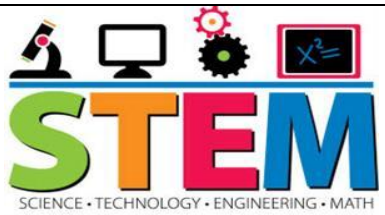
General Knowledge about STEM for Teachers EDUC 450		Teacher Education STEM Links & Resources www. smithclass.org

Graduating teacher education students with a working knowledge of STEM are in higher demand, and are a more employable group than those who lack experiences in STEM teaching. (Kinash, 2015)

STEM is a curriculum approach based on the idea of educating students in four specific disciplines — science, technology, engineering and mathematics — in an integrated and applied approach. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning model based on what people do in the real world (*Content in Context*).

Virginia SOLs: Core Ideas are studied in Life Sciences, Engineering & Technology, Earth & Space Sciences, and Physical Sciences (very close connection to VA SOL strands).

STEM in elementary focuses heavily on **observational** and **experiential** learning integrating across the content areas laying the foundation for analyzing measurement, testing ideas, and communicating understanding. It does not focus on memorizing concepts.

The Next Generation Science Standards lay out many specific interactions by students. See suggested engineering design practices by grades levels at: http://ngss.nsta.org/AccessStandardsByTopic.aspx

Student teachers design the 4 areas into the science lesson plan, blending cooperative groups, teams, and whole class instruction. Assessment can be evidenced in any of the parts. For a STEM lesson about designing the Best Aluminum Foil Boat to hold weights (coins) before sinking, the disciplines can be viewed as in this example:

1. Math
    - Measurement, in both standard and non-standard units.
    - Data collection, display, and analysis. *What story does the data tell?*
    - Problem solving.
2. Science
    - Force, specifically gravity and buoyancy.
    - Measurement, including mass, volume, surface area, and displacement.
3. Engineering
    - Structural analysis, including design and materials.
    - Product design, including **testing to failure** and maximizing results.
    - Improving the design (included writing, oral reporting).
4. Technology
    - Analyze results: photos, video and various software (graphing, calculating).
    - Students can also use voice recordings for a final explanation.
    - Calculate **ideal** value/numbers for maximum results.

Teaching Channel: https://www.teachingchannel.org/videos/science-engineering-practices-achieve

** Kinash, et al. (2015). What students and graduates need to know about graduate employability: Lessons from National OLT Research.