




“what students do”

“what students know”

“how students think”

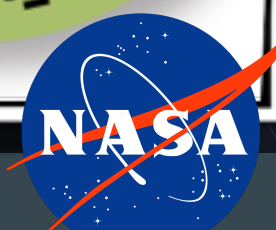
PRACTICES

CONTENT

CROSSCUTTING

3D's to 5E's

Integrating STEM into Everyday Practice

TRADITIONAL

- Inform** (about what they should know through textbooks/lectures)
- Verify** (new knowledge with lab activities/demos)
- Practice** (new knowledge by answering questions/working problems)



Problem:

Students view the content as separate from practice.

Interesting activity but doesn't lead students to form an evidence based claim.

No first-hand experience to construct knowledge.

Brown, P. (2018). Instructional Sequence Matters: Structuring Lesson with the NGSS in Mind. Arlington, VA: NSTA Press.

Scaffolding Simulations

- Capitalize on the students sense of play by always allowing a period of open play to start
- Circulate the room looking for progress asking open ended questions
- Solicit student ideas (stop and ask a student to explain what they have found)
- Avoid teaching them how to engage with the simulation (hands off their devices)
- Check for Understanding
- Facilitate Whole-Class Discussion and Pull it Altogether
- Be Flexible

Inquiry-Based

- Explore** (first hand knowledge is gained through data collection)
- Invention** (concept introduction: derives concepts and new terminology from the data)
- Practice** (concept application: elaborate on and verify new knowledge in other contexts)



Sequence Matters!

Students collect data and investigate **BEFORE** the introduction of new terms/concepts.

Facts and terms are directly linked to scientific ideas students have built through the exploration phase.

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Six Characteristics of a great STEM lesson:

1. Focus on REAL-WORLD issues and problems.
2. Guided by the engineering design process.
3. Immerse students in hands-on inquiry and open-ended exploration.
4. Involve students in productive teamwork.
5. Apply rigorous math and science content your students are learning.
6. Allow for multiple right answers and reframe failure as a necessary part of learning.



Works Cited

Brown, P. (2018). Instructional Sequence Matters: Structuring Lesson with the NGSS in Mind. Arlington, VA: NSTA Press.

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