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President American Nuclear Society
13 April 2021

American Nuclear Society

ANS Center for Nuclear Science and Technology Information

Introducing

NAVIGATING NUCLEAR

Energizing Our World





Goals

- Clarify common misconceptions surrounding nuclear science and explore its current and future role in technological applications
- Build understanding of and create value for nuclear science and technology
- Inspire future careers in the nuclear field and the pursuit of higher education to achieve this goal

Navigating Nuclear Website (navigatingnuclear.com)

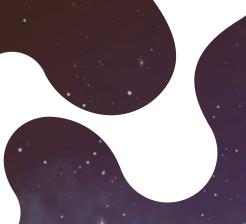
- Navigating Nuclear curricular materials for free
 - Virtual field trips
 - Digital lessons
 - STEM project starters
 - Career profiles
 - Next generation science standards
- For students, educators, parents, and the public
- Elementary, middle, and high school resources







Spread the good word!!!





NAVIGATING NUCLEAR Energizing Our World





KEEPING YOU CONNECTED





INNOVATING THROUGH DIGITAL CURRICULUM SOLUTIONS THAT ACCELERATE ACADEMIC ACHIEVEMENT

Global leader in standards-based digital curriculum

First fully digital textbook

Largest professional learning community of its kind









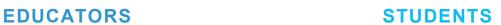






COUNTRIES

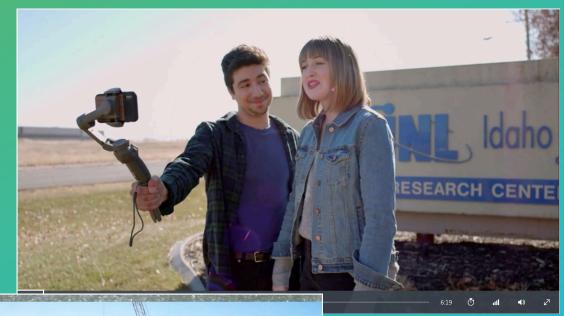
140+ 4.5 MILLION 45 MILLION





Virtual Field Trips

Virtual Field Trips (~25-minute feature classroom documentary productions) are one of Discovery Education's most popular and utilized offerings with historic viewership in distance/remote learning.





Thursday, May 6th at 1:00pm ET

MUCLEAR FRONTIERS: POWERING POSSIBILITY

navigatingnuclear.com











Enhancing the Viewing of a Virtual Field Trip



NAVIGATING"



Overview

In this Wintal Field Tip (VFT), elementary students ride along on a volgage to outer spear and lack again. As they are hosted by ______ students will expicre the different ways nuclear science is being used on Clam the Order and Additionally, they will learn about the potential of nuclear power for travel between Earth, the Moon, and beyond. They will also investigate some of the ways that nuclear technology can be used in space, and they'll learn about the potential these technologies have to positively impact technology can be used in space, and they'll learn about the potential these technologies have to positively impact be read to designed to engage students prior to and during the Virtual Field Tip, as well as extend learning from the Virtual Field Tip to the classroom.

Objectives

- · Investigate the multifaceted applications of nuclea
- Compare and contrast the use and potential of nuclear
- energy on the Moon with other energy sources
- Design their own lunar base while considering when nuclear power and nuclear science are used

Materials

- Engage: Energy Sort Cards, one set for half the clas-
- (cut out in advance).
- During-the-Virtual Field Trip: Nuclear Science graphic organizer, one per student.
- After-the-Virtual Field Trip: Nuclear Science Potential graphic organizer enough for half the class
- After-the-Virtual Field Trip: Design A Lunar Base graphic

Virtual Field Trip | Educator Guide

Instructional Delivery Method
The Virtual Field Trip is presented as an in-classroom experience, but it can also easily be completed at home. Feel free to make modifications based on your teaching environment. For example:

- All materials may be shared virtually.
- All partner activities may be completed independently or in virtual breakout rooms.
- Discussions can be conducted virtually, or students can respond to questions in writing independently.

Educator Prep

Looking for a fun way to prepare students for their extraterrestrial Vartual Field Trip? Consider kicking off with a read-aboud! A story like Max Goes to Mars by Jeffrey Bennet will prompt students to begin thinking about some of the topics they will be exploring throughout this activity. This digital version is fee to all and read by NASA Astronaut Michael Hookins!

Engage

- Divide students into pairs and distribute one set of Energy Sort Cards to each pair. Challenge pairs to review the cards and devise a way to sort them into different categories.
- Once students have tried a few sorting techniques, invite them to share some of their categories.
- Then write the term energy on the board and describe energy as the ability to do work or make things happen Explain that any kind of movement, change, or growth requires energy.
- Ask students to sort through their cards once more as they consider which images use or need energy. Then be sure the class understands that every card illustrates something that uses and/or requires energy. However, this energy comes in different forms! An energy source







Viewing Parties:

- Watching together as a class
- Invite special hosts that kick off the VFT
- Viewing specific chapters with special guests to do Q&A

Deeper Content Engagement

 Educator Guide provides talking points and pre and post activities for deeper engagement with content covered in the VFT.

Penn State Radiation Science and Engineering Center Education, Outreach and Virtual Programs

Candace Davison

Assistant Director for Education & Outreach

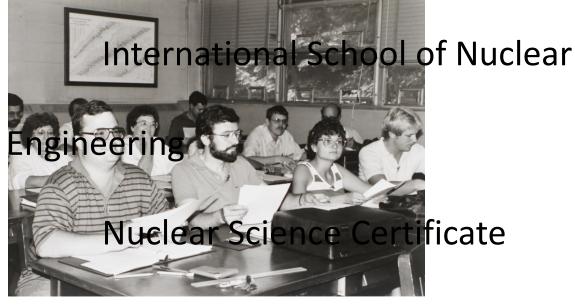
Senior Reactor Operator

Gamma Irradiation coordinator

Facility Website: http://www.rsec.psu.edu/



PSU Reactor Outreach History



Science and

teachers for pre-college

Courses and workshops for

Educators

PSU Reactor Teacher workshops

- TRACE Teaching Radiation Application and Cycles in our Environment
- Atoms to Energy a Discovery Journey
- Totally RAD Exploring radiation and nuclear science
- Harnessing energy from the Atom – real world applications

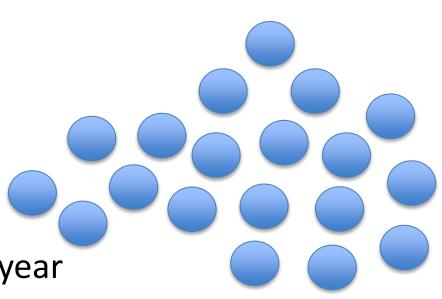


Program outreach

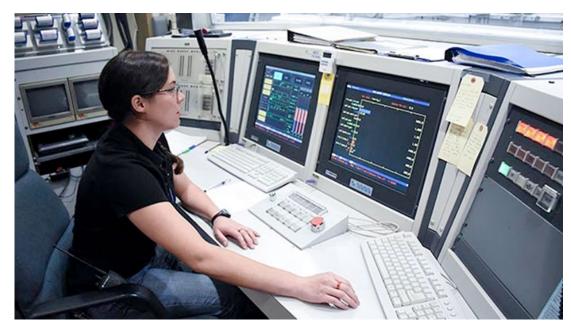
- We learn from each other
- Share expertise
- Nuclear knowledge
- Teaching
 - Educator to Educator
 - 1 Teacher multiple students per year
- Student
 - to other student
 - to parents



Don't underestimate the impact on one person!



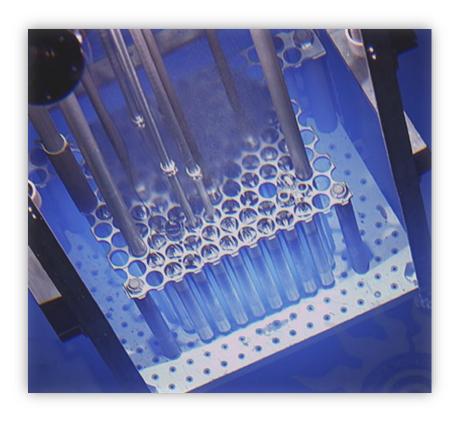
Research Reactor Visit



- Hands-on activities and experiments
- Use equipment not available to most schools
- Control room
- See the reactor operating
- College student involvement

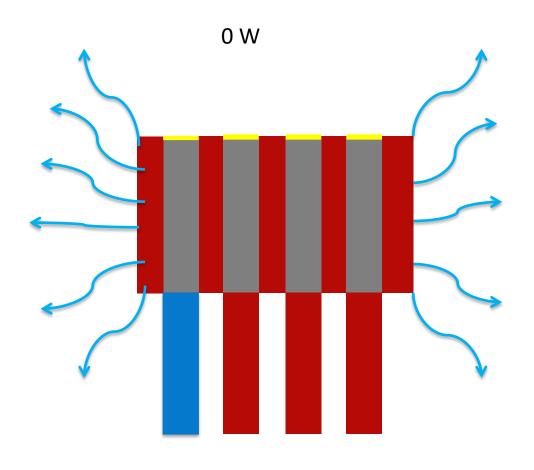
Virtual Experience Shift....

- Synchronous virtual programs and visits with pre-college and college students/teachers for over 10 years
- Increase in demand due to pandemic
- Developing more asynchronous experiences
 - Reactor videos
 - Experiments with "real" data
 - Radiography Design contest
- ANS resources



Reactor Startup

- Moving control rods out of the core allows more neutrons to interact with the fuel
- This increases the fission events
- The more fissions the higher the reactor power (thermal energy)
- The "blue glow" is brighter
- Questions?





Experience-based Ideas for Reaching Out to Teachers, Engaging Them, and Insights on How Best to Address Their Classroom Instructional Needs

Reaching Out (To Teachers) and Getting Noticed

- Think of the Inverse Square Law
 - The greatest influence and probability of interaction with your local schools are the ones located nearby.
 - Introduce "Navigating Nuclear" in local school's teacher's newsletters.
 - Hold a local Zoom meeting with teachers in your area to explain "Navigating Nuclear" and the materials that are available to them.



Engage Teachers

- Teacher's Need Assistance from You!
- Promote an engaging lesson plan
 - Elementary School Resources https://www.navigatingnuclear.com/classroom-resources/elementary-school/
 - Middle School Resources

https://www.navigatingnuclear.com/classroom-resources/middle-school

High School Resources

https://www.navigatingnuclear.com/classroom-resources/high-school

HANDS-ON HANDS-ON HANDS-ON



HANDS-ON

- Virtual Field Trips (These are great!)
 - "You" can ZOOM in to assist, answer questions!
- GM-Counters
 - Fiesta ware, Vaseline Glass
 - Measurement of Half-Life
 - Demonstration of Inverse Square Law, Shielding
- Cloud Chambers
 - Direct Observation of Alpha, Beta particle interactions

Contact Janice Lindegard: jlindegard@ans.org



