Moving from STEM *to* STEAM

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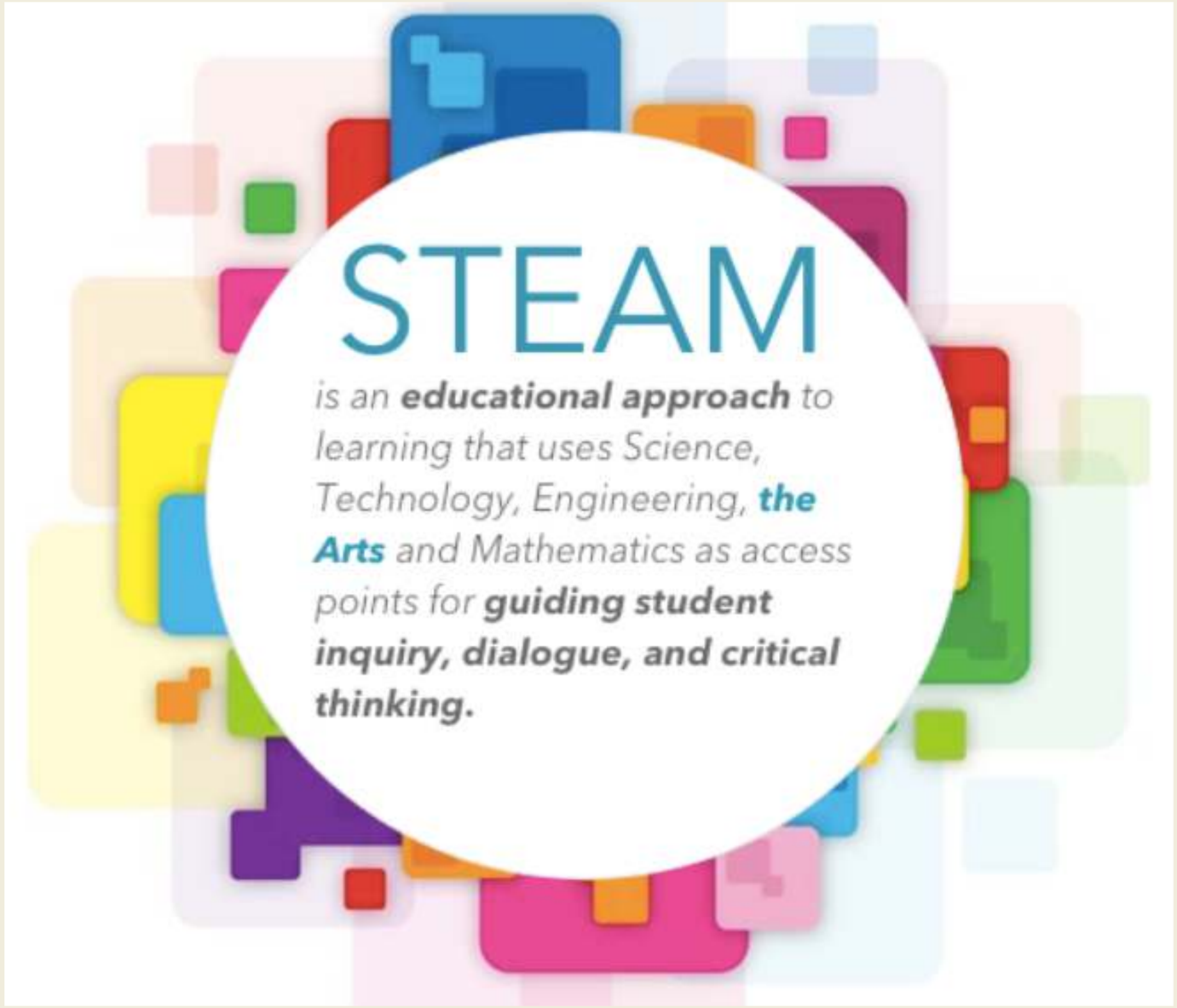
The difference between science and the arts is not that they are different sides of the same coin, or even different parts of the same continuum. Rather, they are manifestations of the same thing.

The arts and sciences are avatars of human creativity.



OUR WORKING DEFINITION

STEAM PROVIDES CONTEXT **AND** CONNECTION

THE PROBLEM?

ONE Many educators use the acronyms STEM and STEAM interchangeably. Or, they refer to everything as STEAM, when it is actually STEM.

TWO Second, I've noticed that the idea of a STEAM lesson is an event instead of a mindset. Some of the lessons connect to our current curriculum, and some do not.

STEM

Focuses on the process and inquiry of science, technology, engineering, and mathematics.

Standards-connected at it's most authentic, though not often what is reality.

Focuses purely on the STEM content areas - little to no connections to literacy or humanities.

STEAM

Uses design principles and processes from the arts to manipulate science, tech, engineering, and math (arts act as a catalyst for STEM); STEM and arts integration combined.

Standards-connected at it's most authentic, though not often what is reality.

Focuses on the whole-picture - connects STEM with all the arts to provide context.

DESIGN CHALLENGE: UNDERSTANDING STEAM VS STEM

Catapult Lesson

SCIENCE

Explore energy's ability to cause motion or create change.

TECHNOLOGY

Students develop, test and refine prototypes as part of a cyclical design process.

ENGINEERING

Recognize design is a creative process and everyone can design solutions to problems.

MATH

Solve problems invloving measurement and estimation of temperature, liquid volume, mass or length.

SCIENCE

Explore energy's ability to cause motion or create change.

TECHNOLOGY

Students develop, test and refine prototypes as part of a cyclical design process.

ENGINEERING

Recognize design is a creative process and everyone can design solutions to problems.

ART

Recognize, know, use and demonstrate a variety of appropriate arts elements and principles to produce, review and revise original works in the arts.

MATH

Solve problems invloving measurement and estimation of temperature, liquid volume, mass or length.

WHAT THE RESEARCH SAYS

INCREASE IN STUDENT ACHIEVEMENT ACROSS THE BOARD

INCREASE IN ACHIEVEMENT FOR **MINORITY, ELL, AND SPECIAL EDUCATION POPULATIONS**

DECREASE IN CLASSROOM BEHAVIOR ISSUES

INCREASE IN ATTENDANCE

SOURCE: ARTSEDSEARCH.ORG

Connecting through the Standards

CREATIVE PROCESS ELEMENTS	NATIONAL CORE ARTS STANDARDS	COMMON CORE READING STANDARDS	COMMON CORE WRITING STANDARDS	COMMON CORE SPEAKING/ LISTENING STANDARDS	COMMON CORE LANGUAGE STANDARDS	COMMON CORE MATH PRACTICES
DESCRIBE (Develop Focus)	**Process: Respond** A7: Perceive and analyze artistic work.	**R.1:** Read closely and cite evidence.	**W.7:** Conduct research projects based on focused questions.	**SL.1**: Prepare for and participate in a range of conversations.	**L.4**: Determine or clarify meaning of unknown words.	**MP1**: Make sense of problems and persevere in solving them ***Also: MP7***
ANALYZE (Explore Details)	**Process: Respond** A7: Perceive and analyze artistic work.	**R.2**: Analyze text development. **R.5:** Analyze text structure. ***Also: R.3***	**W.9**: Draw evidence from literary or informational texts.	**SL.2:** Integrate and evaluate information presented in a variety of formats.	**L.4**: Determine or clarify meaning of unknown words	**MP5**: Use appropriate tools strategically. ***Also MP1 and MP8***
INTERPRET (Discover & Develop Personal Meaning)	**Process: Respond and Connect** A8: Interpret Intent and Meaning in artistic work. *Also A10*	**R.4:** Interpret words and phrases in text.	**W.1:** Write arguments to support claims in analysis.	**SL.1:** Participate effectively in a range of conversations and build on others' ideas to express their own clearly.	**L.6:** Aquire and use accurate a range of words and phrases.	**MP2**: Reason abstractly and quantitatively **MP4**: Model with mathematics.
CREATE (Apply Knowledge & Link to Personal Meaning)	**Process: Create** A.1: Generate and conceptualize artistic ideas and work. *Also A2 and A3*	**R.9**: Analyze how two or more texts address similar themes/topics to build knowledge and compare different approaches.	**W.2:** Write informative/ explanatory texts. **W.3.**: Write narratives. **W10:** Write routinely over time.	**SL.5**: Make strategic use of digital media and displays of data to enhance understanding of presentation.	**L.3**: Apply knowledge to comprehend more fully when reading or listening.	**MP4**: Model with mathematics. **MP7**: Look for and make use of structure.
PRESENTATION (Share your creation)	**Process: Perform/ Present/Produce** A5: Develop and refine artistic work. *Also: A4, A6*	**R.10:** Read and comprehend text.	**W.4:** Produce clear and coherent writing. **W.6:** Use technology to produce/publish writing.	**SL.4**: Present information, findings and evidence such that listeners can follow a line of reasoning.	**L1**: Demonstrate command of the conventions of standard English grammar. ***Also: L2, L3***	**MP6**: Attend to precision.
EVALUATE (others)	**Process: Respond** A9: Apply Criteria to evaluate artistic work.	**R.6**: Assess point of view **R7**: Integrate & evaluate content.	**W8**: Gather information and assess credibility.	**SL.2:** Evaluate a speaker's point of view, reasoning and use of evidence.	**L.3:** Apply knowledge to comprehend more fully when reading or listening.	**MP3:** Construct viable arguments and critique the reasoning of others.
REFLECT (self)	**Process: Respond and Connect** A10: Synthesize and relate knowledge and personal experiences to make art.	**R.8:** Delineate and evaluate the argument and claims in a text for validity, relevance and sufficiency.	**W5**: Develop and strengthen writing through planning/ revising/editing/ rewriting or trying new approach	**SL.6**: Adapt speech to a variety of contexts and tasks.	**L.3:** Apply knowledge to comprehend more fully when reading or listening.	**MP4**: Model with mathematics.

CONNECTING TO THE STANDARDS **THROUGH THE CREATIVE PROCESS**

THE STEM TO STEAM

PROCESS

01

Review the STEM project for the standard(s) and content area(s) addressed. What was the goal of the project or lesson? What product or process was developed? What essential question(s) did you explore?

02

Select an arts area that would make a natural connection with your original STEM project. Would visual art, music, dance, theater or media arts make the most sense? Select ONE artistic area that is the best fit.

03

Explore the chosen art form's arts standards and essential questions. Review the standards for your art form and look for naturally aligned standards to your original STEM project standards. Seek out common verbs such as "explore", "create", "investigate", etc as a starting place.

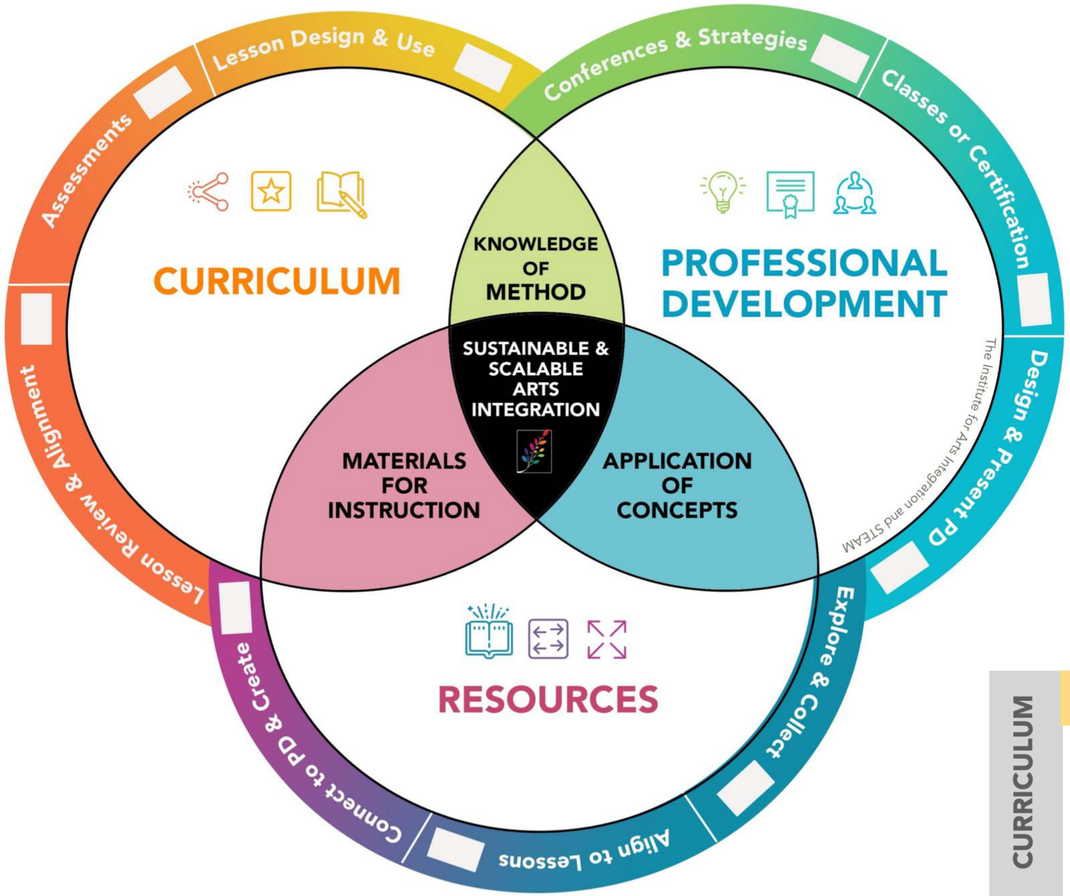
Discuss any standards you find as possible alignments with the arts teachers in your building if possible. Then, consider an essential question or point of inquiry that students can use for both the STEM and arts area for this project/lesson. Write this down and use it as a lever for creating your new STEAM lesson.

04

Align your STEM and Arts Standards and design a new assessment. Determine what project, process or outcome students can produce or share that represents their learning and application of both the STEM and Arts Standards you selected. Create a new assessment that equitably measures both standards.

05

Create a rebooted STEAM lesson. Determine how you can intentionally teach or provide opportunities to explore the STEM and arts standards simultaneously within your original project/lesson in a way that will enable students to reflect their learning in both areas on the corresponding assessment.



THE IMPLEMENTATION WHEEL

AND SCORECARD

CURRICULUM	1 Finding Standards Alignments • Looking at model lessons & strategies • Noticing standards connections • Connecting standards for your own lessons	2 Creating Assessments • Using pre-created assessments • Reviewing assessments for both areas • Creating your own assessments for AI lessons	3 Designing Lesson Plans • Using arts integrated strategies • Using pre-created lessons • Designing your own arts integrated lessons
PD	4 Learning Best Practices • Taking a strategy workshop • Attending AI conferences • Collaborating with teaching artists and observing peers using AI	5 Take a Course to Go Deeper • Take a foundational AI course • Get certified in arts integration • Creating a course or PD day for others in AI/STEAM practices	6 Evolving PD & Support • Occasional PD day in AI strategies • Monthly workshops in AI methods • Designing personalized, regular PD based on needs of staff in AI/STEAM
RESOURCES	7 Curate a Resource Library • Scrolling & collecting AI resources • Curate a library for all AI resources • Create AI/STEAM resources for your school & add to library	8 Align Resources to Lessons • Resources have little/no connection to AI lessons • Connecting resources to AI lessons • Creating resources aligned to lessons	9 Extend Resources for PD • Review handouts from previous AI PD • Seek out resources to support planning/assessment efforts • Create resources for upcoming PD

STAY IN TOUCH!

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