STEAM: A framework for teaching that is based on natural ways of learning, customizable for ALL types of students and programs and is FUNctional!

Why STEAM Education

A way to teach about all things as they relate to each other
The pyramid helps map & connect the subjects to the business world.
Why teach how to learn?

- To create knowledgeable people to shape the next generation and keep education going, who know how to use teamwork to evaluate needs, wants & opportunities
- To be informed users, responders & innovators (Barlex, p. 180)
- To create a culture to reduce:
  - the drop out, unemployment & poverty rates
  - having to teach to the test instead of the individual
  - the disproportionate percentage of women & minorities in leadership positions

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STE@M Education:

• is where ALL subjects & peoples are recognized, can contribute & all effort is encouraged

• has curricula that is representative of the surrounding culture & aware & tolerant of all types of diversity & perspectives

• is adaptable, strong, benchmarked, measurable & inclusive of the standards & easily reinforces standards in unique & engaging ways.

• can be done inexpensively!

• promotes deeper understandings and a transference of knowledge
What is technical literacy?

**FUNctional literacy**

~ being able to keep up with the modern world.

STEAM students not only learn to be literate in each (silod) discipline, but they become life-long learners who are much more capable of being functionally literate and advancing society.
All STEAM Learners:

All participants have ways they are advanced & ways they are challenged further to investigate and coordinate topics and tangents to fully participate, learn & teach others.

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Student Benefits of STEAM

• Connections & Transference
  • application of skills - design

• Interest, Engagement, Behavior, Realistic Discovery & Innovation – Exploratory

• Balance of education – educator network and student teams & subjects

• Understanding & respect of their abilities – student directed learning

• Adding human side to ‘hard sciences’ – culturally relevant discovery learning
STEAM teams naturally help balance work for all types of learners

• Learn with each other for more perspectives in discussions and on projects
• Recognition & encouragement of varying skill sets
• More natural respect for other types of learning – multiple intelligences
• Easier for all personality types to have a voice
• Extensions (dementia & rehab)
• Team dynamics help solve conflicts
• Group identity and pride – shift from ME to WE

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Assessing STEAM students by using...

portfolios & process work
and recognition that:
the end product is only part of it
Where the STEAM concept came from:

*research & practical results since the beginning of modern ed.*

The Giants (Educational Researchers of Mod. Ed.)

- Significant epistemological similarities among recognized philosophers
- Integration of cognitive theory & educational psychology strengthened

The Silos (Individual Disciplines)

- Most schools have always taught subjects separately & have developed signature pedagogies & standards – they are all now recognizing the importance of inter-connecting to other fields
- Holistic – an unobtainable goal that each student will learn in the same way – STEAM gets close!

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Supported by learning theories.

- Constructivism & PBL
- Scaffolding & ZPD
- Gardner’s Multiple Intelligences
- Bloom’s Taxonomy
- Marzano’s Strategies
- CASTL: Teaching Commons
TE/STEM/iSTEM Trends & US

iSTEM vs. S-T-E-M

• ‘Silo’
• Integrated
  1 dominant or blended
• PBL & RBL

• 3 Primary STEM Conferences
• All US states have STEM-focused schools and/or Programs

SCIENCE is...

the natural universe, from where everything comes.

ENGINEERING is...

R&D (research & development)

Purposeful Innovation, Creation & Analysis

TECHNOLOGY is...

Tools and innovative devices, uses and enhanced abilities, human/animal-made.

MATH is...

Fact organizing, base language.

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STEM organizes the materials, principles & processes of what & how things can be done, includes why & by whom things are done.
The Arts are SO MUCH MORE than design, they add the **who & why** to the **what & how** of STEM
Including the Arts

S-T-E-M with the A includes:

- sharing knowledge with language arts,
- a working knowledge of manual and physical arts,
- better understanding the past & present through fine arts.
- understanding developments with social/liberal arts...

including: sociology, psychology, history, politics, philosophy, education, etc.


Social Studies

How Society Develops
Past, Present & Future
Societal Constructs, Ethics

STS – Science Technology Society

ANT – Actor Network Theory

INCLUDES EDUCATION!

Language Arts is...

Communication used & interpreted
Written (shu), spoken, sign, body, symbols, etc.

3 primary types
– Math, Technical & Social
Pictorial vs. Alphabetic Languages
Societal influences - from and on
Communicate effectively

Musical Arts

• Sound meanings - before words
  Mnemonics - social language
• Rhythm – math
• Sound - physics – instruments - Videos - fine arts + music
Fine Arts

Oldest Sustainable Cultural Pieces

Interpreters of S & T

Aesthetics

E hurt if A not included

4 Arts of Scholar:

Qin, Qi, Shu, Hua,

Music, Go Strategy,

Calligraphy, Painting

Critical to learning environments

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Physical Arts

Connects to athletes
• hands-on field & classroom
• Push oneself to be the best in all areas and respect and promote other things and people in one’s network
• memorize mental 'plays'
• S-T-E-A-M of athletics
Sustainability

Limits & consequences of resources
- Cultures & Societies
- Ultimate Recycling
- Businesses
- Sellable items
- Fill community needs
- Purchase responsibly
- Renewable Resources / Energy
- Biorestitution

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STEAM Interdisciplinary Education - Reasons Why:

• Expands current curriculum’s lesson plans into STEAM plans for more realistic discovery & innovation for all types of learners
• Diversification of teaching methods - more engaging student self-directed, project-based, discovery learning
• Faculty rejuvenated by richer living learning environments in which to work
• Using purposeful integration of the exploratory subjects: fine art, music, PE, technology & engineering
• Opportunity to teach collaboratively: exchange ideas – reduce individual work load – more productive common planning times
• Subject matter integration/connections - Each subject helps students learn about the other subjects involved for deeper understanding
• Student team development & room management options

Many programs choose to revolve their STEAM curriculum framework around themes, here are some of the most popular ones worked with so far;

**STEAM Themes**

- Power & Energy
- Elements & Processes
- Life & Movement
- Transportation
- Communication
- Inventions
- +

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Example Course: WHAT’S YOUR POINT!?!?

Identify needs, wants & opportunities for yourself

- Learn about all kinds of work opportunities
- Best at your talents and
- Explore your interests to
- Reduce your limitations!

Ex. Project: Around the World in Many Ways

Ideally a thematic unit taught by multiple teachers

- discipline based instruction: each teacher revolves some of their lessons around the theme and makes connections to their discipline's benchmarks/standards

  • Overview lesson teachers about transportation systems well beyond planes, trains and automobiles to wireless technology ++

  • Science – most closely linked to inputs, outputs and byproducts

  • Technology – most closely linked to what has been developed – strong industrial and military ties

  • Engineering – most closely linked to inventions and goals of industry

  • Arts – LA research, reports, opinions – SS expectations of systems – FA design & PE interactive functions & Music, – the sounds of the machinery sending messages and being useful as a language as well as pleasing or not

  • Math – most closely linked to understanding the equations that make things work – algebra and geometry key
STEAM Team – WINS National Technology/Engineering Contest

S = table of elements – chemistry
T = industry & home production & machinery – element examples
E = what can be done - new combinations – designing
A = aesthetics, fitting, drawing, photography, technical & creative writing,
M = measuring, drafting, economics

STEAM Education Trained 2012-2016

2,100+ educators, 60+ staff, 39 states, 15 countries

STEAM Law HR51 took only 3 years to pass due to the urgency to address educational gaps

It took 10 years to pass STEM Bill!


US – VA Senator Mark Warner
Science & Technology interpreted through Engineering & the Arts, all understood with elements of Mathematics.

Professional Development & Certifications, Lesson Plans, Consulting, Keynotes & Workshops:

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contact@steamedu.com