Notes from SEEC 2025 by Wes Fryer - space.wesfryer.com

These are my notes from the Feb 6-8, 2025 SEEC (Space Exploration Educators Conference) at the Johnson Space Center. I'm attending virtually. *My thoughts and comments are in italics.*

All notes are in reverse-chronological order

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Bringing Space to Life: Space Colonization Units Implemented in the STEM Classroom

By Annamarie Vandrevala
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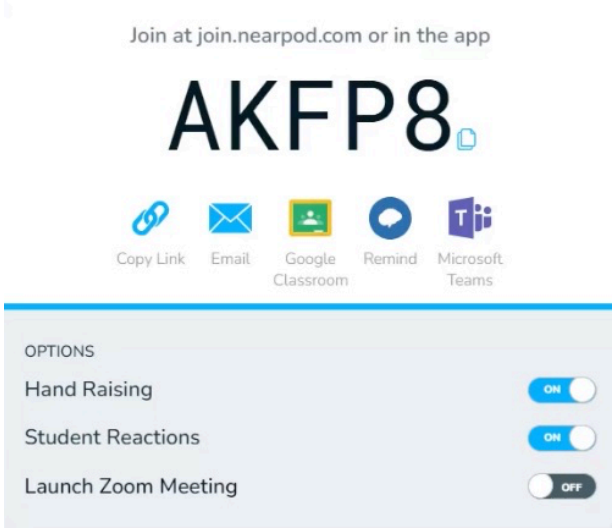
Started working on these in 2014, first group to ever see ALL the units



https://app.nearpod.com/presentation?pin=AKFP8

I combine all my resources in this Wakelet!
https://wakelet.com/wake/G9z5tdRdo_pbbrBGvgvHs

3 units that all fit together, but you can change order:

I am a big science fiction nerd… So very fun to build these different parts

Each unit about 2 weeks long, using 45 minute class periods

My shares in session chat:

I'm a middle school STEM teacher in Charlotte, NC, and have been using a Mars Colonization / "Coding Mars" unit with my students for the past 3 years too.

The "Moonrise" podcast from the Washington Post really highlights how important the science fiction writers were to the original Moonshot!
https://www.washingtonpost.com/podcasts/moonrise/introducing-moonrise/

Presentation slides:
https://docs.google.com/presentation/d/1UpyVIVEY3dNBx-yxSPKID4FowBzYxs7GlopbUYN_wog/edit#slide=id.g32e8d582829_2_0

Activity: Create a timeline of Rocket history
- when
- who was involved
- what was happening

We did this in the session in NearPod

Comparing timelines can help students focus beyond themselves, define for themselves what they think is important, can lead to compare and contrast debate
- can do this on big white post-it notes

Used this link in activity:
https://www.grc.nasa.gov/www/k-12/TRC/Rockets/history_of_rockets.html#:~:text=The%20date%20reporting%20the%20fir

Next moving into design features of rockets, variables for space rockets

I discourage students from using Quora or Answers.com as sources
- vetting process for resources
- use NASA.gov, sometimes Space.com

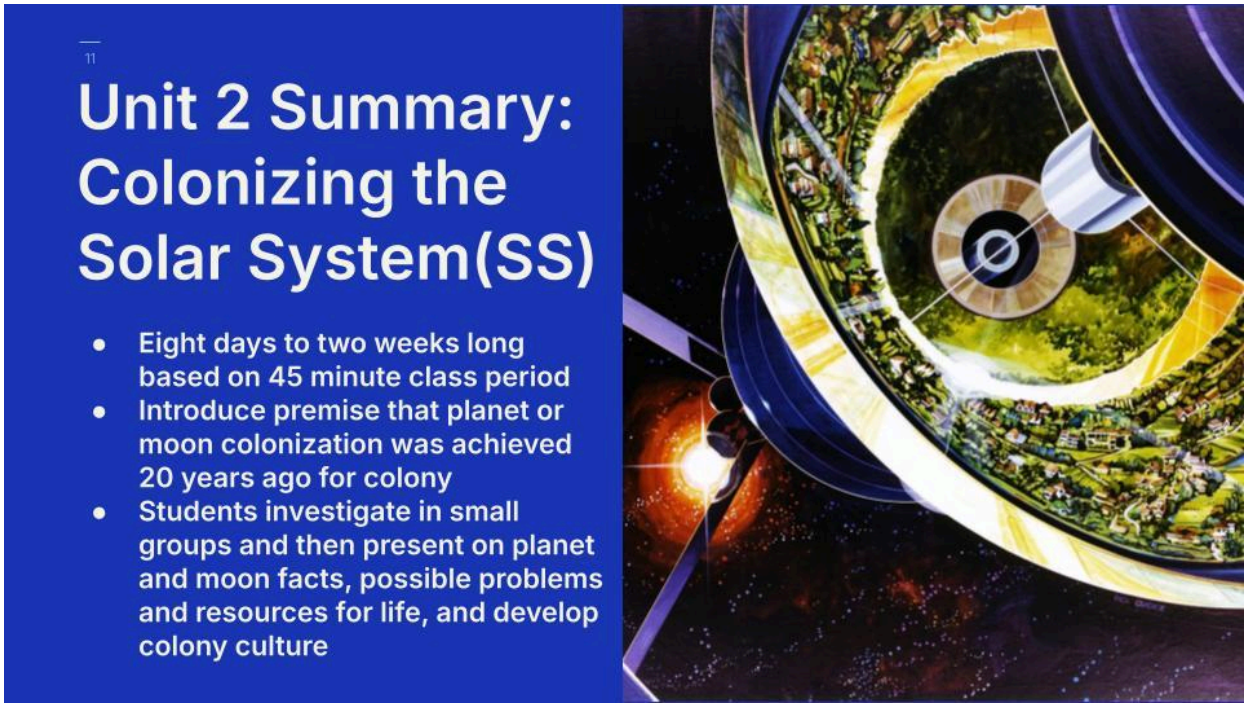
Students pick a rocket to base their design on

She uses “check ins” of drawings and ideas students are sharing

Students favorite unit: The Application of Traveling to Space and Beyond
- can buddy up younger students with older students to help with the calculations

Built our own launch systems when I was working at / with Purdue Univ

Unit 2 is Colonizing the Solar System



Students favorite part is developing their own CULTURE for their colony

Students are in groups and assigned a colony, have specific resources and issues, have to come up with group artifacts for their colony

- a possible extension is to go into interacolony trade, discuss relationships created between colonies

Great website: NASA's "About the Planets"
https://science.nasa.gov/solar-system/planets/

She includes an 'artifact requirement"
- something about their actual colony
- something about the culture: can be game pieces, crowns, food items, etc.
- students get to decide who they are in the colony

Next students have to come up with their BUDGET
- avoid getting bogged down with facts from research about their selected planet / location

Example worksheet to help students:
https://cf.nearpod.com/neareducation/new/assets/4b5b99cf-dae0-4ef7-b70d-6459e7cd13a8/reference_media.pdf?AWSAccessKeyId=AKIA5LQSO4AXLNJOYW5K&Expires=2147483646&Signature=0Bcl%2FcA4SgmcvyJ1scKoNHLxYDU%3D

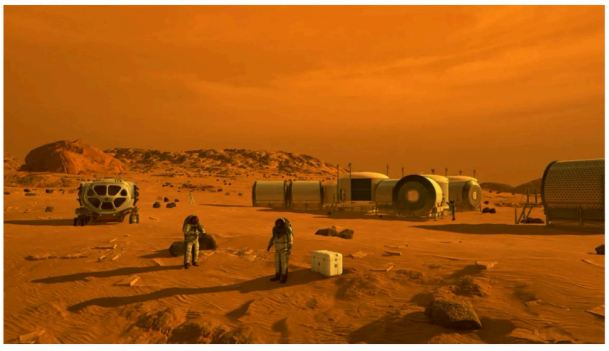
Fantastic NASA resource website to use:
https://science.nasa.gov/planetary-science/programs/mars-exploration/

Mars is the only planet we know of inhabited entirely by robots.

From Robots to Humans

Recorded observations of Mars date back more than 4,000 years. Led by our curiosity of the cosmos, NASA has sent a carefully selected international fleet of robotic orbiters, landers and rovers to keep a continuous flow of scientific information and discovery from Mars. The science and technology developed through Mars Exploration missions will enable humans to one day explore the Red Planet in person.

Artist's concept depicts astronauts and human habitats on Mars.



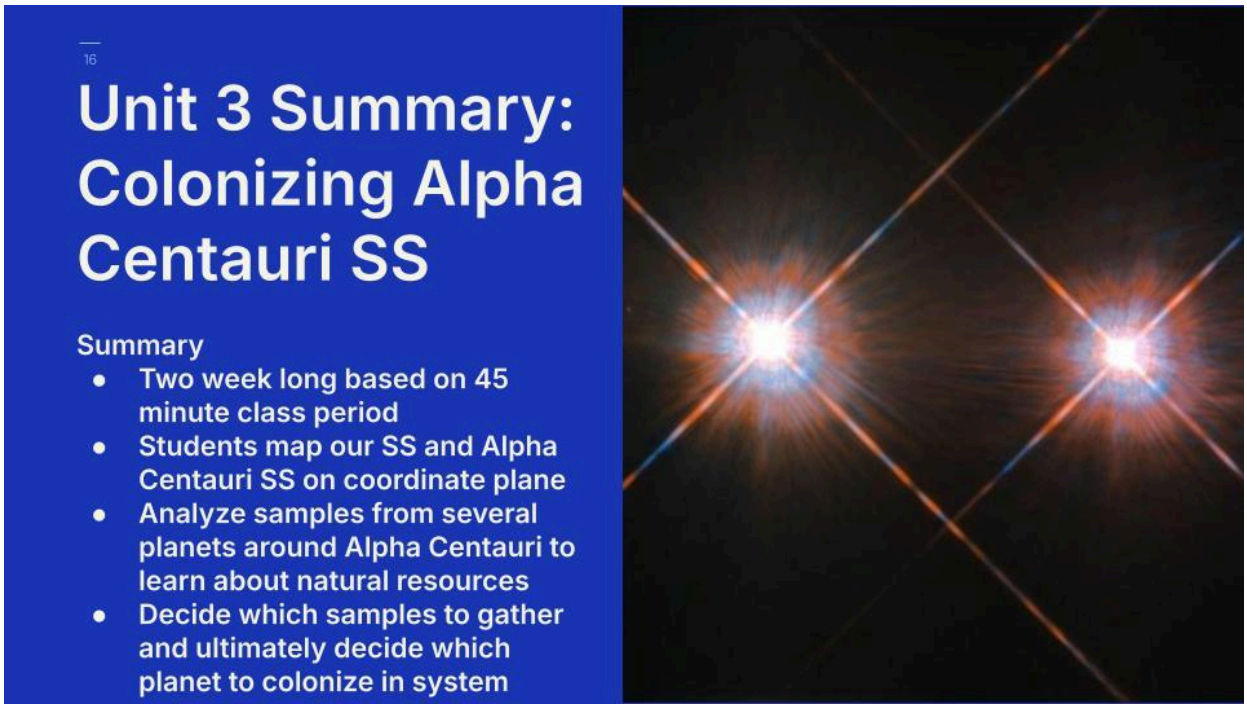
Artist's concept depicts astronauts and human habitats on Mars.
NASA/JPL-Caltech/MSSS

Also great to study these NASA Mars exploration goals:
https://science.nasa.gov/planetary-science/programs/mars-exploration/science-goals/

Measurement and Units come up a lot…

Lots of different differentiation options, so many cross-curricular options and ideas

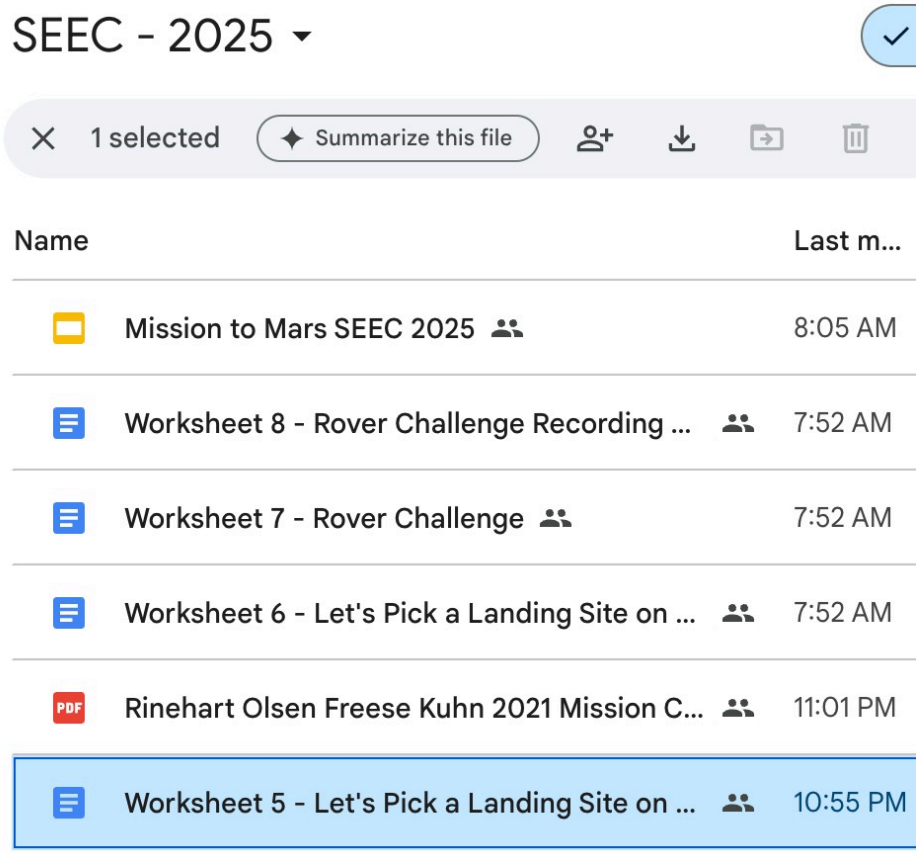
Now final Unit 3: Colonizing Alpha Centauri



Mission Cognition: A Mission to Mars

A presentation by Dr Ron Rinehart and Dr Ben Olson at #SEEC2025 on 8 Feb 2025

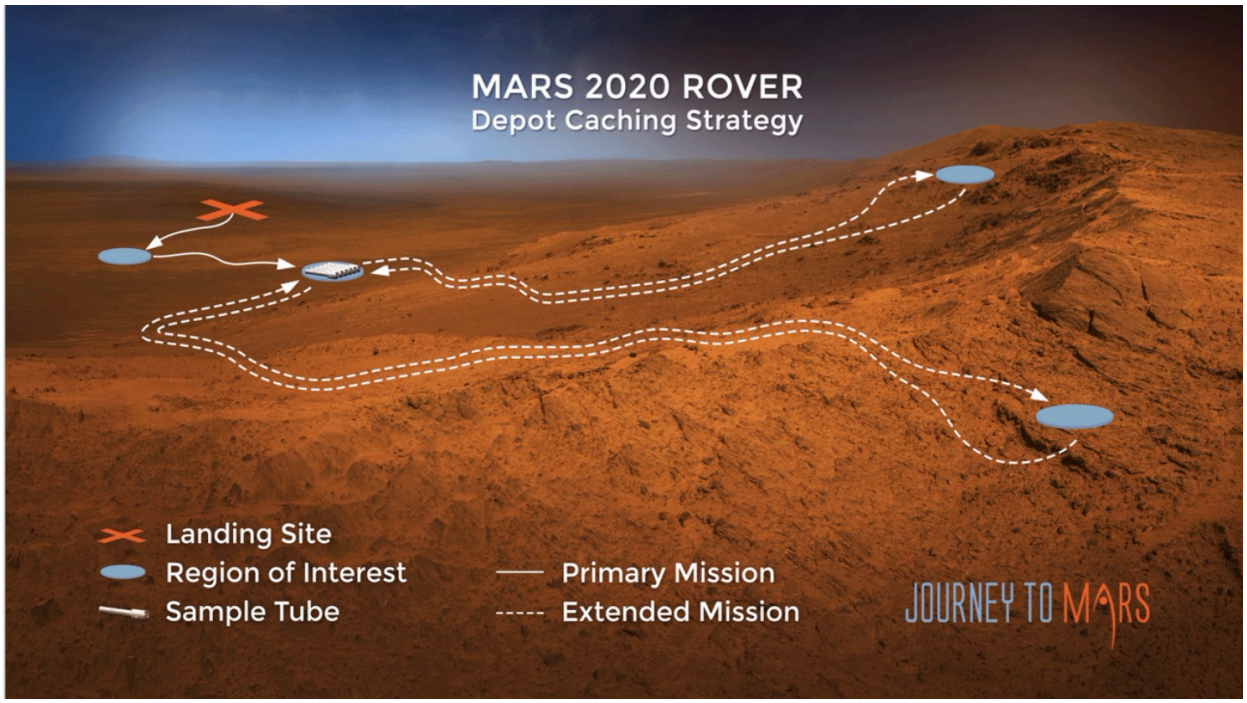
Schedule link
Session resources (Google Drive folder)



Slideshow

“Depot Caching Strategy” is key for how NASA rovers operate on Mars

1. Scientific Rationale for Depot Caching on Mars 2020



ChatGPT explanation for a 6th grader: (archived conversation)
“Imagine you're on a big scavenger hunt in your neighborhood, looking for cool rocks to bring back home. But instead of carrying all the rocks with you the whole time (which would get really heavy and risky if you dropped them), you decide to leave small piles of rocks at safe spots along the way. These safe spots are called "depots."

Now, NASA's Mars rovers do something similar. When the rover finds interesting rocks on Mars, it drills out small samples, seals them in special tubes to keep them clean, and then instead of carrying all of them around, it leaves these tubes in certain spots on the ground. These spots are the "depots." Later, another robot might come to Mars, pick up those tubes from the depots, and bring them back to Earth for scientists to study.

This method is smart because:

The rover doesn't have to carry everything all the time, which means less chance of something going wrong.
Scientists on Earth can choose which samples are the most interesting to bring back.
If something happens to the rover, at least some of the samples are already safely on the ground, waiting to be picked up.
So, "Depot Caching" is like leaving your collected treasures in safe spots, so you can explore more without worrying about losing everything!”

Now the presenters are inviting in person participants to get out lego kits / prepared bags so they can build attachments for the Dash robot to make it into a rover: (See slideshow starting at slide #95)

The “Mars Yard” portion of the presentation starts at slide 94

Ideas I’m thinking of:

1. *It would be cool to replicate the “Depot Caching Strategy” game they shared in Minecraft Education*
2. *I would also like to setup a lesson where students could select landing sites based on the types of data and criteria they shared in their slideshow*
3. *I’m wondering what other teachers might have created Minecraft Education worlds we can use with students which are more “Mars realistic”*
4. *SO much great information and background data / history / photos in their slideshow about our Mars rovers and Mars geology*

Blockly is the main coding app they use with the Dash Robot and use that at JSC https://www.makewonder.com/en/apps/blockly/

Blocky Games is free and web-based, introduces many basic coding ideas: https://blockly.games/

Fuse Little Bits is also free and web-based https://fuse.littlebits.com/builder

Social share:

This morning attending #SEEC2025 virtually I learned about “Depot Caching Strategy” and so much more in “Mission Cognition: A Mission to Mars” by Iowa educators Ben Olsen and Ronald Reinhart! Check out my notes with links to their GREAT resources: https://wfryer.me/seec2025

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Coding & Electronic Sensors for Space Exploration by Nathan W Tubbs

Slides for this presentation:
https://docs.google.com/presentation/d/19eeTNmss9e4ENzDLZgCvz7au5PJl57N718F0MP_SzbA/edit?usp=sharing

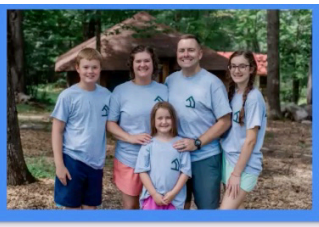
Coding for Human Spaceflight:
Free Resources to Teach Entry-Level Coding Skills

Nathan W. Tubbs
Auburn University, AL

Wifi: SCH-Private
Password: schsaturn

aub.ie/seec-coding-2025

About me...


Middle School Science Teacher, 16 years

SEEC Crew Member, Unity

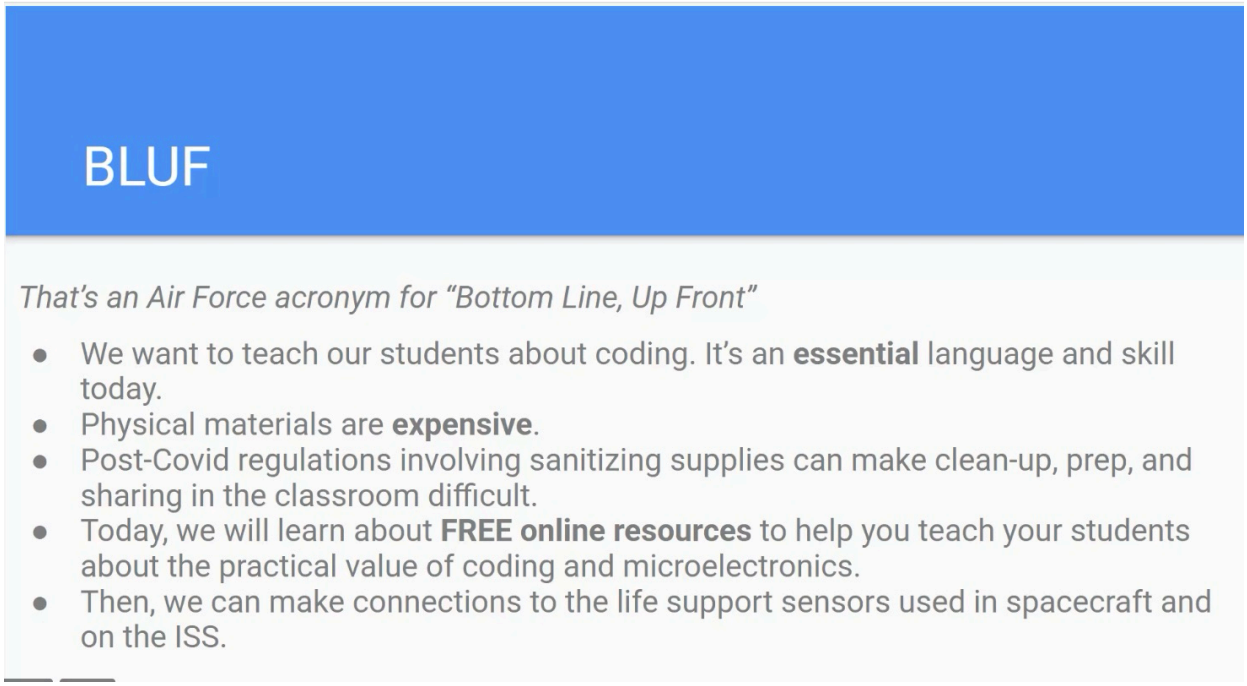
JPL Solar System Ambassador

Space Foundation Teacher Liaison

Husband, Father, Pastor, USAF Reserve Chaplain

SPACE STATION EXPLORERS

SPACE FOUNDATION



Coding is so essential today!
- some of the hardware (like Arduino) is EXPENSIVE to buy, sensors, computers, software, etc.
- can easily move into thousands of dollars

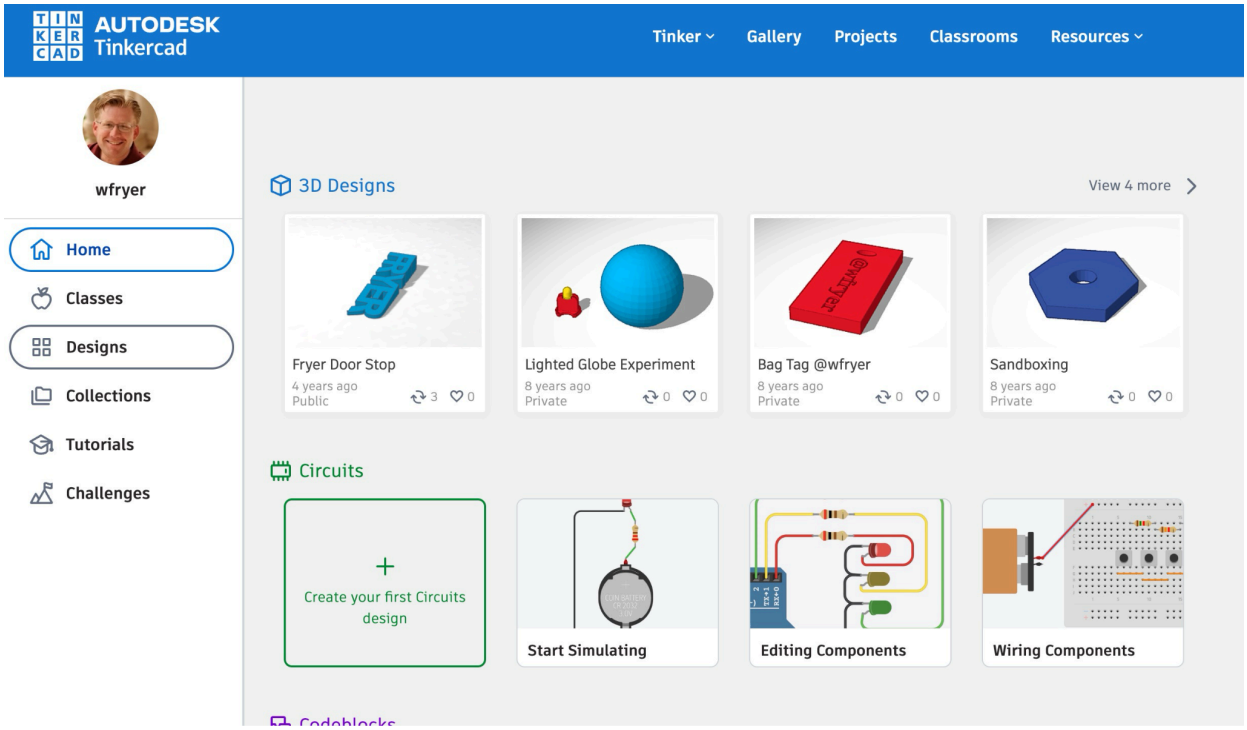
Nathan works for Auburn University, still with AF Reserve stationed at Cape Canaveral

Money and supplies are everything
So hard to get things done in the time restrictions of the classroom, so many restrictions

I want to share FREE online resources so you can build basic knowledge with your students
- have to get into Arduino to do high altitude balloons…. But where do you start?

Can you use different communicators where you can get realtime telemetry data from space, we won't get that deep today, but that is possible

Start with TINKERCAD.com!
- personal accounts - sign in with GOOGLE! (don't click join)


AUTODESK
Tinkercad
Tinker
Gallery
Projects
Classrooms
Resources
wfryer
Home
Classes
Designs
Collections
Tutorials
Challenges
3D Designs
View 4 more
Fryer Door Stop
4 years ago
Public
Lighted Globe Experiment
8 years ago
Private
Bag Tag @wfryer
8 years ago
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Sandboxing
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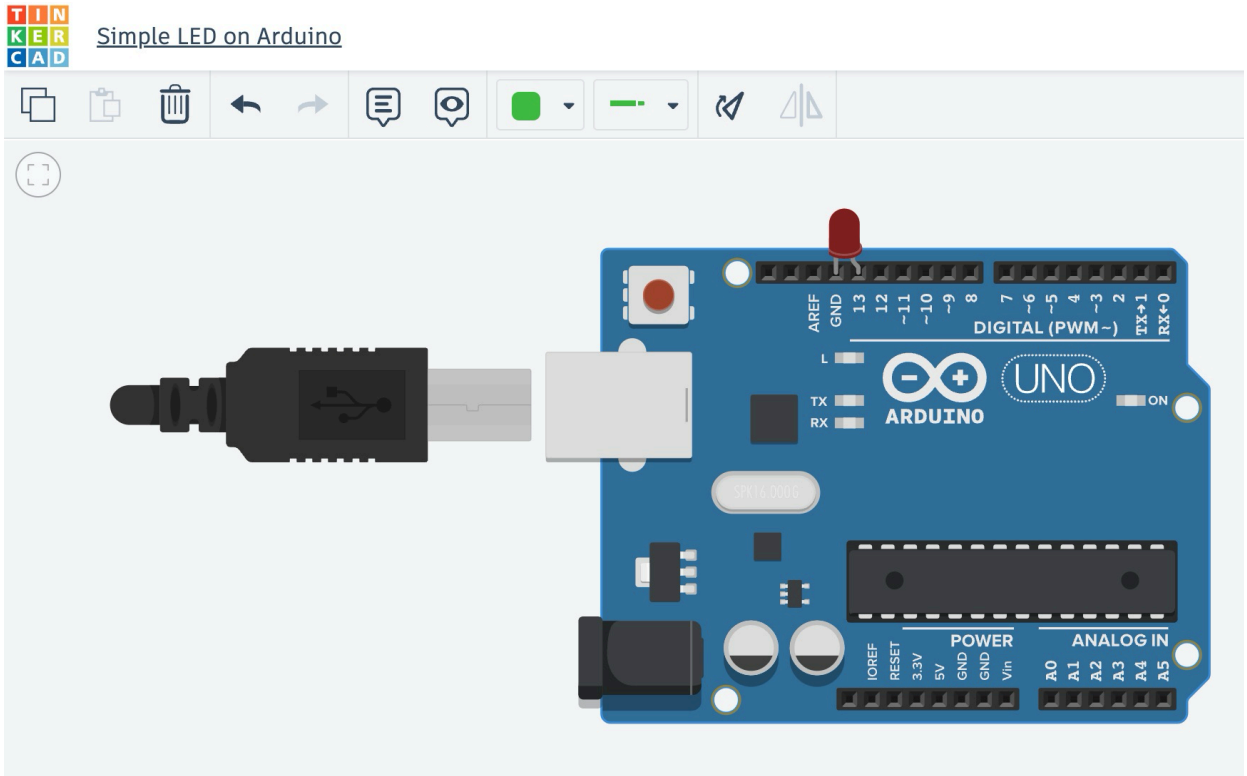
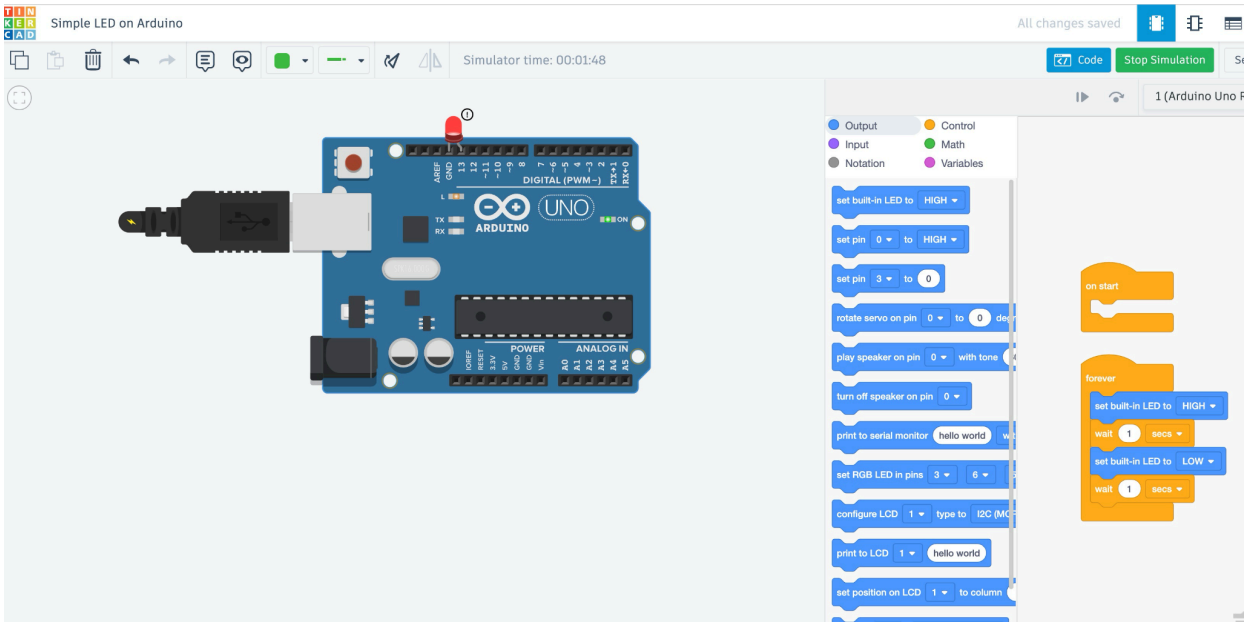
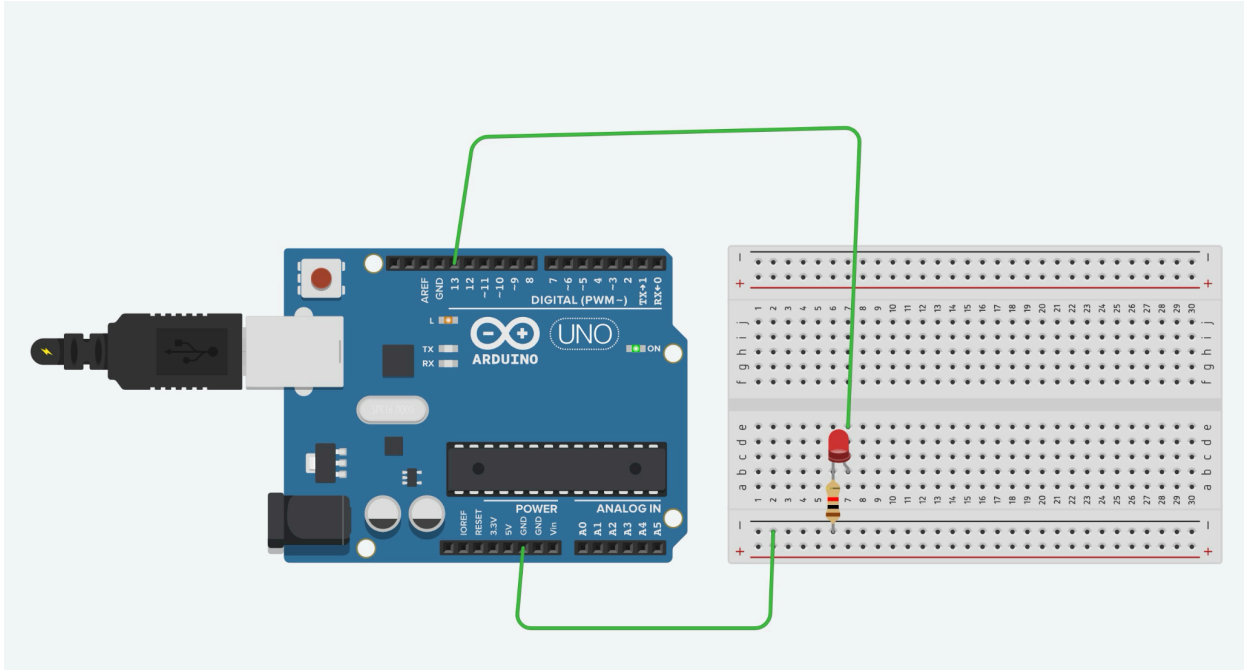
Circuits
Create your first Circuits design
Start Simulating
Editing Components
Wiring Components

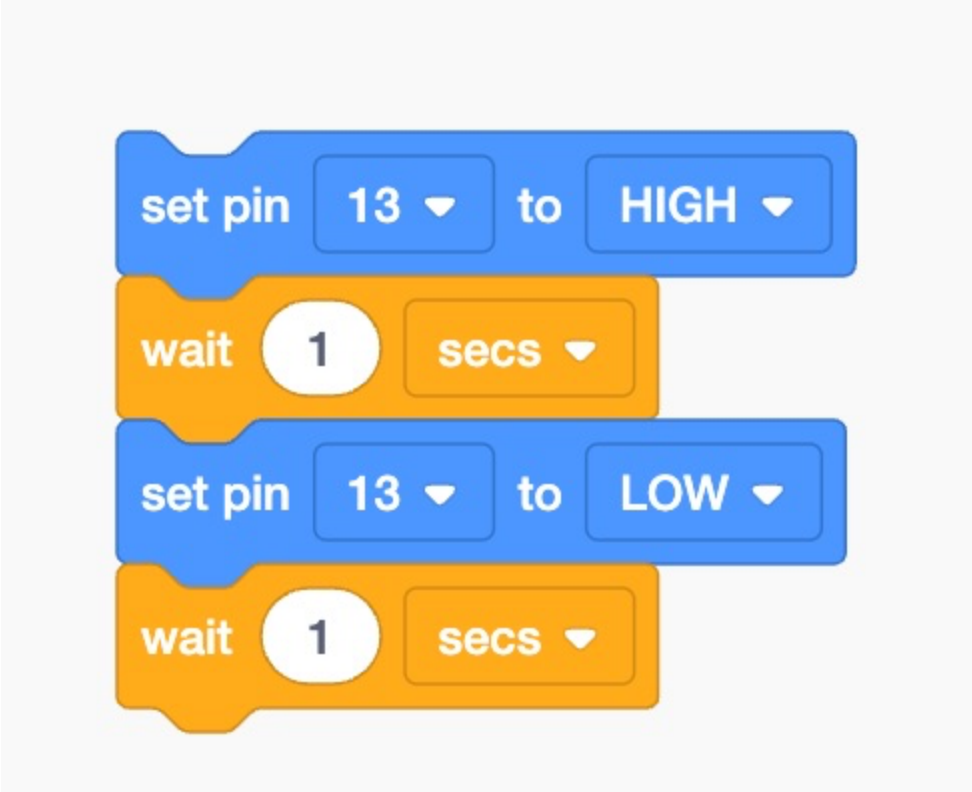

Simple LED on Arduino
DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN



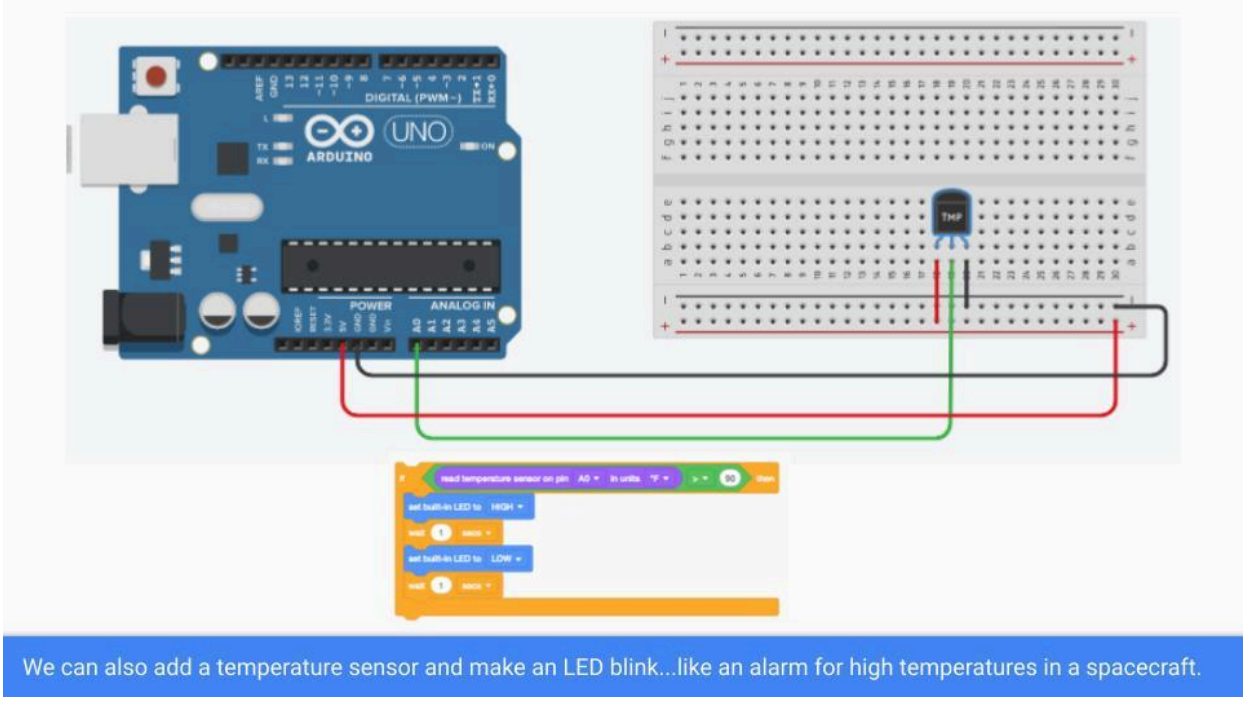
Drag a breadboard out…. Do the same connector via a resistor



I changed the code to match:



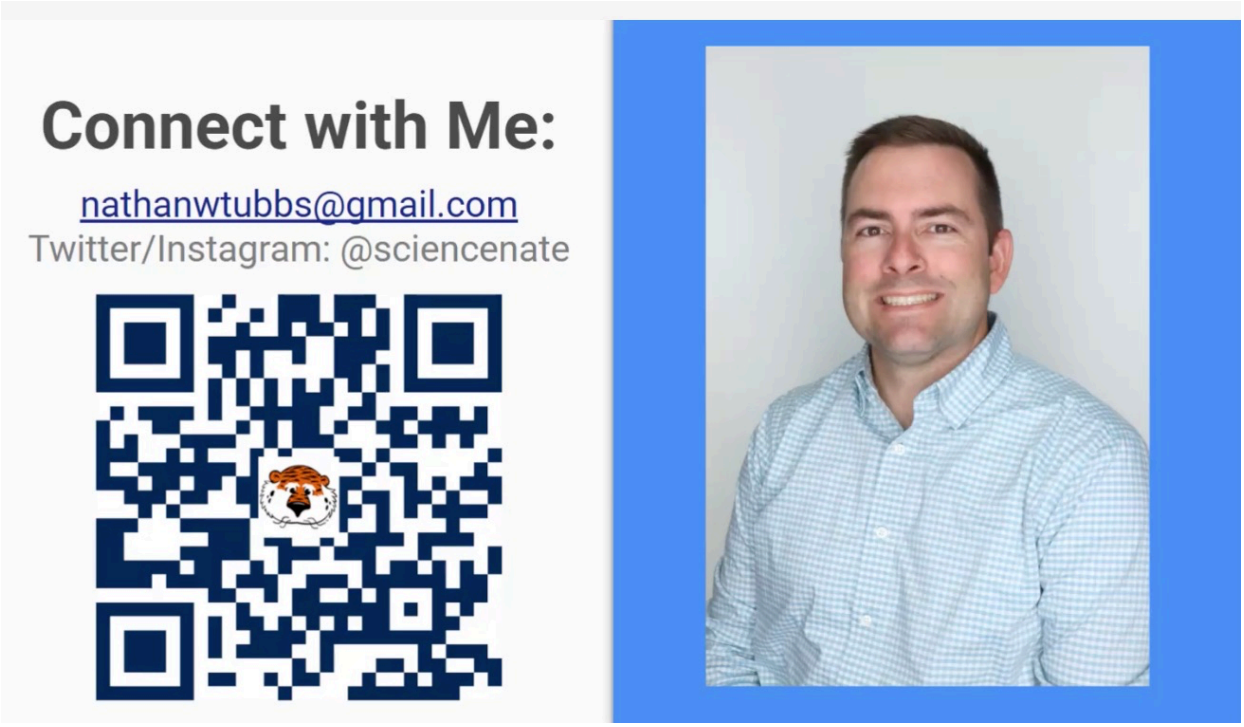
Next project: Making a temperature sensor:



We can also add a temperature sensor and make an LED blink...like an alarm for high temperatures in a spacecraft.

PocketLabs is GREAT but very expensive for K12 schools:
https://www.thepocketlab.com/

Contact info!



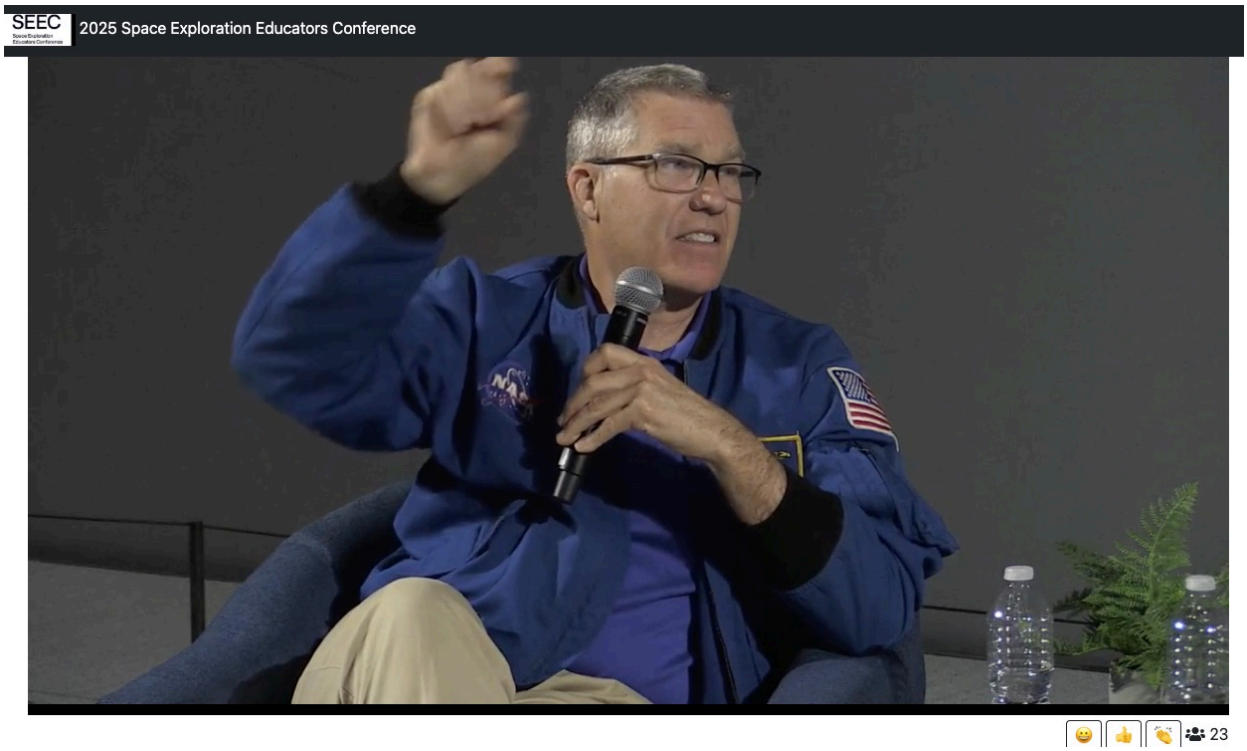
Friday Keynote- Lessons from Astronaut School (Virtual Viewing only) - February 7, 2025, 8:00 AM CST (1 hour)

Recording URL: https://vimeo.com/event/4846413

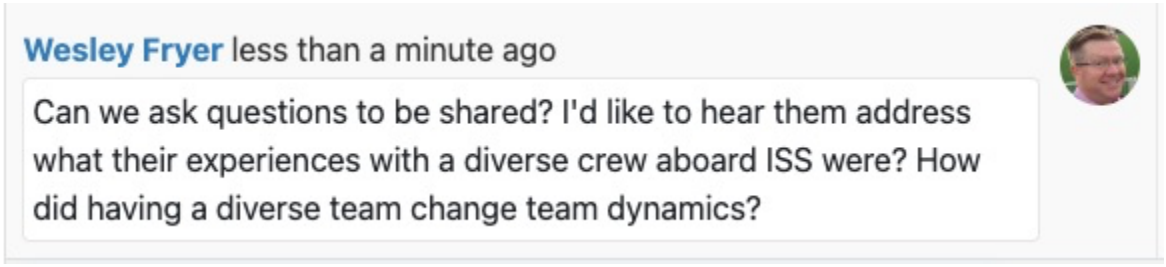
Powerful “teacher impact story” from astronaut Tony Antonelli
https://en.wikipedia.org/wiki/Dominic_A._Antonelli

“Individual teachers have HUGE impact”
Many people have chosen their career path because of a single teacher
Middle school is KEY to turn on students to STEM, especially science and math
Most important skills are all the things you learned in kindergarten
The job is really easy, being a good teammate and getting along, and Russian language! Those are key

Physics is so fun when you are in space!



“STEM-in-stations” on ISS



(I asked this late in chat so it was not shared)