

STE(A)M Education- What does it mean and why is it important?

The U.S. Department of Education believes that in an ever-changing, increasingly complex world, it's more important than ever that our nation's youth are prepared to bring knowledge and skills to solve problems, make sense of information, and know how to gather and evaluate evidence to make decisions. Former President, Barack Obama, put out the call in his 2011 State of the Union Address, igniting a movement to teach students 21st-century skills to become more competitive with other nations in the fields of STEM. The U.S. Department of Education suggests that these are the kinds of skills that students develop in science, technology, engineering and math—disciplines collectively known as STEM.

Where does the “A” come in to turn “STEM education” into “STEAM education” and why? The STEAM approach recognizes the *arts* in STEM learning experiences. John Dewey, American philosopher, psychologist, and educational reformer, believed in the desegregation of subjects and in allowing children to just ask and seek answers with their unbridled natural curiosity. In today's educational system, youth asking questions can be seen as inadequate rather than curious. In reality, the most successful innovators, creators, engineers and scientists use a myriad of skills to innovate, create and engineer.

A fantastic example of this comes from the University of Concordia-Portland's website: “The scientist who can use science and math to create a new treatment for disease must also use design-thinking to imagine and visualize her work. She must also express herself with impressive communication skills in order to secure funding and support. She must work collaboratively with her colleagues and investors to improve and expand ideas, and then publicly speak about her progress and discoveries with eloquence and ease. This multi-skilled individual is a representation of a student who understands how academic subjects are meant to work together.”

In the context of 4-H Youth Development, 4-H provides the cross-curricular projects and real-life experiences that youth need to further develop their skills in the field of STEAM. 4-H programs use hands-on activities in robotics, computer science, electrical engineering and various other areas, to teach problem solving, creative and critical thinking, and inspire kids to explore engineering and technology. In the Nebraska State Fairbook there are countless opportunities for leaders and parents to further involve youth in hands-on STEAM learning experiences. In every area of the static exhibits at the fair there are more than one opportunity for STEAM learning to be incorporated. For example, project ideas from six areas of the static exhibits are listed below with contextual STEAM questions for leaders and parents to ask youth:

Agronomy: Crop Technology Display – Display information about aspects of technology used in crop production, such as genetic engineering, crop breeding, GPS, yield mapping, computers, etc. *In the context of STEAM-* This project uses science and technology concepts to explore the question, “how can crop production be improved?” These examples (genetic engineering, crop breeding, GPS, yield mapping, computers, etc.) give the youth the opportunity to explore engineering and math concepts as well. In order for a viewer to actually want to read this display, the youth must also consider his or her design to catch the viewer's attention.

Citizenship: Exhibit depicting a cultural food- that is special to your family. Can be a story or essay. *In the context of STEAM*- How does the science of different ingredients affect this special food? Have advances in technology made the process of making this food faster or easier?

Entomology: Insect Poster/Display Exhibits - Exhibits can be posters or three-dimensional displays, and artistic creativity is encouraged. Posters should be no larger than 22" x 28". They should be instructional and can be attractive and have pictures, drawings, charts, or graphs. *In the context of STEAM*- How might the youth engineer an interactive display? Could technology be used?

Clothing: Embellished Garment with Original Design- Create a garment using intermediate or advanced techniques as defined in the project manual. Designs are the original idea of the 4-Her using the elements and principles of design to make an original statement. *In the context of STEAM*- how might you use technology to compliment the creation of this garment?

Photography: Creative Techniques & Lighting Display or Print- Photos should capture a creative use of lighting, such as diffused lighting, backlighting, or hard lighting, reflections, or another lighting technique covered in Book 2 Next Level Photography. *In the context of STEAM*- How does the science behind light (optics) come into play with photography? How could the photographer engineer a better lighting set up in a dimly light area? Could the use of technology improve the lighting?

Conservation, Wildlife & Shooting Sports: Community Vitality Display - Explore how shooting sports, conservation, fishing, and hunting makes a difference in keeping Nebraska vibrant especially in rural areas. Present facts and research in an interesting way for the public to learn from. *In the context of STEAM*- How does technology improve these areas? How do public displays catch visitor's attention and bring them into communities?

Displayed in the information above, STEAM concepts can be found throughout the Nebraska fairbook. By incorporating multiple subject areas, 4-H can create more meaningful learning experiences for youth. When projects are designed with STEAM concepts, intention and care, they can lower barriers to engagement, stimulate creativity, and allow youth to deeply connect to their work.

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Resources used:

2019 Nebraska State Fairbook. <https://4h.unl.edu/fairbook>

4-H STEM & Agriculture Programs for Youth. Retrieved from <https://4-h.org/parents/stem-agriculture/>.

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Science, Technology, Engineering, and Math, including Computer Science. Retrieved from <https://www.ed.gov/stem>.

STEAM Practices. Retrieved from <http://fosteringsteam.org/steam-practices/>