STEM Engagement Ideas for the Texas EcosySTEM

TEXAS EDUCATION AGENCY TexasEcosySTEM

Audience: Texas EcosySTEM stakeholders

Purpose of the Tool: Students benefit from the expertise and authentic STEM experiences provided by PK-12 STEM educators, administrators, families, informal STEM education organizations, post-secondary partners, and industry partners. The following list of STEM engagement ideas provides examples of how Texas EcosySTEM members can work together as a community to engage with PK-12 students for the purpose of developing and strengthening the STEM pipeline.

FORMAL EDUCATION (PK-12 SCHOOLS)

- ☐ **STEM** Methodology: Integration of STEM design challenges to solve real-world problems within core content areas while building STEM fluency skills through STEM experiences.
- ☐ **Authentic STEM Learning Experiences:** Expose students to STEM through field trips, speakers, STEM PBL projects or engineering design challenges, STEM Club, job shadowing, externships, internships, and volunteering opportunities.
- ☐ **STEM Events:**
  - Host STEM events to engage students, families, and the community with STEM through activities, competitions, and exhibitions.
  - Events might include the Texas Mobile STEM Laboratory (a mobile STEM learning space that hosts learning days and community events)
  - STEM nights (an after-school event the provides hands-on STEM activities for the whole family)
  - Engineering/Maker Fairs (A family-friendly showcase where people show what they are making, and share what they are learning)
  - STEM competitions (school-based, local, regional, state, national, or international STEM competitions such as science fair, Invention Convention, Science Olympiad, FIRST Robotics, etc.)
  - STEM movie nights (Show a STEM movie on campus and invite families to attend)
  - STEM open-house (Invite families to attend an open-house at the school where students can share their work and families can gather information about STEM education STEM in the community, and other opportunities/resources for STEM engagement
  - Virtual show and tell (Students exhibit and/or present STEM projects through virtual means such as pre-recorded or live video presentations, student websites/blogs, online portfolios, or other digital means
- ☐ **STEM Makerspaces:** Create makerspaces for students to develop creativity and problem-solving skills while engaging in STEM design challenges.
- ☐ **STEM Engagement for Families:** See *Family STEM Engagement Ideas for a District* document on the Texas Education Agency STEM webpage: https://tea.texas.gov/academics/college-career-and-military-prep/science-technology-engineering-and-mathematics-education-stem.
- ☐ **STEM professional development:** Offer professional development/training to educators and partners in the Texas EcosySTEM related to education, teaching/instruction, and the classroom setting.
- ☐ **Career Counseling:** Provide career counseling and advising for students interested in pursuing a STEM pathway.
- ☐ **STEM Pathways:** Offer Career and Technical Education (CTE) STEM Programs of Study (https://tea.texas.gov/academics/college-career-and-military-prep/career-and-technical-education/approved-cte-programs-of-study) that lead to STEM Industry Based Certifications, post-secondary credit and a STEM Endorsement.
- ☐ **STEM Portfolios:** Allow students to create a portfolio of their product designs, innovative solutions, and photographs of their prototypes to use to showcase their talent to future employers.

FAMILY

- ☐ **Child Interest Surveys:** Have your child take an interest survey to find careers they might like and allow opportunities to explore those career options while on vacation, family facility tours, topic related summer camps, out of school programs (Boy Scout Explorer Posts, STEM Scouts), and reaching out to employees in the field to mentor and/or be a pen pal for your child.
- ☐ **STEM Family Experiences:** Pursue and attend STEM engagement opportunities to expose and participate in STEM as a family. Examples might include visiting the science museum, local zoo, conservation area/center, attending and engaging in local STEM events in the school and community, or STEM career themed trips/vacations/tours.
- ☐ **STEM at Home:** Engage in STEM experiences and projects at home. Examples might include developing a family garden, designing something for the home, or solving a STEM-based problem at home.
- ☐ **STEM Movie Night:** As a family, watch a movie related to STEM. Examples might include *Dream Big: Engineering Our World* - Not Rated (2017), *Hidden Figures* – Rating PG (2016), *Spare Parts* – Rating PG-13 (2015), *The Martian* – Rating PG-13 (2015), *The Man Who Knew Infinity* – Rating PG-13 (2015), *The Lego Movie* – Rating PG-13 (2014), *Interstellar* – Rating PG-13 (2014), *The Imitation Game* – Rating PG-13 (2014), *The Theory of Everything* – Rating PG-13 (2014), *Gravity* – Rating PG-13 (2013), *A Beautiful Mind* – Rating PG-13 (2001), *October Sky* – Rating PG (1999), *Apollo 13* – Rating PG (1995).
- ☐ **Family Coding Day:** Adults partner with children to code robots or other programmable devices (e.g. drones, programming blocks, etc.). Participate in an Hour of Code through Code.org.
- ☐ **Volunteering:** Seek out STEM-related volunteering opportunities for the family. Adult family members can offer to volunteer their time and expertise to assist with or chaperone school STEM events, classroom STEM activities or projects, STEM Field Trips, or STEM after-school programs. Families can engage in STEM-related community service projects (e.g. community gardening, building/construction projects, re-envisioning community spaces, recycling or clean-up projects, etc.)
- ☐ **Job Shadowing:** "Take Your Child to Work Day" to learn about STEM careers and employability skills.
- ☐ **Connect to Local STEM Events/Organizations:** Use the Connectory (https://theconnectory.org/) to connect and collaborate with other families and organizations to provide robust STEM experiences for your child and develop/strengthen the STEM pipeline.

INFORMAL EDUCATION

(e.g. museums, zoos, libraries, conservation centers, after-school programs, community programs or resources, etc.)

- ☐ **STEM Focused Field Trips/Worksite Tours:** Host field trips for PK-12 students to engage in and explore STEM-related spaces. Field trips and tours could be on-site or virtual.
- ☐ **STEM Camps:** Host STEM-focused camps for elementary, middle, and high school students. Camps might include day camps throughout the school year to weeklong summer camps.
- ☐ **Outreach Programs:** Provide STEM events and educational programs for PK-12 students, families, and educators. Examples might include library events, museum programs, conservation nature center educational programs, zoo events/programs, cybersecurity events, etc. Programs might include in-class visits to the school and/or on-site programs at the organization's site.
- ☐ **Mentoring:** STEM faculty and undergraduate/graduate students mentor PK-12 students. Examples might include assisting with projects, collaborating on projects, and consistent open communication.
- ☐ **Badging Programs:** Offer programs in which students receive STEM-related badges/certificates (e.g. Scouts STEM Badge system).
- ☐ **Service Opportunities:** Provide STEM-related volunteering opportunities for students to engage in within the organization.
- ☐ **Job Shadowing:** Provide opportunities for students to shadow a variety of STEM professions/jobs within an organization.
- ☐ **Immersive Experiences:** Offer STEM-based practicum, internship (paid and/or unpaid), and/or apprenticeship opportunities for students.
- ☐ **Professional Development:** Facilitate and/or collaborate on STEM-focused professional development for educators and administrators. Examples might include virtual or face-to-face conferences, workshops, training modules, webinars, panel discussions, etc.
- ☐ **Curriculum Development:** Collaborate with schools and teachers to develop TEKS-aligned curricular activities.
- ☐ **STEM Advocacy:** Engage in STEM advocacy efforts through research, presentations, and STEM organizational work.
- ☐ **Texas EcosySTEM Connection:** Connect and collaborate with other members of the STEM Ecosystem to provide robust STEM experiences for students and develop/strengthen the STEM pipeline.
- ☐ **STEM Connectory:** Use the STEM Connectory (https://theconnectory.org/) to make the community aware of STEM events. The Connectory is searchable by zip codes and cities to connect families and educators to local STEM events.

HIGHER EDUCATION
(e.g. post-secondary programs – CTE, colleges, and universities)

- ☐ **STEM Tours:** Host STEM tours on campus for schools and PK-12 and postsecondary students to participate in. This might include tours of STEM-specific spaces (e.g. labs, learning/workspaces, engineering project spaces, architectural highlights, etc.)
- ☐ **STEM Learning Days:** Host STEM learning days for PK-12 students or families to participate in. Examples might include, but are not limited to:
  - Engineering/Maker-focused activities involving engineering design activities.
  - Science-focused activities involving science lab activities in a college lab or other authentic science learning spaces (greenhouse, water, farm, etc.)
  - Computer Science-focused activities involving coding/programming or eSports.
- ☐ **STEM Camps:** Host STEM-focused camps for elementary, middle, and high school students. Camps might include day camps throughout the school year to weeklong summer camps.
- ☐ **STEM Competitions:** Host STEM Competitions for districts. Examples might include Science Olympiad, Invention Competition, Science/Engineering Fair, STEM-based competitions or exhibitions.
- ☐ **Presentations/Demonstrations:** STEM faculty and undergraduate/graduate students conduct in-class or virtual presentations and/or demonstrations in PK-12 classrooms or during on-campus school visits.
- ☐ **Mentoring:** STEM faculty and undergraduate/graduate students mentor PK-12 students. Examples might include assisting with projects, collaborating on projects, and consistent open communication.
- ☐ **Professional Development:** Facilitate and/or collaborate on STEM-focused professional development for Pk-12 and postsecondary educators and administrators. Examples might include virtual or face-to-face conferences, workshops, training modules, webinars, panel discussions, etc.
- ☐ **Curriculum Development:** Collaborate with schools and teachers to develop grade-level/course appropriate and TEKS-aligned curricular activities.
- ☐ **Research/Grant Writing:** Engage STEM or STEM Education undergraduate/graduate students to pursue and acquire grant funding for STEM programming and research. Partner with school districts and acquire grant funding for STEM educational programming and research.
- ☐ **STEM Advocacy:** STEM and STEM Education faculty and students engage in STEM advocacy efforts through research, presentations, STEM organizational work.
- ☐ **Educator Externships or Research Opportunities:** Provide Pk-12 educators an opportunity to work alongside a STEM professor and gain real-world research and work experience to understand how their content applies to careers.

INDUSTRY (e.g. business, workforce)

- ☐ **STEM Focused Field Trips/Worksite Tours:** Host field trips for PK-12 students to engage in and explore STEM-related spaces. Field trips and tours could be on-site or virtual.
- ☐ **Expert Talks/Demonstrations:** STEM experts share their experiences leading up to entering their career and what it is like working as a professional in their field in a formal presentation or through an informal setting like a lunch and learn.
- ☐ **Mentoring:** Employees mentor PK-12 students and educators. Examples might include assisting with projects, judging STEM or Engineering fairs, collaborating on projects, answering student questions during a design challenge, or being a pen pal with a student interested in entering the STEM field.
- ☐ **Job Shadowing:** Provide opportunities for students and educators to shadow a variety of STEM professions/jobs within the organization.
- ☐ **Immersive Experiences:** Offer STEM-based practicum, internship, and/or apprenticeship opportunities for students and educators.
- ☐ **Outreach Programs:** Host STEM community events and/or educational programs for PK-12 students, families, and educators. Programs might include showcasing different technologies within the industry, design challenges on site working along side STEM employees, or issuing students a problem from their industry as a design challenge for students to solve and present their solutions back to the industry.
- ☐ **STEM Advocacy:** Engage in STEM advocacy efforts through informing, communicating and engaging with local and state political representatives/legislators, other industry leaders, local community leaders, educational leaders, and the greater educational community about industry/workforce needs and educational/training needs to develop the STEM workforce.
- ☐ **Employability Skill Development:** Connect with in and out of school educators through the Texas EcosySTEM to share industry hard skills that need to be developed through STEM education as well as the employability skills needed in industry.