

STEAM PLANNING GUIDE

Based on the rubrics originally created by the South Carolina Department of Education, the Arts + STEAM Collaborative created this outline to help your leadership team map out a plan of action for your STEAM school/program.

To find out more information about creating a STEAM school/program, or to take a quiz to assess your readiness, go to:

<http://artsandstemcollaborative.org/>

PROGRAM PLANNING & DEVELOPMENT

Write a STEAM plan

Create a mission and vision statement.

Create goals and objectives

Develop a timeline

Determine how your school/program wants to assess their progress

Use this guide to fill in the details of your plan

Determine which STEAM Content Areas to include

What are the STEAM Content Areas?

- Science
- Technology
- Engineering
- Arts
- Mathematics

Arts areas include:

- Music
- Visual Arts
- Dance
- Theater
- Media Arts

Identify potential postsecondary pathways and develop a plan to connect with relevant resources

Postsecondary pathways create partnerships between K-12, higher education, and business. These partnerships ensure that curriculums align with workforce needs in their geographic areas. They also are designed to increase access to work and success after graduation. Individual planning may guide students to identify their interests and skills early so that they may select courses and internship experiences in various areas so that they may advance more deliberately beyond high school.

Form a Leadership Team

What should my team represent?

Each content area of STEAM, as appropriate, should be represented on the leadership team. Your team is charged with buy-in, development, implementation, and forward momentum of the STEAM plan. Your team may include:

Who should be on my team?

- Students
- Teachers
- Administrators
- Community College Staff (where available)
- College or University Staff (where available)
- Teaching Artists (appropriate to STEAM)
- Community Arts Leadership (appropriate to STEAM)
- Museum or Arts Education Directors
- Business Persons (at least one person for each career pathway, if pathways are a focus)
- Community Leaders
- Parents

Reach out to a STEAM Network

Healthy STEAM schools/programs create partnerships outside of their campus.

Who should be in my network?

- Other Schools
- Community Resources
- Postsecondary Institutions
- Military Personnel
- Businesses/Industries
- Teaching Artists
- Arts Organizations (Agencies and organizations that focus on the arts or arts education. For example, state and local arts councils, museums and galleries, symphonies, theatres, dance studios, professional arts education associations, and arts oriented clubs.)
- Other key stakeholders (These may include the STEAM leadership team, administrators, local business partners, and other STEAM related industry professionals.)

Identify funding and/or other resources that will help you implement and sustain your plan and determine how your school/program plans to procure those resources

Utilize a team of community stakeholders to discuss STEAM education challenges and solutions to create funding streams

Community stakeholders are individuals or groups invested in the work of the STEM/STEAM programs. These may include the STEM/STEAM leadership team, local business partners, and other STEM/STEAM related industry professionals.

Funding resources may include:

- Grants
- District/State resources
- Corporate/industry partnership
- Donations from individuals

Identify specialized STEAM courses that you already offer or want to offer in the future

You may want to include specialized courses in STEAM related career fields that meet the skills, needs, and career aspirations of your students.

Specialized courses are those which are beyond the traditional courses of study.

EXAMPLES of specialized STEAM courses

- introduction to bio-medical engineering
- astronomy
- genetics
- environmental studies
- glaze chemistry
- technical theater
- world music

Identify and procure appropriate facilities

You may find that you need specific, collaborative work areas for STEAM study. These should include areas beyond a computer lab.

Collaborative work areas have sufficient space and tables where students may be able to complete STEAM-related projects, and where learning resources/materials are housed with sufficient space to encourage face-to-face collaboration.

For arts class space recommendations, educators may use the Opportunity to Learn Standards located in this Arts in Basic Curriculum website:

<http://www2.winthrop.edu/abc/>

DEVELOPING ARTS + STEM CURRICULUM

Identify the STEAM standards for your district / county / state and align your goals accordingly

Some states may not have STEAM standards identified, so you may have look up individual standards and create a plan using the combined information

A few places to start:

The Center on Standards and Assessment Implementation (CSAI)

<https://www.csai-online.org/collection/2810>

STEAM Thematic Standards

<http://steamedu.com/wp-content/uploads/2016/07/STEAM-Thematic-Curriculum-Standards-with-British-Standards.pdf>

California PTA

<https://capta.org/focus-areas/education/curriculum/stem/>

Identify ways in which your school is already infusing arts and STEM subjects as well as new ways in which it can create enhanced, infused experiences and curriculum

Schools/programs will want to consider ways in which the content of arts and STEM disciplines can create in-depth and embedded connections via practical applications.

The content of the different disciplines mutually support and enhance each other through constant planning and collaboration. An arts and STEM infused school disseminates and permeates STEAM content into the traditions and experiences that are at the core of every program within the school. When infusion is implemented effectively, instruction and learning is seamless.

What courses are ripe for infusion? In what ways do you envision that happening?

What teachers are already infusing STEAM subjects in the classroom?

Identify those teachers who are willing to work together to create infused lessons

Identify ways in which students can work cooperatively to apply STEAM skills, frame STEAM-related problems, and test solutions that incorporate STEAM content

Identify ways in which your school is already promoting habits of mind as well as new ways in which it can create experiences and curriculum that promotes habits of mind

Habits of mind are approaches to learning that focus on traits, thought process, etc. that are exemplified in learning practices such as those set forth in the engineering process and the mathematical practices.

Studio habits of mind include:

- Observe
- Reflect
- Envision
- Stretch and Explore
- Express
- Develop Craft
- Understand Community
- Engage
- Persist

Identify and implement ways in which teachers can develop authentic assessments

What is a Traditional Assessment?

TRADITIONAL ASSESSMENT: Refers to the forced-choice measures of multiple-choice tests, fill-in-the-blanks, true-false, matching and the like. Students typically select an answer or recall information to complete the assessment. Traditional assessments / tests may be standardized or teacher-created. They may be administered locally or statewide, or internationally.

What is an Authentic Assessment?

AUTHENTIC ASSESSMENT: testing springs from the following reasoning and practice:

1. A school's mission is to develop productive citizens.
 2. To be a productive citizen, an individual must be capable of performing meaningful tasks in the real world.
 3. Therefore, schools must help students become proficient at performing the tasks they will encounter when they graduate.
 4. To determine if it is successful, the school must then ask students to perform meaningful tasks that replicate real world challenges to see if students are capable of doing so.
- Typically, teachers first determine the tasks that students will perform to demonstrate their mastery, and then a curriculum is developed that will enable students to perform those tasks well, which would include the acquisition of essential knowledge and skills.

Traditional Assessments vs. Authentic Assessments

TRADITIONAL: Select a Response

AUTHENTIC: Perform a Task

TRADITIONAL: Contrived Scenarios

AUTHENTIC: Real Live Scenarios

TRADITIONAL: Recall/Recognition

AUTHENTIC: Construction/Application

TRADITIONAL: Teacher-structured

AUTHENTIC: Student-structured

Identify how much tech support and maintenance of software and hardware is available to teachers

What is currently available?

What is needed to fully support the curriculum you plan to implement?

Identify the software resources your school/program for STEAM subjects and the software the school should have to enhance their STEAM curriculum

Software

Schools/program will want to utilize software applications that allow students to work digitally.

FOR EXAMPLE:

- spreadsheet applications in biology
- robotics in programming
- design software in engineering
- calculators in mathematics
- Computer-Aided Design (CAD) for 3-D printers
- digital/media arts, dance, music, technical arts software

Computer/Web-Based Technology

Schools/programs will want to allow teachers and students to use computer-based, online, mobile, virtual, and/or other technology tools to support standards-based learning.

Identify those teachers that are proficient in the effective use of the software necessary for teaching STEAM subjects and/or who want to become more skilled in using and teaching appropriate software

Where can we find out more about resources for technology in education?

The International Society for Technology in Education (ISTE) is a not-for-profit organization that provides educational technology standards, resources and professional development opportunities for educators.
<https://www.iste.org/>

Identify in-school learning, mentorship, and work-based opportunities directly connected to current work in STEAM-related professions and industries

Types of projects

Your school/program may want to reach out to STEAM-related professions to learn what types of projects are being done in the real world to then determine what kinds of real-world projects could be replicated in the classroom

Mentorship

Your school/program may want to provide students with opportunities to meet STEAM professionals and/or experience STEAM work environments during and/or outside of school

Work-Based Experiences

An active, work-based learning experience may include competitions, service-learning, apprenticeships, internships with artists, industrial designers, architects, or other opportunities to engage with STEAM career-related individuals; durations of experiences could vary from one day to one year.

TEACHERS

Develop a network of STEAM schools

The school/program leadership may want to connect with an outside network of schools to help address STEAM education and its evolution and to give teachers a support system

Identify other schools that are successfully implementing a STEAM curriculum

- in your district
- in your county
- in your state
- nationally

Develop opportunities for teachers to meet and plan curriculum

Horizontal Planning

Teachers need time to meet with grade level peers at your school and if appropriate, across the district

Vertical Planning

Teachers need time to meet in their subject and with their STEAM peers, across grade levels in their school and if appropriate, across the district

Create a schedule that allows for teachers to plan together

Teachers need common planning time in professional learning communities to share STEAM activities and ideas, and utilize data to plan learning outcomes

Encourage teachers to discuss collaborative assessment development

Teachers benefit from sharing assignment strategies, collaborating on assessments, and reflecting on student work

Provide individual professional development opportunities for teachers

Professional learning is the acquisition of best practices, skills, and knowledge through a variety of methods such as workshops, training sessions, literature reviews, etc.

Opportunities may include strategies for standards-based learning that infuse/integrate STEAM or information on current content and best practices, techniques, materials and processes.

Develop opportunities for job-embedded professional development

What is job-embedded professional development?

Job-embedded professional development (JEPD) refers to teacher learning that is grounded in day-to-day teaching practice and is designed to enhance teachers' content-specific instructional practices with the intent of improving student learning (Darling-Hammond & McLaughlin, 1995; Hirsh, 2009).

It is primarily school or classroom based and is integrated into the workday, consisting of teachers assessing and finding solutions for authentic and immediate problems of practice as part of a cycle of continuous improvement (Hawley & Valli, 1999; National Staff Development Council, 2010).

JEPD is a shared, ongoing process that is locally rooted and makes a direct connection between learning and application in daily practice, thereby requiring active teacher involvement in cooperative, inquiry-based work (Hawley & Valli, 1999).

High-quality JEPD also is aligned with state standards for student academic achievement and any related local educational agency and school improvement goals (Hirsh, 2009).

For a more comprehensive look at JEPD, go to:

<https://learningforward.org/wp-content/uploads/2017/08/job-embedded-professional-development.pdf>

Develop opportunities for STEAM-related professional learning

STEAM-related professional learning addresses integrating STEAM content, community/industry partnerships, connections with postsecondary education, pedagogy (including strategies specific to diverse learners), and/or digital learning.

Develop opportunities for applied learning experienced for teachers

Examples of applied learning experiences include study trips, fellowships, externships, etc. The durations of experiences could vary from 1 day to 1 year.

DEVELOPING STEAM CULTURE AND RECOGNITION

Develop a strong STEAM culture

The STEAM culture is the atmosphere, mindset, or mode of operation that bases all educational endeavors on the processes, practices and habits of mind that support the integration/infusion of STEAM disciplines.

Find ways to be cheerleaders for STEAM

Actively recruit and include underrepresented students to engage in STEAM

Who are considered underrepresented students?

- females
- people of color
- students from low socio-economic backgrounds
- students with diverse learning needs

Develop clear guidelines and/or practices that explicitly focus on increasing long-term participation by students from underrepresented groups in postsecondary STEAM pathways

Identify and utilize multiple ways to communicate internally and externally about STEAM

ONE WAY TOOLS: i.e. websites and newsletters

TWO WAY TOOLS: i.e. social media platforms, webinars, meetings

Seek out exhibit and performance opportunities to showcase STEAM work

Opportunities may be found:

- In School
- Online
- In the community
- At the state level
- At the national level
- At the international level

Identify ways for the school/program leadership to honor and encourage innovation in STEAM among students

Identify ways your school/program to share the success of STEAM curriculum with other teachers and administrators

School/program-level student data on performance in the STEAM program (from test scores to work samples) should be made available and shared with administrators and teachers.

CONNECTIONS WITH POSTSECONDARY EDUCATION (for middle and high schools)

Identify ways to share secondary/postsecondary STEAM programs and STEAM career topics among counselors, teachers, and students

Develop a diverse array of courses that directly of STEAM-related career fields are available to students - either face-to-face or virtually

Identify opportunities for counselors and STEAM teachers meet to discuss the alignment of students' coursework to postsecondary careers and/or education

Encourage school counselors to develop one-on-one relationships with students about future plans and coursework as it relates to STEAM

Counselors and students can use time together (face-to-face or virtually) to plan, discuss, and track the connections to the students' individual graduation plans as it relates to STEAM.