systematically share information about students' learning differences.

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<p>3. Staff Spreads Practices</p> <p><i>The staff shares with others practices they enact in their classrooms and school.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - STEM practices and strategies are shared across all staff members in the school. - The staff at this school shares information and strategies with other schools interested in STEM practices. 	<ul style="list-style-type: none"> - Staff members at this school provide PD/training/consultation to each other and to other schools interested in STEM practices. - Staff members at this school share instructional materials with each other and with other schools interested in STEM practices.
<p>4. Common Planning Time and Individual Planning Time are Incorporated into the Schedule</p> <p><i>Planning time specifically devoted to supporting collaborations among school staff, and planning time provided specifically for staff to prepare individually for instruction, in any way that they choose.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Teachers have a set time to collaborate and work individually at least monthly together to plan integrated lessons, share/co-create STEM activities, and plan learning outcomes. Regular, collaborative planning time allows teachers within grade levels to give each other advice and ideas about instruction, and work through problems together. 	<ul style="list-style-type: none"> - Teachers have a set time to collaborate and work individually at least weekly together to plan integrated lessons, share/co-create STEM activities, and plan learning outcomes. - Regular, collaborative planning time allows teachers within and across grade levels to give each other advice and ideas about instruction, and work through problems together.

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Student Engagement and Equity

There is solid evidence for engagement of all demographics in the local community. Efforts are connected and follow a coherent, research-based plan. Efforts show a deep understanding of STEM equity issues and needs. Students are regularly involved in planning and conducting learning activities. Students are regularly engaged in the actual doing of science, mathematics, and project-based learning.

Student Engagement and Equity				
Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
<p>1. Support for Social and Emotional Needs of Students</p> <p><i>The staff considers the range of students' needs. These include social, emotional, and academic needs.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - The school has a student induction process, program, or activities that support incoming students. - Teachers reach out to family and talk with students to understand students' social and emotional well-being. - Regularly scheduled strategies and procedures have been implemented across the entire school that focus on relationships and on developing and fostering global literacy (e.g., student advisory class, class meeting, or homeroom). 	<ul style="list-style-type: none"> - The school has a student induction process, program, or activities that supports new students' transitioning to the school in ALL grade levels. - Teachers meet regularly to discuss students' social and emotional needs. - A scheduled part of the school day extends instruction or focuses on supporting relationship building. - Annual resources are allocated to develop, revise, and sustain strategies and procedures across the entire school (e.g., student advisory class, class meeting, or homeroom). - Students, teachers, parents, and external partners provide input into strategies and procedures (e.g., student advisory class, class meeting, or homeroom).
<p>2. Belief That All Students Can Learn</p> <p><i>The staff takes steps to ensure all students have opportunities to master content.</i></p>	<p>N/A <i>Belief that all students can learn is central to instruction. Schools need to have this element in place to be eligible for</i></p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - The school works to provide equitable access to rigorous, high-level courses. - All students' specific and identified needs are being met. - Specific considerations are made in STEM classrooms that support all students, including populations underrepresented in STEM fields. 	<ul style="list-style-type: none"> - The school works to provide equitable access to rigorous, high-level courses. - Special programs have been designed to encourage underrepresented students to develop interest in STEM careers. - Special programs have been designed to encourage

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	<i>STEM School Certification.</i>		- Teachers receive professional development on underrepresented populations in STEM fields to inform instruction.	underrepresented students to develop interest in STEM careers.
3. Student Participation in Decision-Making	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	<ul style="list-style-type: none"> - Students participate in the development/revision of the code of behavior and values. - Students are encouraged to give feedback at any time (via a suggestion box, etc.). - There are structured opportunities for students to provide feedback. 	<ul style="list-style-type: none"> - Students participate in high-level school decision-making, such as disciplinary regulations, course planning and development. - School has a system in place to ensure that there is representative voice in student decision-making.
4. Extracurricular Activities <i>Students have the opportunity to participate in sports, clubs, and STEM activities that take place outside of regular school hours.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	<ul style="list-style-type: none"> - Programming is connected to the school day curriculum. - The school offers extracurricular activities that are engaged in by some of the students. - Some of the students participate in STEM competitions on-site/online STEM exhibits, and/or in state and national STEM forums. 	<ul style="list-style-type: none"> - STEM experiences are directly connected in in-class learning. - The school offers extracurricular activities that are engaged in by most of the students. - Students participate in STEM competitions on-site/online STEM exhibits, and/or in state and national STEM forums.
5. Representative Population <i>School maintains student population with a focus on reflecting a population representative of the community/area the school serves.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The school engages in outreach, support, and focus on underrepresented student populations.	<ul style="list-style-type: none"> - The school actively recruits student populations reflective of the diversity and gender of the local community. - School population is fully representative of the diversity and gender of the local community.
6. Student Autonomy <i>Students have independence in and ownership of their learning. Students set goals for their learning and make choices about how to accomplish them.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	<ul style="list-style-type: none"> - Some lessons/activities required students to take initiative and be self-directed. - The majority of STEM lessons/activities require students to manage their own work and bring it to completion. - Students make meaningful 	<ul style="list-style-type: none"> - Most lessons/activities required students to take initiative and be self-directed. - Most STEM lessons/activities require students to manage their own work and produce results. - Teachers seek input from students about their personal

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			choices about their learning (e.g. choosing a topic) experiences.	<p>interests to incorporate into lessons.</p> <ul style="list-style-type: none"> - Students make choices that significantly shape their learning experiences (e.g., choose style of learning). - Teachers allow students to lead the class. - Teachers seek input from students about their personal interests to incorporate into lessons.
<p>7. Students Reflect on Their Learning</p> <p><i>Students reflect on the strengths and weaknesses of their learning approaches and ways they can improve them; students accept changes.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Most classes employ the use of self-assessment for students to reflect on their learning specific to content and skills for each unit/problem solving learning project. - Students identify and document strengths and weaknesses at least twice a year in collaboration with faculty. 	<ul style="list-style-type: none"> - All classes employ the use of self-assessment for students to reflect on their learning specific to content and skills for each unit/problem-solving learning project. - Students identify and document strengths and weaknesses more than four times per year in collaboration with faculty. - School maintains a portfolio of student reflections to inform students' continued self-assessment over the course of their high school career.

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Community

There is an established community of practice regarding STEM learning and STEM teaching. Events, activities and opportunities for involvement help students, teachers, parents and community members learn about and support STEM education in the school.

Element	Non-existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
<p>1. Family Involvement</p> <p><i>Families are aware of/participate in student activity and achievement.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Staff members keep students' parents/guardians up to date about classroom instruction and their student's learning. - Some teachers use technology to regularly communicate student progress to parents/guardians. - Opportunities exist for parents to be involved in presentations and/or assisting in the classroom. 	<ul style="list-style-type: none"> - Staff members keep students' parents/guardians up to date about classroom instruction and their student's learning and seek structured feedback. - All teachers use technology to regularly communicate student progress to parents/guardians. - The school actively engages in strategies to increase parent engagement.
<p>2. Service Learning</p> <p><i>Students participate in service learning or volunteer activities to give back to partners in the community.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Students engage in service-learning opportunities that are aligned with school curriculum and instruction at least once per year. 	<ul style="list-style-type: none"> - Students and some partners engage in service learning opportunities that are aligned with school curriculum and instruction two or more times per year. - Student leadership is evidenced in the planning and implementation of service learning.
<p>3. School Establishes and Maintains Community Presence</p> <p><i>School actively engages the community and participates in community involvement activities.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - The facility is open to students before and after school hours to help build the school community and provide opportunities to continue academic work. - School supports community-based events with facilities. - STEM teams communicate frequently and consistently with the community. 	<ul style="list-style-type: none"> - The school works with community organizations to support community initiatives (e.g., staff and students volunteer, school and community organizations work together for a common cause). - Opportunities exist to showcase student work through community events via on-site or online exhibitions.

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Facilities

Spaces are available for collaboration and project work. Facilities have been adapted or designed for STEM learning. Facilities reflect a focus on STEM learning efforts. Facilities reflect student design and input in the use of the facilities. Materials and equipment follow safety protocols. Obvious efforts have been made to make resources available to students for use in learning, design and project efforts.

Element	Non-existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
<p>1. Technology Use</p> <p><i>Students use technology as intended for learning purposes.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - The teacher uses current and emerging technologies in instruction of most classes. - Teachers teach students specific skills using a range of technologies (computers to AutoCAD, etc.). - Products of 21st century technology tool use by students are visible throughout the school through several grade levels. - Teachers and students receive ongoing access and opportunities to expand their proficiency in technology use at least once per year. 	<ul style="list-style-type: none"> - The teacher uses current and emerging technologies in instruction of ALL classes. - Products of 21st century technology tool use by students are visible throughout the school through ALL grade levels. - Teachers and students receive ongoing access and opportunities to expand their proficiency in technology use at least once per month. - Teachers challenge students to identify and use the tools they need to solve problems. - Technology is used to engage in global learning opportunities and communities that extend beyond the state of Utah.
<p>2. Allocation for Physical Resources to Support STEM Learning for Students</p> <p><i>The allocation and use of resources and space are present to create flexible community learning environments to meet the needs of project-based learning.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Spaces are available for collaboration and project work. - Facilities have been adapted or designed for STEM learning. - Materials and equipment follow safety protocols. 	<ul style="list-style-type: none"> - Spaces are available for collaboration and project work, and are regularly used by all students and teachers to facilitate learning. - Facilities reflect student design and input on use of the facilities.

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Strategic Alliances

Alliances exist between the school and strategic partners. Parents and parent groups are involved in the school process and decision making. Business, industry, and other community partners work together to promote STEM learning and career awareness. Long-term partnerships are formed and supported through ongoing efforts. Partnerships are evaluated at least annually, and additional partnerships are formed to support emerging needs and opportunities. Teachers have ongoing relationships with industry partners and engage in externships.

Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
<p>1. Partners Support Instruction and Provide Resources</p> <p><i>Partners from industry, institutes of higher education, career and technical centers, etc. participate in and/or support instruction to meet a variety of academic goals, which often includes connecting students with professionals.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Community members are actively engaged in the vision and work of the school (e.g. curriculum, co-teaching, field experiences). - Partners help teachers understand what is expected of a student planning to enter a career in the partner's field. - Business, community, and post-secondary partnerships are involved in all STEM classes at least once per school year to: <ul style="list-style-type: none"> - Develop lesson plans or problem-solving learning projects with teachers. - Provide professional learning. - Provide field experience or site-based learning opportunities. - Partners provide resources to support student learning outcomes. 	<ul style="list-style-type: none"> - The school actively seeks input from partners and integrates suggestions into school-wide strategies - Partners recruit other STEM partners to support the school with resources.
<p>2. Partners Help Establish and Maintain Community Presence</p> <p><i>Partners increase knowledge and visibility of the STEM school.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Several partners actively showcase student work in their business or elsewhere in the community, and/or support publicity around student STEM learning. - Partners engage in school-related functions with students. 	<ul style="list-style-type: none"> - Partners attend and/or host community events to support the school or showcase student work

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<p>3. Staff Establishes and Maintains Partnerships</p> <p><i>Staff creates and develops partnerships with organizations external to the school.</i></p>	<p>The school does not include and/or does not have evidence of this element in practice at this time.</p>	<p>Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.</p>	<ul style="list-style-type: none"> - Some staff members at this school create external partnerships with the school, such as with colleges, universities, businesses, or institutions. - Staff members work collaboratively with the school's external partners. 	<ul style="list-style-type: none"> - Most staff members this school create and maintain external partnerships with the school, such as with colleges, universities, businesses, or institutions.
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Advancement and Sustainability

A five-year plan includes each of the criteria for an effective STEM school. Strengths and weaknesses are identified. Plans are in place to address weaknesses with evidence and research supporting the plan. Strengths are examined for the purpose of continued improvement. Future efforts and trends are examined, and ongoing renewal is planned for.

Element	Non-Existent	Developing	Existing	Exemplary <i>(In addition to all "Existing" indicators)</i>
1. Development of a Five-Year Plan on Goals and Benchmarks for Community Strengths <i>The school has a five-year plan that includes evaluation of each of the criteria for a STEM school. Examination of strengths takes place for the purpose of continued improvement.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The plan was created by multiple stakeholders and includes at least two strengths to build upon.	- The school plan includes plans for sustainability and improvement regardless of changes in leadership or staff with LEA support.
2. Development of a Five-Year Plan on Goals and Benchmarks for Improvement <i>The school has a five-year plan that includes evaluation of each of the criteria for a STEM school. Examination of weaknesses takes place, with evidence and research supporting the plan.</i>	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The plan was created by multiple stakeholders and includes at least two weaknesses to address.	- The school plan includes plans for sustainability and improvement, regardless of changes in leadership or staff with LEA support.

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Resources

- a. State Board of Education Guidelines for STEM School Criteria approved in Board Meeting – August 2014
- b. STEM Schools Study - Outlier Research and Evaluation with University of Chicago available at - <http://outlier.uchicago.edu/s3/>
- c. Georgia STEM Schools Program- <http://stemgeorgia.org/>
- d. Indiana STEM Schools Program - <http://doe.in.gov/sites/default/files/ccr/indiana-stem-school-certification-applicationv2.pdf>
- e. Texas T-STEM Schools Program - http://www.edtx.org/uploads/general/pdf-downloads/misc-PDFs/2011_TSTEMDesignBlueprint.pdf