

Live Session 10/18/21 Make Up

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Engineering Integration

During this live class, Dr. Arnone covered Engineering integration in the classroom and modeling and making in STEM classrooms. To answer Dr. Arnone's question "What does engineering look like in a K-12 classroom?" I would say it involves kids building and creating new things. The kids would learn the design process and use it to create something new based on their learning goal with materials they are given. The item they create could be used in tandem with a science experiment or math project. Dr. Arnone explained that engineering instruction is based on design problem solving, it integrates learning across content areas, and it is hands on tasks that reflect real world problems. To answer Dr. Arnone's question "what is the difference between engineering, science and technology? How are they related?" I would say they are all related because they are based on design problem solving through trial. When using technology, learning science, or creating using engineering ideas, the kids often have to come up with an idea or design, test it, and improve it. I believe this idea is applied in science, technology and engineering classrooms. To explain how they are different, I agree with Schyler's idea of science being the theory, engineering being the design, and technology being the tool. Dr. Arnone explained that the ideas of science, technology and engineering are different, but they are closely related; science being the body of knowledge that engineers use to create something, and the technologies are the creations. As an elementary teacher, I agree with Dr. Arnone that engineering in K-12 is helpful and fun for kids to determine the "why?" they are always seeking. I think using engineering in the classroom helps kids learn 21st century skills like communication, collaboration, and team work. It also helps students be creative and improve spatial and geometric awareness with hands on projects, as well as help students gain

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an understanding of fields of study that are available to them based on their interests. After beginning to talk about teaching engineering, Dr. Arnone brought up ill and well-structured questions. She said well-structured questions typically only have one answer, but an ill structured question has more than one answer and could be debated. An example of a well-structured question could be “What do people who celebrate Christmas decorate every year?” but an ill structured question could be “Do you think Buddy the Elf could have had as much of an impact on his family if he visited during a different holiday?”

Dr. Arnone went on to explain the engineering design process in 8 steps: 1. Identify the problem, 2. Identify Criteria and Constraints, 3. Brainstorm Possible Solutions, 4. Generate Ideas, 5. Explore Possibilities, 6. Select an Approach, 7. Build a Model or Prototype, and 8. Refine the Design. I agree with Dr. Arnone that this is a good model, but the steps should be less cyclical and more fluid in that we can move between different steps depending on where we are in our process, and communication should be integrated at every step.

Modeling and Making STEM

Dr. Arnone talked about modeling using visual images as scientific models to explain phenomena. She said scientific models should include specific variables, representing component relationships, and creating a sequence to explain the phenomena. I loved Dr. Arnone’s comment about having kids, not just ELL students, draw and label to explain phenomena. I think this is a great way for all students to express their thinking creatively if they struggle to do it in words or they are not ready to put their thoughts into writing yet. To answer Dr. Arnone’s question “what is a maker?” I think a maker is someone who uses the model and actually makes something. It is a person who does the hands on work of physically taking an idea off paper and turning it into a reality.

