Indiana DEPARTMENT OF EDUCATION

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Working Together for Student Success

Indiana's Department of Education STEM Education Implementation Rubric

The rubric that follows provides an outline for the implementation of STEM attributes in schools. The rubric is designed to show varying levels of implementation based upon key elements that have been identified as being critical for a successful school. Using the rubric, schools should determine their level of implementation and develop a deeper understanding of the critical components using the Implementation Matrix.

Full Implementation	**Highest level of implementation of a STEM school**
Approaching Implementation	**School meets many of the expectations**
Developing Implementation	**School has met some components, but still needs further development**
Initial Implementation	**STEM program discussions have occurred and program implementation in infancy**

How to use this rubric: The key elements listed on the left---hand side of the chart indicate the critical attributes required for a high level of STEM program development. For each key element, read the brief description and determine which best describes your school or program. Please use the space provided in the rubric for notes or descriptions of your STEM school. The reflection areas that follow can be used to determine action steps for your school. For a quick reference, an Overview/Summary page is provided as well.

The Indiana Department of Education will only certify Full Implementation STEM Schools. Fully implemented STEM Schools must demonstrate implementation of 85% of the Indiana Department of Education STEM Attributes.

Essential STEM School Standards: Highlighted standards (1.1, 1.3, 1.5, 1.8, 2.3, 3.5, 4.3) that must appear in all STEM applications. Schools that have not achieved full implementation of essential STEM school standards will not be considered for STEM School Certification.

Modified from the STEM Immersion Matrix for Schools and Districts © 2012, The Immersion Guide © 2013, created by and work product of The Arizona STEM Network, led by Science Foundation of Arizona in collaboration with Maricopa County Education Service Agency.

INDIANA DEPARTMENT OF EDUCATION STEM ATTRIBUTES	Initial IMPLEMENTATION	Developing IMPLEMENTATION	Approaching IMPLEMENTATION	FULL IMPLEMENTATION
– Infrastructure: Is a structure and process in place to support the program's mission, vision, and goals? STEM school requires several leadership teams that collaborate and dialogue frequently about the program's design and effectiveness. Teachers are highly collaborative and community members are included in decision---making.				
1.1 Leadership Teams at the district and school levels				
1.2 School schedules				
1.3 Community Engagement				
1.4 School Environment				
1.5 Technology Resources				
1.6 Data (state, district, school, classroom)				
1.7 Evaluation				
1.8 Equity				
– Instruction: Does the instruction environment provide time and professional development for educators to develop and improve their craft of pedagogy and content? Students in STEM school engage in inquiry based learning that may include authentic problems. Classrooms are facilitated by teachers who are highly effective in this type of instruction and require professional development and collaboration time to help develop and improve their craft of pedagogy and content. In addition, teachers consistently use and model technology in classroom instruction and use creative assessment opportunities like science fair, portfolios, labs, debate, etc.				
2.1 Instructional Programming				
2.2 Integrated STEM				
2.3 Professional Development				
2.4 Instructional Technology				
2.5 Instructional Strategies				
2.6 Teacher Content Knowledge				
– Curriculum: Is your STEM curriculum aligned to the adopted Indiana Academic Standards? Courses/Classes are integrated across content and infused with community needs and content progresses from grade to grade and are aligned across content areas.				
3.1 Curriculum Integration				
3.2 Curriculum Progression and Alignment				
3.3 Community Engagement				
3.4 21st Century Skills (http://www.p21.org/)				
3.5 Student Performance Assessments				
--- Extended Learning: Does the STEM program offers opportunities outside the school day? STEM program offers opportunities outside the school day that may or may not be held at the school. There are multiple opportunities for students to extend their STEM learning, but the program has a strong connection to the school curriculum and activities that lie within and processes to maintain connections.				
4.1 Programming				
4.2 Program Alignment				
4.3 Community Engagement				

– Infrastructure: STEM programming requires leadership teams that collaborate and engage in dialogue frequently about the STEM program's design and effectiveness. Teachers are highly collaborative and community members are stakeholders in decision---making. Is a structure in place that supports the program's mission, vision, and goals?					
Key Element	**Initial Implementation**	**Developing Implementation**	**Approaching Implementation**	**Full Implementation**	**Description of your program/Supporting Documentation**
1.1 Leadership Teams at the district and school levels	*---Administrative leadership and/or STEM teacher teams have determined the program's purpose and content* *---Leadership provides support to STEM teacher teams by allocating resources towards implementation and professional development* *---Decision making is made by less than 25% of staff*	*---Administrative leadership provides support to STEM teacher teams by allocating resources towards implementation and professional development* *---STEM teacher teams meet with administration regularly to discuss program implementation.* *--- Decision making is made by 25---50% of staff*	*---STEM leadership team in place to define and monitor and evaluate entire program* *---PLCs or teacher teams address expectations of program set by the leadership team.* *---Teams meet regularly to discuss program goals and progress, research, best practices, and opportunities for improvement.* *--- Decision making is made by greater than 50% of the school's staff*	*---STEM Leadership team in place to define, monitor, and evaluate entire program* *---PLCs and teacher teams address specific expectations of the program set by the leadership team* *---Leadership teams meet regularly to discuss research, best practices, successes, and opportunities for improvement towards STEM program goals.* *--- Decision making is made by all school staff, classroom, and special area teachers.*	
1.2 School schedules	*---Participating teachers have a daily common planning time within the school day*	*---Participating teachers have a daily common planning time within the school day* *---Scheduling supports STEM integration across two or more subjects but not on a consistent basis*	*---Participating teachers have a daily common planning time within the school day* *---Scheduling supports STEM integration across two or more subjects, i.e. block schedule, co---teaching, etc.*	*---Schedules allow for consistent teacher collaboration, co---teaching and integration of subjects* *---Schedules allow ample time for projects, teacher planning, and non---traditional courses*	
1.3 Community Engagement	*---Student work is showcased in the community* *---Participating teachers invite community members to participate in some classroom activities*	*---Community members have been identified as partners to collaborate or visit STEM teams* *---Student work is showcased in the community*	*---Community members are actively engaged in the vision and work of the program (e.g. curriculum, co---teaching, field experiences)* *---STEM teams communicate frequently and consistently with the community* *---Student work is showcased in the community*	*---Community members are partners in the leadership of the STEM program and needs assessments guide programming for the school* *---Program has engaged multiple partners to guide the work of the program* *---Opportunities exist to showcase student work*	

				through community events via on---site or online exhibitions. ---School uses parent/community feedback to assess the STEM implementation progress School provides community awareness opportunities for parents	
1.4 School Environment	---Classrooms are designed or oriented for collaborative work ---Classroom locations facilitate the integration of STEM content and teacher collaboration, i.e. math classrooms may be located next to the science classroom	---Classrooms are designed for collaborative work ---Participating teachers foster a culture of inquiry with students through the implementation of 21st Century skills (http://www.p21.org/ in every class.	---Classrooms are designed for collaborative work ---Virtual learning is used to connect students and teachers ,to bring in outside STEM expertise, or to exhibit student work --- Classroom locations facilitate the integration of STEM content and teacher collaboration, i.e. common prep area or physical closeness of integrated subjects ---A culture of inquiry and creativity exists among teachers and students through the implementation of 21st Century skills in every class.	---Classrooms are designed for collaborative work ---Additional spaces are identified for students to use for collaboration or work areas. ---Virtual learning is used a way to connect students and teachers, to bring in outside STEM expertise, or to exhibit student work ---Classroom locations facilitate the integration of STEM content and teacher collaboration ---A culture of inquiry and creativity exists among all students, teachers, and administrators through the implementation of 21st Century skills in every class	
1.5 Technology Resources	---STEM teachers and students have access to technology when instruction and learning require it ---Participating teachers use media tools to communicate activities	---STEM teachers and students have access to a variety of technology on a daily basis, not just limited to computers. Students need to understand the broad scope of technology. ---Participating teachers use media tools for communication within the classroom	---STEM teachers and students have access to technology on a daily basis ---A purchase/replacement plan exists to address technology needs. ---Media tools are created and utilized to communicate internally and externally about STEM activities	---Student and staff technology needs are identified and addressed as part of program design ---Technology purchases are either complete or included in a future budget ---Teachers and students have on---demand access to maintenance or support for the use of instructional technology in the classroom. ---Media tools are created and utilized to	

				communicate internally and externally about STEM activities	
1.6 Data	*---Teachers minimally use student data to guide instruction* *---Only state standardized tests are used* *---Date is only tracked for special populations*	*---Teachers and school staff use standardized test data to guide instruction* *---Teachers also collect formative data about students* *---RTI process is in initial stages* *---All students data is tracked in aggregate*	*---Teachers and school staff use state standardized test data, in addition to other standard assessments* *---Teachers collect formative data.* *---RTI process is followed with fidelity* *---All student data is tracked down to the individual student's needs, possibly through use of individual learning plans or specialized software* *---Data walls and a variety of other data tracking systems are employed*	*---Teachers and school staff use state standardized test data, in addition to other standardized state and national, district, and classroom assessments* *---Teachers collect formative data and maintain records for all students* *---RTI process is followed with fidelity* *---All student data is tracked down to the individual students needs and each student has an individual education plan* *---Data walls and a variety of other data tracking systems are employed* *---Students are able to access their data, understand it, and know how to improve* *---Parents are readily able to access their child's data and understand it*	
1.7 Evaluation	*---PL90, the teacher evaluation law is followed* *---School provides the minimal amount of observations and feedback*	*---PL90, the teacher evaluation law is followed* *---School provides more than minimal amount of observations and feedback* *---Professional development is provided and is specific to the needs identified in observations* *---May have adopted models that have been tested, piloted an approved, such as TAP or RISE*	*---PL90, the teacher evaluation law is followed* *---School provides more than minimal amount of observations and feedback* *---Professional development is provided and is specific to the needs identified in observations* *---May have adopted models that have been tested, piloted an approved* *--- Schools use validated classroom observation protocols that have been found to support high quality STEM instruction* *---Supplemental observations and feedback*	*---PL90, the teacher evaluation law is followed* *---School provides frequent observations and feedback* *---PD is provided and is specific to the needs identified in observations* *---May have adopted models that have been tested, piloted an approved* *--- Schools use validated classroom observation protocols that have been found to support high quality STEM instruction* *---Supplemental observations and feedback are done by teacher leaders on a non---evaluative basis*	

			are done by teacher leaders o non---evaluative basis *---Evaluator is experienced in STEM education*	*---All teachers have career ladder with opportunities for promotion* *---Evaluator is experienced in STEM education*	
1.8 Equity	*---All students receive equitable access to instruction and programs* *---Students with special needs are accommodated*	*---All students receive equitable access to instruction and programs* *---All students specific needs are being met* *---Special programs have been designed encourage underrepresented students to develop interest in STEM careers*	*---All students receive equitable access to instruction and programs* *---All students specific and identified needs are being met* *---Special programs have been designed encourage underrepresented students to develop interest in STEM careers* *---Teachers receive professional development o cultural an gender differences to inform instruction* *---Student demographics are o par with the district or community*	*---All students receive equitable access to instruction and programs* *---All students with specific an identified needs are being accommodated* *---Special programs have been designed encourage underrepresented students to develop interest in STEM careers* *---Teachers receive professional development o cultural an gender differences to inform instruction* *---STEM classroom is differentiated to accommodate all students, with special consideration made for girls and students of color* *---Student demographics in STEM are o par or in greater percentage than the district or community*	
Action Steps					

– Instruction: Students in a STEM program engage in science and mathematics taught through the integration of engineering design, technological design, and mathematical analysis delivered through inquiry or project---based and/or problem---based learning grounded in real---world issues. Integrated STEM PBLs also bring in Language Arts/English and Social Studies in an interdisciplinary approach to delivering instruction. Classrooms are facilitated by teachers who are highly effective who receive ongoing professional development time for collaboration to further refine their pedagogical content knowledge. In addition, teachers infuse technology in classroom instruction as well as in creative assessment opportunities.

Key Element	Initial Implementation	Developing Implementation	Approaching Implementation	Full Implementation	Description of your program/Supporting Documentation
2.1 Instructional Programming	*---STEM teachers utilize inquiry and project---based learning some of the time,* *---Teachers meet to discuss student work and instructional practices*	*---STEM teachers utilize inquiry and Project---based learning* *---Teachers meet regularly to discuss student work and instructional practices.*	*---Problem/Project---based/Inquiry learning is integrated into the regular curriculum* *---Methods of inquiry and investigations are utilized to guide student learning* *---Curriculum supports the development of explanatory models and critical thinking* *---Teachers meet regularly to reflect on student work and instructional practices.*	*--- Problem/Project---based/Inquiry learning is used as an interdisciplinary teaching strategy using all STEM content areas as well as additional contents.* *---Teachers use methods of inquiry and investigations to guide student learning* *---Curriculum supports the development of explanatory models and critical thinking* *---Authentic, real---world problems are posed to students to guide teaching and learning.* *---Teachers meet regularly to reflect on student work as a way to inform instructional decisions and strategies* *---School maintains instructional coaches to guide pedagogy*	
2.2 Integrated STEM	*---Science and mathematics teachers integrate engineering design, technological applications, inquiry, and mathematical analysis into the teaching of science and mathematics in at least 20% of implemented instruction per year.*	*---Science and mathematics teachers integrate engineering design, technological applications, inquiry, and mathematical analysis into the teaching of science and mathematics in at least 30% of implemented instruction per year*	*---Science and mathematics teachers integrate engineering design, technological applications, inquiry, and mathematical analysis into the teaching of science and mathematics in 50% of implemented instruction per year*	*---Science and mathematics teachers integrate engineering design, technological applications, inquiry, and mathematical analysis into the teaching of science and mathematics in greater than 50% of implemented instruction per year*	

2.3 Professional Development	*---STEM teachers participate in whole group, i.e. all STEM teacher PD that aligns with STEM initiatives, which includes inquiry and PBL practices. ---PD includes support across the school year during implementation of strategies.*	*------STEM teachers participate in whole---group PD that aligns with STEM initiatives, which includes inquiry and PBL practices PD includes support across the school year during implementation of strategies.*	*--- STEM teachers participate in whole---group PD sessions focused on developing integrated curriculum, building teacher, content knowledge and effective pedagogy (e.g. PBL, inquiry) ------STEM teachers observe colleagues and engage in formal reflection and discourse regarding practice ---PD sessions align with the needs of the program/school and student learning needs. --- PD includes support across the school year during implementation of strategies. ---Teachers are provided 40 or more hours of professional development each year*	*---Teachers have the opportunity to develop individualized PD plans and the school/program partners with higher education to find opportunities for teachers that fit within their individualized plans. STEM teachers participate in whole---group PD sessions focused on developing integrated curriculum, building teacher, content knowledge and effective pedagogy (e.g. PBL, inquiry) ------STEM teachers observe colleagues and engage in formal reflection and discourse regarding practice ---PD sessions align with the needs of the program/school and student learning needs. --- PD includes support across the school year during implementation of school based STEM strategies. ---Teachers are provided 40 or more hours of PD each year*	
2.4 Instructional Technology	*---Teachers and students use technology appropriately multiple times a week to accomplish a learning objective*	*---Teachers and students use technology appropriately multiple times a week to accomplish a learning objective ---Students use technology in projects and are aware that technology does not just refer to computers or tablets*	*---STEM teachers utilize technology in instruction on a daily basis ---Students use technology in projects and are aware that technology does not just refer to computers or tablets ---Virtual technology tools are integrated into the program*	*---Teachers use and model appropriate technology in instruction on a daily basis for communication, research, and delivery ---Teachers require students use appropriate technology as available for collaborative work, communication, research and data collection/analysis, in projects and other*	

				assessments daily ---Computer---based/virtual technology tools are integrated and embedded into the program	
2.5 Instructional Strategies	*---Students collaborate in small groups or with partners on quarterly projects. ---Teachers facilitate learning through questioning.*	*---Students collaborate in small groups or partners at least monthly on projects. ---Teachers facilitate learning by guiding students with questions.*	*---Students work in teams (partners and small groups) at least weekly to work on projects or real world problems ---Teachers facilitate learning by guiding students with questions. ---Teachers design lessons around student project needs.*	*---Students regularly learn in teams on a daily basis to frame problems and test solutions ---Teacher serves as facilitator by guiding learning through questioning, listening, and guiding students towards their learning. ---Teachers design instruction around student project needs ---Instruction supports student discourse through writing and speech aligned to literacy standards*	
2.6 Teacher Content Knowledge	*---Teachers have essential content knowledge as exhibited through classroom observations and discussion. ---PD is offered to support the improvement of common gaps in teacher content knowledge.*	*---Teachers exhibit content knowledge through classroom observations and d discussion, and support the content knowledge of other teachers ---PD is designed to support the improvement of common gaps in teacher content knowledge as identified by content assessments*	*---Teachers are regularly assessed regarding content knowledge, and support the content knowledge of other teachers ---PD is designed to support the improvement of common gaps in teacher content knowledge as identified by content assessments ---Content experts provide professional development for teachers ---Teachers participate in graduate level content training*	*---Teachers are consistently assessed regarding content knowledge through the use of formal assessment and/or performance reviews ---Individualized PD plans are developed and implemented to support the improved content knowledge ---Content experts provide professional development for teachers ---Teachers participate in graduate level content training*	
Action Steps					

– Curriculum: A STEM curriculum design is aligned to the adopted Indiana Academic Standards. Courses/Classes are integrated across content and infused with community needs and also progress naturally from subject to subject, grade to grade.					
Key Element	**Initial Implementation**	**Developing Implementation**	**Approaching Implementation**	**Full Implementation**	**Description of your program/ Supporting documentation**
3.1 Curriculum Integration	*--- Units of PBL/Inquiry/ STEM instruction include integrated STEM within science and mathematics and other content areas at least twice a year ---STEM teachers collaborate on planning curriculum but may teach it individually within their own classrooms.*	*---Units of PBL/Inquiry/ STEM instruction include integrated STEM within science and mathematics and all content areas at least two quarters of the year. ---STEM teachers collaborate on the planning of curriculum but may teach it individually within their own classrooms.*	*------Units of PBL/Inquiry/ STEM instruction include integrated STEM within science and mathematics and all content areas at least three quarters of the year. ---Science and mathematics teachers co---teach units*	*------Units of PBL/Inquiry/ STEM instruction include integrated STEM within science and mathematics and all content areas all four quarters of the academic year. ---Science and mathematics teachers co---teach units*	
3.2 Curriculum Progression and Alignment	*---Curriculum is aligned to current Indiana Academic Standards ---STEM careers awareness makes up a small portion of the curriculum.*	*---Curriculum is aligned to current Indiana Academic Standards --- Curriculum is vertically aligned to shown progression of content ---STEM careers are minimally included in the curriculum.*	*---Curriculum is vertically aligned within program as well as to current Indiana Academic Standards ---STEM careers are included in the curriculum*	*---Teacher teams vertically plan STEM instruction within schools ---Curriculum is aligned to current Indiana Academic Standards ---Connections to STEM careers are a regular part of the curriculum*	
3.3 Community Engagement 3.4 21st Century Skills (http://www.p21.org/)	*---Guest speakers are utilized regularly to engage students in the learning. ---The 21st Century Skills are integrated within science and mathematics classrooms.*	*---Guest speakers and/or field experiences are often used as a part of the work towards STEM implementation ---The 21st Century Skills are integrated within science and mathematics classrooms and within interdisciplinary PBL units.*	*---Community and business leaders are identified as partners in the curriculum development, which may include field experiences and/or guest speakers ---The 21st Century Skills are integrated within all content areas and within the interdisciplinary PBL units.*	*---Students have direct experiences with STEM professionals in authentic environments ---Field experiences and guest speakers are embedded to add to the knowledge of students ---The 21st Century Skills, as well as global themes are integrated within all content areas, interdisciplinary instruction and are a required component within regular instruction during the school year*	
3.5 Assessments	*---Performance based*	*---Performance based and*	*---Teachers use*	*---Teachers use*	

	assessments are used to monitor student learning *---State---wide data is used to drive instructional practices*	*pre/post assessments are used to monitor student learning* *---Student observations are included as an assessment tool* *---State---wide data is used to drive instructional practices*	*performance based assessments to determine student learning* *---Pre/Post assessments are used to show student growth* *---Non---traditional assessments are used to monitor student processes* *---State---wide data is used to drive instructional decisions.* *---Teachers use observation and monitor student dialogue to assess student processes in problem solving and innovation.*	*performance---based assessments to determine student learning* *--- Pre/Post Assessments are used to show student growth* *---Teachers use observation and monitor student dialogue to assess student processes in problem solving and innovation.* *---Students participate in self---evaluation and goal setting consistently* *---School uses data from State---wide and school assessments to drive instructional decisions and RTI opportunities.*	
Action Steps					

Key Element	Initial Implementation	Developing Implementation	Approaching Implementation	Full Implementation	Description of your program/ Supporting Documentation
--- Extended Learning: STEM program offers opportunities outside the school day that may or may not be held at the school. There are multiple opportunities for students to extend their STEM learning, but the program has a strong connection to the school curriculum and activities that lie within.					
4.1 Programming	*---Programming is regularly connected to the school day curriculum*	*---Programming is regularly connected to school the day curriculum* *---Field experiences are offered to students for authentic learning*	*---Programming is connected to school day curriculum* *--- Field experiences are offered to students regularly for authentic learning* *---Internships or on---site STEM participation exists for students* *---Program is in partnership with the Indiana Afterschool Network*	*---STEM experiences are directly connected to in---class learning* *---Extended learning includes field experiences and authentic, contextual learning* *---Opportunities exist for older students to participate in internships after school or on weekends.* *---Program is in partnership with the Indiana Afterschool Network*	

4.2 Program Alignment	*---Program may be aligned with curriculum but there is no explicit standards alignment*	*---Extended learning is aligned with appropriate State standards for science, ELA, Literacy, and Math* *---Afterschool STEM programs uses the Indiana Afterschool Specialty Standards for STEM Standards*	*---Extended learning is aligned with appropriate State standards for science, ELA, Literacy, and Math* *---Afterschool STEM programs uses the Indiana Afterschool Specialty Standards for STEM Standards* *---Afterschool program does its own evaluations and observations to ensure quality of STEM experience, possibly using the DOS Observation Tool or other research based tools*	*---Extended learning is aligned with appropriate State standards for science, ELA, Literacy, and Math* *---Afterschool STEM programs uses the Indiana Afterschool Specialty Standards for STEM Standards* *---Afterschool program does its own evaluations and observations to ensure quality of STEM experience* *---Afterschool program uses research based observation tools aligned to STEM experience standards, i.e. the DOS Observation Tool*	
4.3 Community Engagement	*---STEM practitioners are utilized to extend student learning* *---Student work is displayed within the school or community*	*--- STEM practitioners are utilized to extend student learning* *---Student work is displayed within the school or community*	*--- STEM practitioners are regularly invited to participate in extended learning opportunities for students.* *---Student work is exhibited an displayed in the community and on the school website* *---Students participate in community events to share program activities*	*---Students have direct experiences with STEM professionals in authentic environments outside the school day* *---Student work is exhibited and displayed in the community an o the school website.* *---Students participant in community events to share program activities an is directly related to STEM*	
Action Steps					