2024 PreK AR STEM Model Program Rubric

Arkansas defines STEM as...Science, Technology, Engineering, and Math intentionally come together as STEM to present a rigorous integrated approach to understanding and interacting with the world in which we live. STEM education provides opportunities for students to engage in authentic experiences in the classroom that are linked to community, occupations, and the global world so that all Arkansas (AR) students become STEM literate in their PreK-12 journey towards college and career readiness.

The AR STEM Model Program connects Arkansas's STEM education system to Arkansas careers and career training opportunities. It is based on the Federal STEM Vision to build strong foundations in STEM literacy, increase STEM education, and prepare students for the future STEM workforce. The AR STEM Model Program is one way schools can help ensure the readiness of all Arkansas students to meet the demands of today's workforce.

Designation as an AR STEM Model School is an indicator of high quality, transdisciplinary STEM education programming in PreK public schools. Informed with the input of state and local Early Childhood educators, this model allows Early Childhood schools to evaluate the prioritization of student-focused STEM education in the PreK classroom, school, and in its community.

Goals of the AR STEM Model Program:

- Increase STEM Opportunities for Arkansas Students
- Recognize Model STEM Schools across the State
- Develop and Strengthen Partnerships with Business, Industry, and Community
- Support Growth and Sustainability of the AR STEM Teacher Pipeline

Benefits of being an AR STEM Model School:

- Three-year state designation for being a model STEM school
- STEM school values student interest, curiosity, and creativity is systemic and part of everyday life.
- 21st Century skills known as the 4C's (Creativity, Critical Thinking, Collaboration, Communication) are common in teaching and learning objectives.
- STEM practices make authentic learning experiences rigorous and integrated.
- Exposure to STEM workforce opportunities
- Strong school partnerships with local business, industry, and community stakeholders that mutually support student learning

Reasons to focus on STEM:

- STEM careers are in high demand.
- Computer jobs are projected to make up two thirds of all new STEM jobs created.
- STEM skills are needed to function as an informed consumer and citizen in the 21st century.
- STEM jobs have higher salaries and lower unemployment rates than non-STEM jobs.
- STEM jobs are projected to grow over two times faster than the total for all jobs in the next decade.
- The future of Arkansas' economic development depends on our STEM workforce.

"The STEM Labor Force of Today: Scientists, Engineers, and Skilled Technical Workers", NSF - National Science Foundation;

"Why computer occupations are behind strong STEM employment growth in the 2019–29 decade", Beyond the Numbers, US Bureau of Labor Statistics

A STEM literate person is CURIOUS:

Connects Academics to Everyday Experiences
Uses Computational Thinking
Recognizes Patterns in Data
Innovates Solutions
Operates Emerging Technologies
Unpacks Academic Language
Sharpens Employability Skills

EXPLANATION OF DESIGNATION LEVELS

Level of implementation will be based on scoring of attributes related to three categories:

I. Classroom
II. School
III. Community

Schools will be rated according to a four-tier level of implementation. No score will be given for attributes without supporting artifacts.

- Exploratory (1) Minimal STEM implementation is evident.
- Developing (2) Some components of STEM implementation and integration are demonstrated but need further development.
- Accomplishing (3) STEM implementation and integration is a regular part of daily learning and school practices.
- Model (4) School has demonstrated the highest level of STEM implementation and integration.

Schools must reach "Model" level of implementation based on rubric total score to be designated as a Model STEM School by The Arkansas Department of Education (ADE). Model schools are encouraged to re-apply for Model Designation every three years.

PreK Attribute Score Table

Level of Implementation	Exploratory	Developing	Accomplishing	Model
Quartile	Q1	Q2	Q3	Q4
Point Ranges*	≤26 points	27-52 points	53-78 points	79-104 points

MINIMUM REQUIREMENTS

- A letter of agreement to participate in the program is signed by a district leader and the school principal.
- Facility must be a *Better Beginnings* Level 3 or higher on the *Early Childhood Tiered Quality Rating System.*
- The school STEM Leadership Team attends AR STEM Model Program professional development prior to participation.

APPLICATION PROCESS

Proposed Timeline:

***Step 1: May** - Attend informational webinar session, submit a commitment agreement letter and school rating report (My School Info), and begin Gateway 1*

***Step 2: Summer** - Attend half-day professional development session to learn about Gateways 1 and 2*

***Step 3: December** - Gateway 1 submission of self-evaluation and artifacts*

***Step 4: January - February** - ADE STEM Team reviews Gateway 1 submissions - Schools are notified of the state-level evaluation results - Gateway 2 site visits are scheduled*

***Step 5: March - April** - Gateway 2 site visits*

***Step 6: April - May** - ADE STEM Team reviews Gateway 2 observation data and determines a final score*

***Step 7: May** - DESE sends a feedback letter on Gateways 1 and 2 to schools who score accomplishing or model*

***Step 8: End of School Year** - Announce STEM Model Program Honorees*

Cycle Term:

3-year cycle for designation

**Schools who apply and do not attain Model Designation in the first year may reapply the following school year - These schools will receive additional support for designation from regional STEM specialists – Model Schools may re-apply for Model Designation every three years*

GATEWAY INFORMATION

Gateway 1

Schools attend an informational webinar and submit a signed agreement letter. School STEM teams attend professional development for information on the application process and how to use the rubric to conduct a self-audit.
Schools will be provided with a digital folder and template to submit their self-scored rubric and artifacts.
Schools are encouraged to request local education service cooperative (ESC) science specialist support to work with school STEM teams.
ADE reviews schools' self-evaluation and artifacts. Schools must score accomplishing or model as described on the attribute score table (p.3) to move on to Gateway 2.

Gateway 2

Schedule a full day site visit with the ADE STEM Leadership Team.
Participate in a Panel Discussion with community stakeholders.
**STEM Specialists will not observe schools that are in their designated ESC region.*

PRE K INFORMATION

According to the *Science and Engineering in Preschool Through Elementary Grades: The Brilliance of Children and the Strengths of Educators* (National Academies of Sciences, Engineering, and Medicine (NASEM) 2022 report, students are building a foundation in science and engineering in preschool through the elementary grades to prepare for later success. Classroom instruction is designed to sustain and enhance children's curiosity about the world around them and to form the knowledge and skills they need to approach the more challenging science and engineering topics introduced in later grades. The PreK AR STEM Model Rubric is based on the state approved Early Childhood classroom quality assessment tool, and the *Arkansas Child Development and Early Learning Standards* (ACDELS). This rubric is designed to be used by Pre Kindergarten schools to evaluate early STEM education programing. The PreK Rubric classroom attributes detail how STEM practices are part of free play, communication is in age-appropriate expressive forms, and the learning experiences are aligned to early childhood learning expectations. Exposure to computer technology is limited according to research on the impact of screen time prior to age five. The Early Childhood classroom quality tool provides uses of simple tools listed on a materials checklist (e.g. blocks, connectors, ramps, tongs). The PreK Rubric school attributes are informed by the subscales for space and furnishings, learning activities, and program structure. The *Preschool-4 Developmental Guidelines Work Sampling System* is a list of performance indicators to use with early childhood appropriate assessments. The PreK Rubric community attributes are similar to the community attributes in the AR STEM Model Program Rubric for grades K-12.

I. The Classroom				
Attribute	**Exploratory-**	**Developing-2**	**Accomplishing-3**	**Model-4**
1. STEM Curricular Integration				
1.a Content Integration	STEM content areas (science, technology, engineering, math) are taught separately and are not integrated. STEM practices are not evident.	STEM content areas are occasionally integrated across some disciplines. There is some evidence of use of STEM practices.	STEM content and practices are regularly integrated into daily instruction across most disciplines, including non-STEM content areas.	STEM content and practices are fully integrated into daily instruction, throughout the school day, across all disciplines.
1.b Standards Alignment	STEM practices and learning experiences are locally developed without regard to alignment with the *Arkansas Child Development and Early Learning Standards* (ACDELS).	STEM practices and learning experiences align with some of the *Arkansas Child Development and Early Learning Standards* (ACDELS).	STEM practices and learning experiences align with most of the *Arkansas Child Development and Early Learning Standards* (ACDELS).	STEM practices and learning experiences align fully with the *Arkansas Child Development and Early Learning Standards* (ACDELS).
2. STEM Learning Experiences				
2.a Hands-on Learning	STEM practices are taught primarily from a text in a conceptual or procedural mode with little or no hands-on experiences.	Some classes provide hands-on experiences to teach STEM practices, but these experiences may not align with developmentally appropriate content.	Almost all classes provide some level of hands-on experiences regularly with relevant and authentic connections to STEM practices; most experiences align with developmentally appropriate content.	There is a rich variety of hands-on experiences offered regularly with relevant and authentic connections across all domains. The hands-on experiences offer students opportunities for enrichment. Experiences align with developmentally appropriate content.

2.b Accommodations	No accommodations or support services are provided for special populations.	Few learning experiences include accommodations or support services for special populations.	Most learning experiences include a wide variety of accommodations and support services are provided to ensure learner variability for special populations.	All learning experiences include a wide variety of accommodations and support services are provided to ensure learner variability for all special populations.
3. STEM Instruction				
3.a Cognitive Tasks	Teachers include limited high-level cognitive tasks and multi-level questioning in direct instruction.	Teachers act as facilitators while students are given limited opportunities to work through high-level cognitive tasks and multi-level questioning.	Teachers act as facilitators while students are given multiple opportunities to work through high-level cognitive tasks and multi-level questioning.	Teachers act as facilitators while students often lead the learning as they work through high-level cognitive tasks and multi-level questioning.
3.b Integration for Problem Solving	Teachers guide students through hands-on activities so students discover the content.	Students apply content knowledge and STEM practices to engineering processes, experiments, and problem-solving tasks to develop new meaning.	Students apply content knowledge and STEM practices across domains to implement solutions and communicate them both in developmentally appropriate expressive forms.	Students are consistently applying content knowledge and STEM practices across domains to implement solutions and communicate them both in developmentally appropriate expressive forms.
3.c Growth Mindset	Fostering a growth mindset, creativity, innovation, and risk taking is a goal for teachers at the school, but there is little evidence of this taking place in classrooms.	Instruction in some classrooms fosters growth mindset, creativity, innovation, and risk taking. Students have limited opportunity to explore ideas and strategies to construct meaning.	Instruction in most classrooms fosters growth mindset, creativity, innovation, and risk taking. Students are encouraged to explore ideas and strategies to construct meaning.	Instruction across the school fosters growth mindset, creativity, innovation, and risk taking. Instruction regularly requires students to explore ideas and strategies to construct meaning.

3.d Relevant Instruction	STEM content and instruction is the same for all students and is only relevant to one group of students. Content has not been reviewed for examples, images, problems, and projects relevant to most of the students engaged. .	STEM content and instruction is the same for most students with some relevant instruction used inconsistently across levels. Content has been reviewed for examples, images, problems, and projects relevant to most of the students engaged.	Program-wide efforts are being made to offer relevant STEM content and instruction that reflects students' lived experiences but with inconsistent implementation. Content has been reviewed for examples, images, problems, and projects relevant to most of the students engaged.	Program-wide STEM content and instruction reflects the lived experiences of all students and includes components that inspire learning. Content has been reviewed for examples, images, problems, and projects relevant to all of the students engaged.
4. College and Career Readiness				
	STEM practices and learning experiences are not designed to proactively assist students in acquiring the skill set (4C's) needed for K-2 learning progressions.	STEM practices and learning experiences provide some opportunities for students to acquire the skill set (4C's) needed for K-2 learning progressions.	STEM practices and learning experiences in most classes provide some opportunities for students to develop the skill set (4C's) needed for K-2 learning progressions.	There are opportunities across the curriculum to engage in experiences that develop the skill set (4C's) needed for college and career. Curriculum and skill sets taught are regularly aligned with K-2 learning progressions.
5. Assessment System				
	Assessments across the learning experiences are given in a single mode, often only multiple choice. No opportunity for students to demonstrate skill (4C's) mastery is provided. There is no alignment to *The Preschool-4 Developmental Guidelines Work Sampling System.* .	Assessments may be limited in variability and do not allow flexibility for students. Assessments across the learning experiences focus on comprehension and offer little or no opportunity for skills (4C's) mastery. There is little alignment to *The Preschool-4 Developmental Guidelines Work Sampling System.*	Assessments across the learning experiences focus on comprehension and offer some opportunities for skills (4C's) mastery. Flexible testing modes are available. Assessments are partially aligned to *The Preschool-4 Developmental Guidelines Work Sampling System.*	Assessments across the learning experiences offer multiple opportunities and flexible modes to gain conceptual understanding and demonstrate skill (4C's) mastery through practical application. Assessments are aligned to *The Preschool-4 Developmental Guidelines Work Sampling System.*

6. Quality of Pre-Technology Integration				
	Students have some opportunities to use pre-technology tools. These opportunities are isolated, do not occur often, and are not routine.	Students have multiple opportunities to use pre-technology tools. These opportunities may be isolated or integrated into individual lessons and are becoming routine.	Pre-technology tools are integrated with purpose in some domains within the school. This integration is routine.	Pre-technology tools are integrated with purpose and are coordinated across domains within the school. This integration occurs often and is routine.

II. The School				
Attribute	**Exploratory-1**	**Developing-2**	**Accomplishing-3**	**Model-4**
1. STEM Vision and Mission				
1.a STEM Mission and Vision Statement	A STEM mission or vision is being developed among administrators and some teachers, but nothing has been formally established. Support for STEM is concentrated among a small number of staff.	A STEM mission and vision has been developed by a core group of staff but is not universally understood by all staff. Some support exists for STEM beyond a core group of staff but universal staff support is not yet established.	A STEM mission and vision has been formally established and is evident to all staff. All staff work to achieve the STEM mission and vision.	A STEM mission and vision is formally established and all stakeholders understand and believe in the value of STEM. All staff embrace the STEM mission and vision and have a passion to prepare students for early learning in STEM.
1.b Alignment of Instruction	There is little to no alignment of classroom instruction with the STEM mission and vision.	Some classrooms have instruction aligned to the STEM mission and vision.	Most classrooms have instruction aligned to the STEM mission and vision.	All classrooms have instruction aligned to the STEM mission and vision.
2. The School Budget				
	There are no available funds, and there is no sustainable funding plan for STEM education.	No specific funds are allocated in the budget, but funding changes are underway and documented.	Some funds are available for STEM education (e.g., monies from other funds, one-time grants); a plan is in place for funding of STEM education but is not sustainable.	The school has a long-term budget plan and is committed to regularly allocating internal funds and seeking external fiscal resources for sustainable and productive STEM education.

3. Leadership				
3.a STEM Leadership Team	The STEM Leadership Team has started to establish a basic STEM strategic plan.	The STEM Leadership Team has developed a basic STEM strategic plan.	The STEM Leadership Team has developed a detailed STEM strategic plan.	The STEM Leadership Team has implemented the STEM strategic plan, provided support to teachers in implementing STEM teaching practices, and developed partnerships with K-12 schools and community partners.
3.b Administrator Support	Administrators are open to staff developing STEM at the school but other areas of focus take priority.	Administrators support STEM-related experiences within the school, collaborative time for teachers, and STEM related professional learning opportunities.	Administrators support STEM practices integration, collaborative time for teachers and STEM related professional learning opportunities.	Administrators support fully integrated STEM practices and learning experiences in daily instruction, collaborative time for teachers, STEM related professional learning opportunities, funding for STEM learning experiences, and continuous monitoring of key STEM indicators for maximizing school performance.
4. School Environment				
4.a STEM Spaces and Design	Some classrooms are designed or oriented for collaborative work.	Most classrooms are designed or oriented for collaborative work.	All classrooms are designed for collaborative work based on a strategic plan for integration across early learning experiences.	All classrooms and common spaces are designed for collaborative work based on a strategic plan for integration across early learning experiences.
4.b Recognition and Public Relations	STEM learning is rarely celebrated, shared, promoted, or communicated in the school.	Limited attempts have been made to celebrate, share, promote, and communicate STEM learning in the school.	There are frequent celebrations, shares, promotions, and communications about STEM learning in the school.	There are extensive celebrations, shares, promotions, and communications about STEM learning in the school. These occur often and are embedded in the school.

5. STEM Professional Development				
5.a Professional Development Plan	The school has started to develop a professional development plan focused on STEM.	The school has a professional development plan that focuses on STEM but has not implemented it.	The school has a professional development plan that focuses on STEM and includes regularly scheduled professional development for early childhood education training.	The school has a professional development plan that focuses on STEM, and includes regularly scheduled professional development for early childhood education training with ongoing monitoring and support for all staff.
5.b Professional Development Participation	Individual teachers participate in STEM professional development that introduces STEM teaching skills.	All teachers are given the opportunity to participate in group professional development focusing on critical STEM teaching skills which align with the school's STEM mission and vision.	Teachers participate in group professional development for all staff focusing on the needs of the STEM program and student learning needs. Teachers engage in discourse with other teachers regarding STEM practices.	Teachers identify unique professional development goals and participate in group and personalized sessions. Teachers observe colleagues and engage in formal reflection and discourse regarding STEM practices.

III. The Community				
Attribute	**Exploratory-1**	**Developing-2**	**Accomplishing-3**	**Model-4**
1. Student Engagement with Community				
1.a The School in the Community	Students learn about STEM focused local or global age-appropriate problems.	Students develop a few proposals or potential solutions to STEM focused local or global age-appropriate problems.	Students engage with the community to develop several proposals or potential solutions to STEM focused local or global age-appropriate problems.	Students bring about change by partnering with the community to solve multiple STEM focused local or global age-appropriate problems.
1.b The Community in the School	The community is invited to view student work.	Students have the opportunity to present the results of their work to the community.	Students present the results of their work to the community and receive feedback.	The community advises students during the planning, creating, and presenting of student work.

2. Family Engagement				
	Little or no formal STEM-related family engagement exists.	Families are aware their children engage in STEM learning at school but may not know what it means. Some families attend school-wide "STEM nights" at the school.	Teachers successfully engage most families in the STEM learning of their children, through school-based family nights and sent-home enrichment activities.	Students engage their families in STEM learning. Projects and student learning activities have components built-in that invite family participation. Efforts are made to make materials relevant and accessible to the family.
3. Business, Industry, and K-12 Engagement				
3.a Partnerships	There is no evidence of business, industry, or K-12 school members engaging with the school.	Business, industry, and/or K-12 school members visit the school a few times per year.	Business, industry, and/or K-12 school members have been identified and participate in the school's activities in some way, including as STEM experts to present information to the students or staff.	Business, industry, and/or K-12 school members officially partner with the school to regularly offer funding, resources, and/or expertise during STEM learning experiences.
3.b Stakeholder Participation	Community engagement is teacher or principal-driven, based on the connections and experiences of the school leaders without regard to the entire school population.	School staff have made efforts to engage a wide variety of community partners without regard to the school population.	School staff actively engage with community partners and these partners mostly reflect the school population.	Students, families, and school staff actively engage and develop relationships with community partners.
4. Communication				
	STEM learning is rarely celebrated, shared, promoted, or communicated in the community.	There are limited attempts to celebrate, share, promote, and communicate STEM learning in the community.	STEM learning is sometimes celebrated, shared, promoted, and communicated in the community.	STEM learning is routinely celebrated, shared, promoted, and communicated in the community.

ARTIFACTS

PLEASE NOTE:

- Competitiveness decreases when the same artifacts are used as evidence for multiple categories.
- School demographic information is required.
- Videos/photos are encouraged (must be recorded within one year of submission).
- Explanation/rationale for why the artifact is evidence for each category should be included.

Artifacts That May Demonstrate Evidence of the Classroom

- STEM Curricular Integration:
  - Teacher planning, units, or pacing guides showing standards integrated together
  - Evidence of collaboration and teamwork
  - Full year of scope and sequence multi-content standards alignment documents with state standards codes
- STEM Learning Experiences:
  - Community problems that are solved by multiple STEM content areas as a focus for learning
  - Pictures of failures (especially if the failures are analyzed and used in the next step)
  - Student work samples - remove student names
  - Videos of student-teacher discourse
  - Examples of STEM curriculum
  - Examples of hands-on lessons showing the accommodations (modification of strategies)
  - Examples of Early Childhood accommodation strategies
  - Examples of student work that show accommodations and or extensions made for special populations
- STEM Instruction:
  - Cognitive Tasks: Samples of assessment tasks, videos of student-teacher discourse
  - Integration of problem solving: Samples of hands on activities, videos of students in the activities, samples of problem solving projects
  - Growth Mindset: Transcripts of students and/or teacher interviews and perceptual data (student/teacher names removed), videos of students and teachers explaining their STEM identities about creativity, innovation and risk taking
  - Relevant instruction: teacher or parent testimonies on how content and instruction is relevant to them
  - Classroom presentations, performance assessments and, lessons
  - Sample assessment tasks: formative assessment tasks, common formative assessment tasks, *Preschool-4 Developmental Guidelines Work Sampling System* performance indicators
  - Scoring rubrics
- Quality of Pre-Technology Integration:
  - Show pre-technology integration on lesson plans
  - Photos of student engagement that demonstrate evidence of pre-technology integration

Artifacts that May Demonstrate Evidence of the School

- STEM Mission and Vision:
  - Copy of statement
  - Faculty meeting agendas and sign-in sheets from development of mission/vision
  - Lesson plans that align to mission and vision
  - Copy of STEM Strategic Plan with evidence of plan implementation
  - Written plan for engaging all students in STEM (ex. All STEM learning is during the day so all students can participate in STEM)
- The School Budget:
  - Copy of the school budget (specifically looking for expenditures/line items that are connected to/support STEM learning)
  - Evidence of how STEM allocations were used in the school
- Leadership:
  - Minutes from STEM Leadership Team Meetings
  - Copy of the STEM strategic plan
  - Letter of support from district superintendent
  - Professional Growth Plans
  - List of STEM team members and their job titles
  - Meeting minutes lead by administrators
  - PLC agendas
  - List of STEM indicators used by administrators
- School Environment:
  - Staff, Student, and Parent Surveys on school engagement
  - School schedule
  - Photos of dedicated spaces used in the school for STEM learning (ex. a makerspace, STEM lab, outdoor garden)
- STEM Professional Development (PD):
  - Copy of STEM PD agendas
  - Copy of slides used during STEM related PDs
  - Copy of PD plan that includes specific science, technology, engineering, and mathematics content area titles and schedules
  - Teacher certifications or sign-in sheets from STEM related PDs or early childhood education trainings
- Communications about the STEM vision and mission:
  - Mission and vision signage posted throughout school building, on website, and in school presentations to community
  - Teacher and student presentations at STEM nights, open house, parent-teacher conferences
  - School website showcasing student achievement in STEM
  - Social media posts, newsletters, press releases
  - Promotion and sustaining policies and collaborative projects in the community
  - ADE level recognition (press releases and Commissioner's Memos)
  - Classroom, school and community videos featuring students and educators to tell the story of STEM

Artifacts That May Demonstrate Evidence of the Community

- Student Engagement with Community:
  - Career Day type speakers
  - Photos/video/recordings of communications with community members
  - Field Trip photos/communication
  - Outdoor classroom photos
- Family Engagement:
  - STEM Expo/Nights
  - Family experiences at school involving STEM presentations or storytelling
  - Sign in sheets and parent attendance forms
  - Photos/videos of events
- Business, Industry, and K-12 Engagement:
  - Partnerships with local schools
  - Photos/videos of meetings with industry partners showcasing partnerships and service learning
  - K-12 students or teachers engaging PreK students in STEM learning experiences
- Communications about the STEM in the school:
  - Newsletters
  - Social media platforms
  - Hosting STEM webinars
  - Public meetings
  - Branding and marketing from local business and industries
  - Websites showcasing student achievement in STEM
  - Openly sharing resources with other schools
  - Partnership agreements with business, community, K-12 schools
  - Teacher and student presentations
  - Displayed mission and vision to the public (ex. website, signs, hall posters)
  - Classroom, school, and community videos featuring students and educators telling their STEM story

GLOSSARY OF TERMS

4 C's: The 4 C's include critical thinking, collaboration, creativity, and communication.
STEM Identity: A concept of identity that a person holds about themself as it relates to lifelong STEM experiences and how those experiences have influenced who they are as a student, educator, or professional.
Artifact: A piece of evidence that is submitted to support attributes listed in each category of the rubric.
STEM Integration: The intentional combination of two or more of the STEM disciplines to provide students with a rigorous approach to understanding and interacting with the world in which we live.
STEM Practices: Arkansas STEM Practices include Arkansas Academic Computer Science and Computing Practices, Five R's of Active Math Engagement, and the Science and Engineering Practices.