PK-20 STEM Education Fidelity of Implementation Rubric

Texas Education Agency

Intended Audience: Leadership

Purpose of the tool: The STEM Fidelity of Implementation Rubric is for use by individuals who are responsible for monitoring school-level implementation of STEM. This analytic rubric is aligned with the high-quality indicators identified on the PK-20 STEM Framework. The performance levels differentiate between the stages of a STEM program. After completing the rubric, districts will complete the scorecard and identify areas of strength and opportunities for STEM program growth. This tool can be used to gather baseline data for a district/campus, evaluate the effectiveness of local STEM programming, and used yearly to reevaluate progress toward targeted goals.

The Texas Education Agency has developed the STEM Framework that provides an overview of the components needed in a high-quality STEM program. There are four tools to assist a district in developing a local STEM program that is aligned to the high-quality indicators identified by the state. The STEM tools are designed to help a district identify areas of need, identify the STEM model that best aligns with programming, help develop the structure and program design, and how to sustain programming long term. The Fidelity of Implementation tool can be used to backwards map a high-quality STEM program during the planning phase.

STEP 1

Look at the Framework

- Review definition of STEM state level objectives, strategies to success, K-12 STEM education models, research-based instructional methods, and high-quality indicators

STEP 2

Complete the STEM Needs Assessment

- Identify needs and gaps in STEM programming

STEP 3

Complete the STEM Model Identification Guide

- Identify the STEM model best aligned to the district

STEP 4

Complete the STEM Program Planning Guide

- Use the STEM Program Identification Guide as a reference when planning the district's future STEM program. The STEM Continuum Sample Experiences can be used to help generate ideas.

STEP 5

Complete the Sustainability Assessment Tool

- Identify appropriate sustainability component assets and/or needs

*A STEM Framework and Effective School Framework Crosswalk can be found at the end of this document.

DOMAIN 1 BROADEN PARTICIPATION

1.1 STEM Instruction is offered for all students on campus

Access to STEM programming have been included throughout this rubric to assist leaders in identifying areas of programming where not all students have access and addressing those barriers to create a STEM environment where every student can succeed.

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
1.1a Program access	System strategies to support access for all students to participate in programs	Increased capacity within the system and incorporated some strategies with inconsistent review for improvement	STEM programming is offered consistently within the system and incorporated in some strategies with consistent review for improvement	All systems and strategies expand access **and** consistently reviewed
1.1b Outcomes impact all students	Intervention(s) are misguided, limited or non-existent increase in student access	Audit of student participation reflects unexpected outcomes when an intervention is applied	Audit of student participation reflects some observed outcomes when an intervention is applied **and** is not validated through assessment	Audit of student participation reflects expected outcomes when an intervention is applied **and** is validated through assessment

EXAMPLE ARTIFACTS

- ○ Strategic plan for interventions including a description of student participation and analysis of campus participation gaps
- ○ Analysis of students participating in STEM programming
- ○ Documentation of STEM leadership team has training/experience designing full access programming

District Identified Artifacts:

DOMAIN 2 SCHOOL CLIMATE AND CULTURE

2.1 Professional development on integrated STEM content, resources, and instructional methods provided for all staff
2.2 Professional development to build a STEM culture and growth mindset in the organization provided for all staff

A campus offering STEM ensures a systemic professional development (PD) model that provides continuous learning based on student results, teacher development, and goals of the school. The PD model, including school-level and personalized plans, creates an environment that allows educators to continue to learn and pursue opportunities that build the capacity to provide better STEM learning opportunities for students.

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
2.1a Quality STEM professional development	Teachers participate in large group professional development sessions that introduce STEM teaching skills	Teachers participate in large group professional development sessions focusing on critical STEM teaching skills	Teachers have identified unique professional development (PD) goals, participate in large and small group, and personalized learning professional development sessions **and** PD includes support across the school year during implementation of school-based STEM strategies and teachers observe colleagues and engage in formal reflection and discourse regarding practice **and** PD sessions align with the needs of the program/school and student learning needs	Professional development (PD) is ongoing and aligns with STEM initiatives and includes support across the school year **and** teachers have identified unique PD goals and participate in large and small group and personalized learning PD sessions **and** teachers observe colleagues and engage in formal reflection and discourse regarding practice **and** PD often embedded within the working day and aligns with the needs of the program/ school and student learning needs
2.1b Professional development on designing PBLs or design-based learning experiences	Teachers participate in PD sessions that provide information and samples of project/problem-based learning STEM modules and/or design-based challenges	Teachers participate in PD sessions that provide information and samples on the development of project/problem-based learning STEM modules and/or design-based challenges	Teachers collaborate to custom design project/problem-based learning and/or design-based challenges STEM modules	Teachers collaborate to custom design project/problem-based learning STEM modules **and** higher education industry partners contribute to the PBL and/or design-based challenges **and** STEM modules include the content area TEKS with the STEM fluency skills
2.1c Professional development on STEM Instructional strategies that include differentiation	○ Instruction is focused on meeting testing standards through drill and practice ○ Instruction is the same for every student and all students are required to produce the same work	○ Instruction is predominantly drill and practice with occasional use of critical thinking, problem solving and higher-order exercises ○ Instruction occasionally utilizes differentiation techniques to support some groups of various learners	○ Instruction mostly supports meaningful learning that includes critical thinking, problem solving and higher-order exercises ○ Instruction utilizes some differentiation techniques to meet the needs of groups of various learners	○ Instruction avoids drill and practice and supports meaningful learning that includes critical thinking, problem solving and higher-order exercises ○ Instruction is differentiated to meet the needs of individual students and supports student innovation
2.1d Professional development on STEM content competency	Professional learning on STEM content proficiency is not available and staff wanting to improve their STEM content knowledge must pursue this PD independently	Professional learning on STEM content proficiency is offered occasionally for some staff **and** some STEM faculty participate	Professional learning on STEM content proficiency is available for all staff **and** most of the STEM faculty participate	Professional learning on building STEM proficiency is available **and** required for all staff at all levels to ensure delivery of rigorous and integrated STEM content
2.2a Leadership professional development (PD)	The school leadership team ***rarely*** participates in PD sessions that address STEM education issues	The school leadership team participates ***semi-annually*** in active, online PD sessions that introduce novice STEM education issues	The school leadership team participates in ***annual*** face-to-face and online PD that address current STEM education issues	The school leadership team participates in annual face-to-face and online PD **and** networks with other STEM school leaders to address current STEM education issues

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
2.2b Professional development on building a STEM culture and growth mindset	Professional learning focuses on building a STEM culture of collaboration among like content area educators	Professional learning focuses on building a STEM culture of collaboration among all educators **and** professional learning includes training for staff on having a growth mindset	Professional learning focuses on building a growth mindset and STEM culture of collaboration among all educators **and** building a STEM collaborative culture in classrooms	Professional learning focuses on building a growth mindset and STEM culture of collaboration among all educators **and** building a STEM collaborative culture in classrooms **and** professional learning includes training on how to build a growth mindset culture in the STEM classrooms

EXAMPLE ARTIFACTS

○ Annual PD plan including training for STEM content, resources, and research-based instructional methods

○ Annual PD plan to build a STEM culture and growth mindset

○ Professional development calendar and attendance records

○ Professional development is available in different modes (face-to-face, online, individualized)

○ Sources of PD: state, district, STEM professionals, higher education faculty, job embedded, model STEM schools, and peer-to-peer

○ Evidence that a STEM culture has been established for example, a consistent problem-solving method (engineering design process/computational thinking) approach is used throughout the school

○ Classrooms are designed for collaboration (tables, moveable desks)

○ Spaces are available for collaboration and project work (white boards, project materials)

○ Provide evidence that teachers have set a time for collaboration to plan integrated lessons

○ Participate in state or regional STEM conference

District Identified Artifacts:

DOMAIN 3 PROGRAM DESIGN

3.1 Leadership team made up of STEM stakeholders including school board, community, higher education, business and industry to ensure a successful academic and career pipeline
3.2 Students' PK-20 learning pathways is aligned to STEM careers and postsecondary STEM degree plan
3.3 STEM pathways include academic and technical skills to prepare students for STEM careers. (For example, engineering students have both CTE courses and high-level math and science course)
3.4 STEM program has a strategic plan including STEM integrated instruction aligned to the TEKS and offered regularly throughout the year

A campus offering STEM programming needs a STEM strategic plan and a leadership team comprised of campus staff and community members who collaborate frequently about the program's design and effectiveness.

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
3.1a Organizational commitment to equitable STEM programming	Strategies for expanding participation are not apparent in the organizations mission or activities – although it may be identified as a value it has not been operationalized	The organization is committed to expanding participation **and** is making efforts to operationalize it	The organization explicitly promotes student participation as an organizational priority **and** has operationalized it in some of its programs	All aspects of the organization explicitly promote student participation as an organizational priority **and** have operationalized it
3.1b STEM leadership team	Leadership team includes campus personnel	Leadership team includes campus/ district personnel and school board	Leadership team includes campus/ district personnel, school board, and a few STEM community members	Leadership team includes campus/ district personnel, school board, STEM community members (non-profit, informal STEM educators, and STEM business members), and higher education partners (secondary)
3.2a Accessibility for STEM pathways **(Secondary Only)**	○ Upper level STEM courses such as calculus and Physics are not available ○ Algebra 1 is available to limited 8th grade students ○ CTE programming is not available in middle school and there are limited offering in high school ○ No modifications or support services are available for students	○ Upper level STEM courses are inconsistently available ○ Algebra 1 is available in the 8th grade ○ STEM related CTE programs are limited at the middle and high school level ○ Few support services are available for students	○ Upper level STEM courses are available in most high schools ○ Algebra 1 is available in most middle schools at the 7th and 8th grade level ○ Some student access to STEM certifications, STEM endorsement, and college entrance examinations ○ Limited support services are available for students	○ A full sequence of STEM courses including academic and CTE ○ A CTE Program of Study in STEM with four coherent sequence of courses are offered at all levels and all students are completing them successfully ○ STEM certifications, STEM endorsement, and college entrance examinations are available and all students are supported to attain them ○ Modifications and support services are available for students
3.2b STEM endorsement completion **(Secondary only)**	○ STEM endorsement is not offered in the district	○ STEM coursework does not necessarily lead to a STEM endorsement	○ Students who are participating in STEM coursework are following a pathway aligned to a STEM endorsement	○ Students who are participating in STEM coursework are following a pathway aligned to a STEM endorsement **and** students are experiencing a blended approach to STEM including both CTE and advanced courses

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
3.2c Post-secondary opportunities **(Secondary only)**	○ A dual credit, College Career Readiness School Model (CCRSM), partial immersion or full immersion STEM plan is developed to encourage student success in high school to college transition **and** online courses are available	○ A dual credit, College Career Readiness School Model (CCRSM), partial immersion or full immersion STEM plan is in place and offers at least six college credits (AP, IB, certifications, dual enrollment) developed to encourage student success in high school to college transition **and** a technology plan is in place to provide online learning for students	○ A dual credit, College Career Readiness School Model (CCRSM), partial immersion or full immersion STEM plan is in place and offers at least twelve college credits (AP, IB, certifications, dual enrollment) developed to encourage student success in high school to college transition **and** HS courses are enhanced by technology based teaching methodologies and opportunities to obtain certifications	○ A dual credit, College Career Readiness School Model (CCRSM), partial immersion or full immersion STEM plan is in place and offers at least fifteen college credits (AP, IB, certifications, dual enrollment) developed to encourage student success in high school to college transition **and** partners with industry ad higher education collaborate with the school staff to continually evaluate and improve course offering **and** HS courses are enhanced by technology based teaching methodologies and opportunities to obtain certifications
Blended approach of technical and academic knowledge **(Secondary only)**	STEM pathways include only core content courses or only Career Technical Education courses	STEM pathways include only core content courses or only Career Technical Education courses	STEM pathways include some advanced course work **and** Career Technical Education courses	STEM pathways include a pairing of Career Technical Education courses and advanced courses to prepare students for the technical application and advanced course content needed in STEM careers and entry into postsecondary institutions
3.4a Frequency of PK-12 STEM experiences	Exploratory Model: ○ Stand-alone events ○ Not integrated within core content ○ Experiences are not aligned to the TEKS	Introductory Level Model: ○ STEM experiences are available for a limited number of students ○ Anchored in one content area throughout the school ○ Experiences might be aligned to TEKS	Partial Immersion Model: ○ STEM experiences are embedded into the lesson cycle regularly ○ Cross-curricular connections within each grade level ○ Experiences are embedded in content and aligned to TEKS	Full Immersion Model: ○ All content taught through a cross-curricular approach blending STEM into all content areas seamlessly ○ All TEKS are taught through PBL/ design-based challenges ○ No content TEKS are taught in isolation
3.4b STEM action and sustainability plan	Program leaders have created a basic STEM plan which outlines STEM high-quality indicators	Program leaders have created a detailed STEM plan grounded in research and defined the role the team plays in the planning and development prior to implementation	Program leaders have implemented the STEM plan and provided support to prepare teachers in the transformation of STEM teaching methods	Program leaders have implemented the STEM plan which includes sustainability and improvement, provided support to prepare teachers in the transformation of STEM teaching methods, **and** have developed partnerships with postsecondary institutions and businesses to identify solutions for executing a quality STEM program

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
3.4c Financial investment	The organization has a limited STEM budget for secondary programming only	The organization has created a secondary STEM budget and a separate budget priority for STEM access initiatives and professional development that supports the organization's STEM learning environment	The organization has a PK-12 STEM budget that reflects its STEM values by using a significant amount of its resources to support initiatives **and** professional development that supports the organization's STEM agenda	The organization has a PK-12 STEM budget that reflects its values by investing in initiatives for all students and their learning environment **and** professional development that supports the organization's STEM agenda
3.4d School schedules	Participating teachers have a common planning time within the school day	Participating teachers have a common planning time within the school day **and** scheduling supports STEM integration across two or more subjects, but not on a consistent basis	Participating teachers have a common planning time within the school day **and** scheduling supports STEM integration across two or more subjects consistently (block schedule, co-teaching)	Schedules allow for consistent teacher collaboration, co-teaching and integration of subjects **and** schedules allow ample time for projects, teacher planning, and non-traditional courses

EXAMPLE ARTIFACTS

- ○ Organization mission and vision
- ○ Budget details and priorities
- ○ Program evaluation tools, rubric, scorecards, and reports that show participation metrics, and outcomes
- ○ Documentation of data trends in STEM program based on evaluation tools
- ○ Course guide showing availability of courses, certifications, and endorsements (secondary)
- ○ STEM leadership team has led stakeholders in a collaborative design process to create a detailed STEM strategic plan using the TEA PK-20 STEM Education Programming Planning Guide
- ○ Provide schedule that supports STEM teaching and learning
- ○ Built-in planning time for teachers to interpret student data and adjust instruction accordingly
- ○ Built in time and evidence for students to participate in self-evaluation and goal setting consistently

District Identified Artifacts:

DOMAIN 4 CURRICULAR ASPECTS OF THE STEM EDUCATION PROGRAM

4.1 STEM Project/Problem-Based Learning and/or Design-Based Challenges are aligned to grade level TEKS
4.2 STEM Project/Problem-Based Learning or Design-Based Challenges have integrated content across STEM fields
4.3 STEM classroom experiences that include career exploration and authentic real-world activities/projects
4.4 Opportunities to develop STEM Fluency Skills: communication, collaboration, creativity, critical thinking, resilience, promptness, time management, adaptable, innovative
4.5 Opportunities to develop the technical skills of the engineering process and computational thinking
4.6 Experiences are vertically aligned throughout the district/campus and to postsecondary (PK-20)
4.7 Experiences are horizontally aligned to TEKS throughout the grade level (cross curricular)
4.8 Student mastery is demonstrated through a variety of assessment methods including formative, summative, and performance-based measures

The STEM curriculum contains Texas Essential Knowledge and Skills (TEKS) and has articulated interconnectedness between science, technology, engineering, mathematics, and other content areas. Project/problem-based learning and design-based challenges form a substantial part of the curriculum. STEM fluency skills are developed and emphasized with students. Curricular components are assessed to measure student outcomes and teacher instruction to ensure a strong, innovative, and cohesive STEM program.

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
4.1 Integrated in the formal curriculum	STEM content is only offered in isolated course or program offerings **and** programs is only offered to high performing students	STEM content is integrated in some courses or programs at the discretion of the educator **and** students served are isolated through course selection or clubs	Program/school-wide efforts are being made to integrate STEM across the curriculum with inconsistent implementation **and** all students' needs are considered in programming	STEM content is formally supported through integrated curriculum, co-teaching, STEM thematic instruction, and professional development **and** all students are encouraged to participate in programming with modifications and support services available for all students.
4.2 Integrity of the academic content	The academic content for the learning experience is inaccurate or is not anchored to any content standard	The academic content for the learning experience is accurately presented **and** appropriately anchored to at least one academic content standard for each content area represented	The academic content for the learning experience is accurately portrayed **and** appropriately anchored to more than one academic content standard for each content area represented	The academic content for the learning experience is accurately portrayed **and** tied to multiple content standards **and** focused on helping students acquire deep understanding of a foundational skill critical to their future learning in the targeted discipline(s)
4.3a Relevant STEM content	STEM content is the same for all students and is only relevant to one group of students	STEM content is the same for most students with real-world and relateable content used inconsistently across levels	Program-wide efforts are being made to offer real-world and relevant STEM content with inconsistent implementation	STEM content is relevant to every student and includes application that inspires learning **and** uses examples, images, problems, projects are relevant to the students engaged

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
4.3b Career connected STEM learning	Student learning is rarely connected to future STEM careers **and** career connections mostly present examples that are typical with the industry **and** student success in STEM careers is not explicitly a part of STEM learning **and** information about STEM education pathways to careers is not systematically or readily available	Student learning is linked to STEM careers during special events or STEM career days **and** career connections often make mention of role models in STEM careers **and** teachers understand and explain that people from all backgrounds succeed in each industry **and** school staff make information about STEM education pathways to careers available	Key concepts throughout the year are connected to STEM careers **and** career connections often make mention of role models in some STEM industries **and** students and their families understand that people from all backgrounds succeed in each STEM industry **and** school staff invite students and families to identify and pursue STEM education pathways to chosen careers	All student learning is connected to relevant STEM careers **and** career connections showcase role models in STEM careers **and** all students and their families believe that they can be successful, regardless of their background, in any STEM industry **and** school staff work with students and families to identify and pursue STEM education pathways to chosen careers
4.4a STEM fluency skill development	The school does not include and/or does not have evidence of this indicator in practice currently	Work is in progress to develop this indicator within the school **and** it is included in the school's STEM planning document	Experiences require students to exercise STEM fluency skills **and** require students to ask questions, define problems, and analyze and interpret data **and** encourage students to effectively communicate and collaborate with their peers	Experiences require students to exercise STEM fluency skills **and** require students to ask questions, define problems, and analyze and interpret data **and** require students to effectively communicate and collaborate with their peers
4.4b School environment	Classrooms are arranged for collaborative work **and** locations facilitate the integration of STEM content and teacher collaboration	Classrooms are arranged for collaborative work **and** participating teachers foster a culture of inquiry with students through the implementation of STEM fluency skills in every class	Classrooms are arranged for collaborative work **and** participating teachers foster a culture of inquiry with students through the implementation of STEM fluency skills in every class **and** virtual learning is used to connect students and teachers, to bring in outside expertise, or to exhibit student work	Classrooms are arranged for collaborative work **and** additional spaces are identified for students to use for collaboration or work areas **and** classroom locations facilitate the integration of STEM content and teacher collaboration **and** virtual learning is used as a way to connect students and teachers, to bring in outside STEM expertise, or to exhibit student work
4.5 Engineering design process and computational thinking process	The learning experience includes no requirement that students develop thinking skills required in the engineering design process or computational thinking	The learning experience helps students develop or refine thinking skills that are part of the engineering design process without explicitly referencing the engineering design process and/or refine thinking skills that are part of the computational thinking process without explicitly referencing the computational thinking process	The learning experience explicitly references the engineering design process or computational thinking process **and** requires students to demonstrate thinking skills across multiple steps in the engineering design process and/or computational thinking process	The learning experience in addition to explicitly referencing engineering design and/or computational thinking, requires students to demonstrate thinking skills in employing all steps in the processes, including opportunities to experience the recursive nature of the process
4.6 Experiences are vertically aligned to TEKS throughout the district/campus (PK-12)	STEM experiences are not aligned between grade levels at the campus level **and** STEM experiences are not vertically aligned to the TEKS	STEM experiences are aligned at the campus level, but not aligned at the district level **and** STEM experiences are vertically aligned to the TEKS in some grades at the campus level	STEM experiences are aligned at the district level **and** STEM experiences are vertically aligned to the TEKS in some grades at the campus level	STEM experiences are aligned at a district level from PK-12 grade **and** STEM experiences are vertically aligned to the TEKS at every grade level to build a student's STEM literacy as they progress through the district

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
4.7 Experiences are horizontally aligned to TEKS throughout the grade level (cross curricular)	No opportunity for students to make connections to non-STEM content (language arts and social studies) **and** no TEKS from other content areas are aligned to the project/challenge	Opportunities for students to be told about connections, but not engage in activities integrating non-STEM content (language arts and social studies) **and** TEKS from 1 other content areas are aligned to the project/challenge	Experiences require students connect STEM learning with a non-STEM area to complete a project/challenge **and** TEKS from 2 or more other content areas are aligned to the project/challenge	Experiences require students connect STEM learning with a non-STEM area to complete a project/challenge **and** TEKS from 2 or more other content areas are seamlessly integrated into project/challenge
4.8a Formative, summative and performance-based assessments	Performance-based assessments are used to monitor student learning **and** state-wide data used to drive instructional practices	Performance-based and pre/post assessments are used to monitor student learning **and** student observations are included as an assessment tool **and** state-wide data is used to drive instructional practices	Teachers use a variety of assessments including performance-based assessments to determine student learning **and** pre/post assessments are used to show student growth **and** non-traditional assessments are used to monitor students processes **and** state-wide data is used to drive instructional decisions **and** teachers use observation and monitor student dialogue to assess student processes in problem solving and innovation	Teachers use a variety of assessments including performance-based assessments to determine student learning **and** pre/post assessments are used to show student growth **and** teachers use observation and monitor student dialogue to assess student processes in problem solving and innovation **and** students participate in self-evaluation and goal setting consistently **and** the school uses data from state-wide and school assessments to drive instruction
4.8b Data driven instruction	Teachers minimally use student data to guide instruction **and** only state standardized tests are used (3-12) **and** data is only tracked for specially funded programs	Teachers and school staff use state standardized test data (3-12) to guide instruction **and** teachers also collect formative data about students	Teachers and school use state standardized test data (3-12), in addition to other standard assessments **and** teachers collect formative data **and** all student data is tracked down to the individual student's needs, possibly through use of individual learning plans or specialized software and data walls and a variety of other data tracking systems are employed	Teachers and school use state standardized test data (3-12), in addition to other standard assessments and national, district, and classroom assessments **and** teachers collect formative data and maintain records for all students **and** all student data is tracked down to the individual student's needs and each student has an individual education plan **and** data walls and a variety of other data tracking systems are employed **and** student data conferences are provided to help students understand their data

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)

EXAMPLE ARTIFACTS

- ○ Student demonstrations that reflect mastery of STEM content and procedures
- ○ Evidence that diagnostic, ongoing, and vertically and horizontally aligned assessments are used for all students to drive instructional and programmatic changes
- ○ Data analysis from formative, summative, and performance-based assessment to support all students to achieve learning goals
- ○ Example of real-world and relevant curriculum
- ○ Documentation of modifications and support services available for students
- ○ Student surveys showing career awareness and interest in STEM
- ○ Examples of curriculum that is focused on the building STEM Fluency Skills (communication, creativity, collaboration, critical thinking, resilience, promptness, time management, adaptability, and innovation)
- ○ Portfolios that allow students to portray their learning via collections of personal work
- ○ Authentic assessments on products using rubrics

District Identified Artifacts:

DOMAIN 5 STAKEHOLDER ENGAGEMENT

5.1 Connections to effective in and out-of-school STEM programs
5.2 Stakeholder partnerships for students that expand classroom learning to include capstone experiences (including virtual) like mentorships, internships, practicums
5.3 STEM Work-Based Learning experiences to increases interest and abilities in careers requiring STEM skills
5.4 Stakeholder partnerships for teachers that connect their academic content to STEM careers through externships and research experiences
5.5 STEM family engagement events/experiences hosted by the district/campus

Ecosystem of STEM partnerships are established and provide connections between curriculum taught in the classroom and practical applications outside of school. These partnerships have created an environment in which students develop high-level STEM skills and knowledge inside and outside of the classroom and increase readiness for college and careers.

HIGH QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
5.1 Extended learning STEM experiences	The school does not include and/or does not have evidence of this indicator in practice currently	Work is in progress to develop this indicator within the school **and** is included in the school's STEM planning document	The school offers extracurricular activities that are engaged in by some of the students **and** some of the students participate in STEM competitions onsite/online STEM exhibits and/or in state and national STEM forums	The students offers extracurricular activities that are engaged in by most of the students **and** most students participate in STEM competitions onside/online STEM exhibits and or in state and national STEM forums
5.2a Partners support instruction	Work is in progress to develop this indicator within the school	Partners from industry, institutes of higher education, and technical center are utilized to extend student learning	Partners from industry, institutes of higher education, and technical centers participate in extended learning opportunities as a part of the school's work toward STEM implementation	Students have district experiences with STEM professionals in authentic environments **and** field experiences involving industry partners are embedded within the design process and implementation of PBL and/or design-based challenges provide authentic, real-world STEM content and industry skills to classroom instruction **and** industry partners are a part of the decision making process
5.2b Community engagement	○ Community engagement is teacher or principal-driven, based on the connections and experiences of the school leaders. ○ Topics for student projects are teacher-designed. Students present to the community at a showcase event.	○ School leadership has made efforts to engage a wide variety of community partners. ○ Topics for projects are teacher-led with community partner input. Students present the results of their work to the community. Community partners offer feedback and ask questions of students.	○ Community partners mostly reflect the student population. ○ Topics for projects are student-led based on their observations and experiences in their communities. Students present the results of their work to the community. Community partners offer feedback and ask students questions. Students revise based on feedback.	○ Students and families join school leaders in suggesting, engaging and developing relationships with community partners. ○ Topics for projects are student-led, after significant community engagement. Community partners advise students during the planning, creation, and presentation of student projects.
5.2c STEM majors and career trajectory	○ Instruction does not include introduction to STEM major and/or careers	○ Instruction includes limited introduction to what is required in a STEM major or career	○ Instruction introduces students to a multitude of STEM careers and provides information about what is needed to pursue further education in a STEM major	○ Instruction encourages students to explore and experience a multitude of STEM careers and supports students to pursue their desired STEM education pathway (2 year degree, 4 year degree, apprenticeship or employment)

HIGH QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
5.2d Business/ industry and non-profit engagement	Students do not interact with STEM business/industry or non-profits to expand learning experiences in STEM ○ **and** no formal partnership agreements are in place	Business and industry leaders are recruited to participate in school activities with no regard for various experiences **and** some students have 1-2 interactions each year with STEM business/industry or non-profits to expand learning experiences in STEM ○ **and** some students have formal partnership agreements in place	Business and industry leaders from a wide variety of backgrounds are intentionally recruited to participate in school activities **and** most students have interactions each year with STEM business/industry or non-profits to expand learning experiences in STEM ○ **and** some connections are made between their work placement and academic content **and** most students have formal partnership agreements in place	Businesses and industry owned and operated by people from a wide variety of backgrounds are partnered with the school in developing STEM experiences **and** students regularly interact with and receive feedback on their work from STEM professionals ○ **and** explicit connections are made between their work experience and academic content **and** students have formal partnership agreements in place
5.3a Exploring STEM careers	Once a year, students participate in career exploration experiences, which include opportunities to explore STEM careers, professional experiences, and STEM fluency skills	Twice a year, students participate in career exploration experiences, which include opportunities to explore STEM careers, professional experiences, and STEM fluency skills	Quarterly, students participate in career exploration experiences, which include opportunities to explore STEM careers, professional experiences, and STEM fluency skills	Monthly, students participate in career exploration experiences, which include opportunities to explore STEM careers, professional experiences, and STEM fluency skills as part of their coursework
5.3b Work-Based Learning (WBL)	Students rarely have an active, WBL experience with an external STEM industry partner, either during or outside of the school day	Students have at least one active, WBL experience annually with an external STEM industry partner, either during or outside of the school day **and** WBL experience promotes industry and career awareness	Students have two active, WBL experience annually with an external STEM industry partner, either during or outside of the school day **and** WBL experience promotes industry and career awareness and exploration	Students have active, WBL experience annually with an external STEM industry partner, either during or outside of the school day **and** WBL experience promotes industry and career awareness, exploration, and experience in career preparation and training
5.4a Quality STEM professional learning	Teachers participate in large group professional development sessions that introduce STEM teaching skills	Teachers participate in large group professional development sessions focusing on critical STEM teaching skills	Teachers have identified unique professional development (PD) goals, participate in large and small group, personalized learning professional development sessions, and ***externship opportunities*** **and** PD includes support across the school year during implementation of school-based STEM strategies **and** teachers observe colleagues and engage in formal reflection and discourse regarding practice **and** PD sessions align with the needs of the program/school and student learning needs	Professional development (PD) is ongoing and aligns with STEM initiatives and includes support across the school year **and** teachers have identified unique PD goals and participate in large and small group and personalized learning PD sessions including ***externship opportunities*** **and** teachers observe colleagues and engage in formal reflection and discourse regarding practice **and** PD often embedded within the working day and aligns with the needs of the program/ school and student learning needs

HIGH QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
5.4b STEM content competency	PD on STEM content proficiency is not available. Any faculty or staff wanting to improve their STEM content knowledge must pursue this PD independently.	PD on STEM content proficiency is offered occasionally for some faculty and staff and some STEM faculty participate.	PD on STEM content proficiency is available for all faculty and staff and a majority of the STEM faculty participate.	PD on building STEM proficiency is available and required for all faculty and staff at all levels to ensure delivery of rigorous and integrated STEM content and include ***opportunities for externships and research experiences***
5.5 Family engagement	The school has a single, one-size-fits-all family engagement plan	The school uses multiple means to transmit information to families. Information generally travels one-way	Families are engaged at school-based events throughout the year. Teachers use multiple means to engage families in a dialogue about students	Families are viewed as collaborators, partners, and decision-makers. Communication is two-way. Differentiated strategies are employed to engage all families. Efforts to engage go beyond paper and email, and include text message, social media, home visits, and visits in the community to ensure all communities are engaged

EXAMPLE ARTIFACTS

- ○ Family engagement plan
- ○ Calendar of family events
- ○ Samples of family communication
- ○ Events/appointments to plan STEM career pathways with parents
- ○ List of community partners/WBL providers and their impact
- ○ Memoranda of Understanding (MOUs) that are in place with local business/industry partners
- ○ Documentation of opportunities for students to interact with STEM professionals to support curriculum
- ○ Documentation of opportunities for students to interact with museums/university/business partners to support curriculum
- ○ Participation in out-of-school opportunities like engineering and innovation competitions, robotics, engineering fairs, and science and math competitions
- ○ Documentation of process to establish a local ecosystem of business, industry, and other community partners that are involved in directly connecting in-school and out-of-school instruction with STEM professionals to support a rich STEM curriculum

District Identified Artifacts:

DOMAIN 6 COMMUNICATION/MARKETING STRATEGIES

6.1 Marketing mechanisms to communicate the STEM plan across district, community and workforce

Successful implementation of a STEM education communications effort can achieve far-reaching results. Strong communication efforts can establish a network of supporters and advocates who can help the district integrate PK–20 STEM education local policy that support rigorous and relevant STEM education for all students.

HIGH-QUALITY INDICATOR	EXPLORATORY MODEL (STARTING POINT)	INTRODUCTORY MODEL (DEVELOPING)	PARTIAL IMMERSION MODEL (INTERMEDIATE)	FULL IMMERSION MODEL (ADVANCED)
6.1 Program visibility	Program is not well known in some communities due to the use of traditional outreach methods. Media outreach does not always promote full participation	Program is not well known in some communities due to the use of traditional outreach methods. Media outreach materials promote limited participation	Program is well known within its constituency and all media outreach materials promote participation to all communities	Organization regularly promotes its work by disseminating results to national and state audiences. Media outreach materials promote and support participation to communities

EXAMPLE ARTIFACTS

- ○ Website and social media channel content and promotional materials
- ○ Regular STEM newsletter
- ○ STEM branding for the district
- ○ STEM Flyers for events
- ○ App reminder for STEM events
- ○ STEM education awareness day/month
- ○ STEM leadership team regularly communicates the STEM plan with STEM teachers and stakeholders

District Identified Artifacts:

Use the score card to record the performance level of each high-quality indicators. The rating for each indicator will help identify where program strengths and opportunities for growth are within the program. If an indicator ranks lower than desired, use the PK-20 STEM Framework to identify tools that are available to help guide the leadership team to the next steps for the program.

STRENGTHS	OPPORTUNITIES FOR GROWTH

NEXT STEPS

FIDELITY OF IMPLEMENTATION SCORE CARD				
Domain 1 Broaden Participation	**Exploratory**	**Introductory**	**Partial Immersion**	**Full Immersion**
1.1 STEM Instruction is offered for all students on campus				
Domain 2 School Climate and Culture	**Exploratory**	**Introductory**	**Partial Immersion**	**Full Immersion**
2.1 Professional development on integrated STEM content, resources and instructional methods provided for staff				
2.2 Professional development to build a STEM culture growth mindset in the organization provided for all staff				
Domain 3 Program Design	**Exploratory**	**Introductory**	**Partial Immersion**	**Full Immersion**
3.1 Leadership team made up of STEM stakeholders including school board, community, higher education, business and industry to ensure a successful academic, and career pipeline				
3.2 Students' PK-20 learning pathways is aligned to STEM careers and postsecondary STEM degree plan				
3.3 STEM pathways include academic and technical skills to prepare students for STEM careers (Secondary Only)				
3.4 STEM program has a strategic plan including STEM integrated instruction aligned to the TEKS and offered regularly throughout the year				
Domain 4 Curricular Aspects of the STEM Program	**Exploratory**	**Introductory**	**Partial Immersion**	**Full Immersion**
4.1 STEM Project/Problem-Based Learning (PBL) and/or Design-Based Challenges are aligned to grade level TEKS				
4.2 STEM Project/Problem-Based Learning (PBL) or Design-Based Challenges have integrated content across STEM fields				
4.3 STEM classroom experiences include career exploration and authentic real-world activities/projects				
4.4 Opportunities to develop STEM Fluency Skills: communication, collaboration, creativity, critical thinking, resilience, promptness, time management, adaptability, innovative				
4.5a Opportunities to develop the technical skills of the engineering design process				
4.5b Opportunities to develop the technical skills of computational thinking process				
4.6 Experiences are vertically aligned throughout the district/campus and to postsecondary (PK-20)				
4.7 Experiences are horizontally aligned to TEKS throughout the grade level (cross curricular)				
4.8 Student mastery is demonstrated through a variety of assessment methods including formative, summative, and performance-based measures				
Domain 5 Stakeholder Engagement	**Exploratory**	**Introductory**	**Partial Immersion**	**Full Immersion**
5.1 Connections to effective in and out-of-school STEM programs				
5.2 Stakeholder partnerships that expand classroom learning to include capstone experiences (including virtual) such as mentorships, internships, practicums (High School Only)				
5.3 STEM Work-Based Learning experiences to increase interest and abilities in careers requiring STEM fluency skills				
5.4 Stakeholder partnerships for teachers that connect their academic content to STEM careers through externships and research experiences				
5.5 STEM family engagement events/experiences hosted by the district/campus				
Domain 6 Communication/Marketing Strategies	**Exploratory**	**Introductory**	**Partial Immersion**	**Full Immersion**
6.1 Marketing mechanisms to communicate the STEM plan across district, community, and workforce				

References

Iowa Governor's STEM Advisory Council (2018). Iowa STEM Scale Up RFP 2018

Nevada Governor's Office of Science, Innovation & Technology, STEMworks (osit.nv.gov/STEM/STEMworks). Nevada Rubric – STEMworks (2018). July 9, 2019 available at http://osit.nv.gov/uploadedFiles/osit.nv.gov/Content/STEM/stemworks%20nv%20rubric_8-8-18.f.pdf

Nevada Governor's Office of Science, Innovation & Technology, Nevada STEM Framework (2018) July 9, 2019 available at http://osit.nv.gov/uploadedFiles/osit.nv.gov/Content/STEM/Nevada%20STEM%20Framework_r.12-21-18.pdf

San Diego STEM Ecosystem (2018) A Criteria for Quality STEM/STEAM in San Diego. July 9, 2019 available at https://www.sdstemecosystem.org/sites/default/files/2018-04/criteria-for-quality-stem-steam-in-san-diego.pdf

WestEd (wested.org) (2017) STEMworks Design Principles Rubric July 9, 2019 available at https://stemworks.wested.org/sites/default/files/STEMworks_Design_Principles_Rubric.pdf

Alief ISD STEM Attributes Implementation Rubric Self-Assessment

Georgia STEM Program: http://www.bremencs.com/images/pdfs/STEMProgramCertificationRubricforElementarySchools.pdf

Indiana STEM School Program: https://www.doe.in.gov/wf-stem/indiana-stem-education-science-technology-engineering-and-mathematics

North Carolina STEM School and Leadership Program: http://www.dpi.state.nc.us/stem/schools/

Ohio STEM School Program: https://education.ohio.gov/getattachment/Topics/Career-Tech/STEM/Updated-for-K-5-FY18-STEM-Application-Fall-2016.pdf.aspx

STEM Schools Study – Outlier Research and Evaluation with University of Chicago: http://outlier.uchicago.edu/s3/

STEM School Designation -Tennessee STEM Innovation Network https://www.tsin.org/designation/

STEM FRAMEWORK AND EFFECTIVE SCHOOL FRAMEWORK CROSSWALK					
Domain 1 Broaden Participation	**Lever 1**	**Lever 2**	**Lever 3**	**Lever 4**	**Lever 5**
1.1 STEM Instruction is offered for all students on campus				X	X
Domain 2 School Climate and Culture	**Lever 1**	**Lever 2**	**Lever 3**	**Lever 4**	**Lever 5**
2.1 Professional development on integrated STEM content, resources and instructional methods provided for staff		X		X	X
2.2 Professional development to build a STEM culture growth mindset in the organization provided for all staff		X	X	X	X
Domain 3 Program Design	**Lever 1**	**Lever 2**	**Lever 3**	**Lever 4**	**Lever 5**
3.1 Leadership team made up of STEM stakeholders including school board, community, higher education, business and industry to ensure a successful academic, and career pipeline	X				
3.2 Students' PK-20 learning pathways is aligned to STEM careers and postsecondary STEM degree plan			X		
3.3 STEM pathways include academic and technical skills to prepare students for STEM careers (Secondary Only)				X	
3.4 STEM program has a strategic plan including STEM integrated instruction aligned to the TEKS and offered regularly throughout the year			X	X	
Domain 4 Curricular Aspects of the STEM Program	**Lever 1**	**Lever 2**	**Lever 3**	**Lever 4**	**Lever 5**
4.1 STEM Project/Problem-Based Learning (PBL) and/or Design-Based Challenges are aligned to grade level TEKS				X	
4.2 STEM Project/Problem-Based Learning (PBL) or Design-Based Challenges have integrated content across STEM fields				X	
4.3 STEM classroom experiences include career exploration and authentic real-world activities/projects				X	X
4.4 Opportunities to develop STEM Fluency Skills: communication, collaboration, creativity, critical thinking, resilience, promptness, time management, adaptability, innovative				X	X
4.5a Opportunities to develop the technical skills of the engineering design process				X	X
4.5b Opportunities to develop the technical skills of computational thinking process				X	X
4.6 Experiences are vertically aligned throughout the district/campus and to postsecondary (PK-20)				X	
4.7 Experiences are horizontally aligned to TEKS throughout the grade level (cross curricular)				X	
4.8 Student mastery is demonstrated through a variety of assessment methods including formative, summative, and performance-based measures	X				X
Domain 5 Stakeholder Engagement	**Lever 1**	**Lever 2**	**Lever 3**	**Lever 4**	**Lever 5**
5.1 Connections to effective in and out-of-school STEM programs			X	X	
5.2 Stakeholder partnerships that expand classroom learning to include capstone experiences (including virtual) such as mentorships, internships, practicums (High School Only)			X	X	
5.3 STEM Work-Based Learning experiences to increase interest and abilities in careers requiring STEM fluency skills			X	X	
5.4 Stakeholder partnerships for teachers that connect their academic content to STEM careers through externships and research experiences		X	X	X	
5.5 STEM family engagement events/experiences hosted by the district/campus			X		
Domain 6 Communication/Marketing Strategies	**Lever 1**	**Lever 2**	**Lever 3**	**Lever 4**	**Lever 5**
6.1 Marketing mechanisms to communicate the STEM plan across district, community, and workforce			X		