30. Government & Public Administration Cluster - Utilities Careers (4 hours)

Purpose/Abstract: To introduce students to introductory utility careers.			
NCCCS Adult Education Standards: R.5.2.9, W.5.2.6, S.1.2.5, M.1.2.10			
Learning Objective: *By the end of the session, students will be able to:* ● Employ critical thinking to decode a map ● Research skills needed in utilities careers ● Apply mathematical concepts of multiplication to real-world problems			
Soft Skills	professionalism, communication, critical thinking and problem-solving	**Resources**	Skills to Pay the Bills (STPTB) (for instructor reference to define each soft skill category) NC Career Clusters Guide (for instructor reference) Handouts: Utilities Careers Information - Print as required and cut up one career for each group. Math Practice - 1 for each student
Additional Materials ● Utilities Careers Information handout , as many as you need to assign one career to each group ● Math practice handout, one for each student. ● Art supplies (glue, glitter, markers, paint, etc.) ● Pencils, paper, and scissors ● Computers for student use			
Icons	💭 **Activity**	✔**Check-In**	⟲ **Review**

PREPARATION

- Review the worksheets and games on education.com and print out the following worksheets:
- Review the Instructional Support Guide and print/prepare referenced scaffolds.
- Print handouts.
- Familiarize yourself with O*NET
- Familiarize yourself with Skills to Pay the Bills, though it won't be used directly in this lesson.

INTRODUCTION (45 min)

Welcome students to the class!

Conduct a "Career Cluster Charades" to review the 16 career clusters - Write down the names of different career clusters on separate pieces of paper, fold them, and place them in a bowl. Each student will take turns drawing a paper and acting out a career cluster without speaking. The rest of the class will guess the career cluster.

Have a few students share what they remember about the career clusters covered so far.
This will help you review the career clusters and transition into the last lesson in the Government and Public Administration Cluster.

Provide a brief introduction to utility careers using the following information.

> Utilities careers encompass a wide range of job opportunities that are essential for providing various services to communities and industries. These careers involve managing, maintaining, and operating systems that deliver essential utilities such as water, electricity, the internet, and other infrastructure services. Here are some key areas within utility careers:
>
> 1. **Water Utilities**:
>   Water Treatment Operator: These professionals work at water treatment plants to purify and distribute clean, safe drinking water to homes, businesses, and industries.
>   Water Distribution Technician: They are responsible for ensuring water supply systems are well-maintained and efficiently deliver water to consumers.
> 2. **Electric Utilities**:
>   Electrician: Electricians install, maintain, and repair electrical systems in residential, commercial, and industrial buildings.
>   Power Plant Operator: These individuals operate and monitor power generation plants to ensure a stable and consistent supply of electricity.
> 3. **Internet and Telecommunications Utilities**:
>   IT Technician: IT technicians support the maintenance and repair of computer systems, networks, and communication devices.
>   Telecommunications Technician: These professionals install and maintain communication equipment, such as telephone lines and internet cables.
> 4. **Infrastructure Utilities**:
>   Civil Engineer: Civil engineers design and oversee the construction of infrastructure projects, such as roads, bridges, and public transportation systems.
>   Infrastructure Maintenance Worker: These workers are responsible for repairing and maintaining various infrastructure components, such as roads, sidewalks, and drainage systems.

Mention that most utilities careers require a combination of technical skills and soft skills

Share the objectives for the lesson.

VOCABULARY, READING & WRITING (45 min)

Divide the students into small groups. Each group should consist of 3-4 students.

Provide each group with the Utilities Careers Information Handout, which contains details about different utilities careers (e.g., Water Treatment Operator, Electrician, IT Technician, etc.). Assign one career to each group.

Instruct the students to carefully read the information in their respective groups and identify the main idea of each career description.

The main idea is the central theme or key concept of the career's responsibilities.

Next, encourage students to find supporting details that provide more information about the main idea. Supporting details help explain or expand upon the main idea.
Students should work together to highlight or underline the main idea and supporting details in each career description.

Emphasize the importance of understanding the key responsibilities and qualifications of each utility career. Remind students to consider any challenges or unique aspects mentioned in the descriptions that contribute to the main idea.

Have students create a short paragraph summarizing their findings about the career, individually.

💭 REFLECTION (10 minutes)

✔ Ask groups to share a summary of the career they read about.

Engage the class in a conversation about the similarities and differences between the careers discussed.

Lower Level	Higher Level
Provide students with sentence starters and guided questions.	Encourage students to include more details in their paragraphs.

MATHEMATICS (30 min)

Distribute the Math Practice handout to students. Tell them to challenge themselves to solve all the problems within 15 minutes using the strategies they've learned in previous lessons.

Allow them 15 minutes to solve the problems in the handout. Walk around and check for understanding.

💭 REFLECTION (15 minutes)

✔ Review the answers to the problems with the whole class.

GROUP WORK (60 min)

Explain to students that map reading plays a crucial role in utility careers, where professionals are responsible for managing complex systems and infrastructure that span large geographic areas. Whether it's water distribution networks, power generation facilities, telecommunication lines, or gas pipelines, utilities professionals heavily rely on maps to navigate, plan, and execute their tasks effectively.

Tell them that in groups they will decode a water company map, understand how to use the legend, and identify key locations and data that is presented through the map.

Divide students into groups of 4. Distribute the Nebo Water System Map to each group.

Instruct the students to work together as a group to examine the Nebo Water Company Map and identify specific features of the map. Ask students to discuss the following questions:

- What data is presented through this map?
- What are the different components you notice on the map?
- How does the legend help you read the map?
- What information can you get using the legend?

Encourage collaboration and communication within the group as they analyze the map and share their findings.

Assist lower-level learners by providing hints or asking leading questions to help them decode the map effectively.

Allow 30 minutes time for students to examine the map.

Gather the class together and project the NC Broadband Planning Map. Take students through the legend for the map and explain how they can use it to interpret the information on the map.

REFLECTION (20 minutes)

✔Ask one volunteer from each group to share what they learned from the map activity.

Guide a short discussion on where else students might require map reading skills in their lives.

INDEPENDENT WORK TIME (45 min)

Initiate a discussion around the soft skills that are important for those in utility careers, highlighting professionalism, communication, critical thinking, and problem-solving skills. Share a few examples of how these skills will help personnel in utility careers.

Emphasize that these skills enable employees to provide quality services, navigate challenges, and contribute to the continuous improvement of utility systems and services.

Pair students up and have them select any one utility career. Tell them to discuss how professionalism, communication, critical thinking and problem-solving skills will help in the chosen career. Have them write out a summary of what they discuss.

💭 REFLECTION (20 minutes)

✔Ask a few volunteer pairs to read out what they've written about the soft skills necessary for utility careers.

WRAP-UP & REFLECTION (15 min)

Distribute exit slips to students.
Ask for a few volunteers to share their reflections.
Collect and review the answers.

Utilities Careers

Directions:
- Read the passage for the assigned career with your group.
- Identify the main idea and underline the supporting details.

Water Treatment Operator

Water treatment operators are responsible for operating and maintaining water treatment plants. They ensure that water from natural sources, such as lakes or rivers, is treated to meet quality standards before being distributed to homes and businesses. Their duties include monitoring and controlling water treatment processes, testing water samples for impurities, and adjusting treatment processes accordingly. They also maintain equipment and machinery used in the treatment process and ensure compliance with environmental regulations and safety standards. Troubleshooting and addressing issues that may arise during the treatment process are also part of their responsibilities.

Electrician

Electricians play a crucial role in installing, maintaining, and repairing electrical systems in residential, commercial, and industrial buildings. Their work involves handling wiring, circuit breakers, transformers, and other electrical components. They read and interpret electrical blueprints and diagrams, install electrical systems ensuring they meet safety codes and regulations, and troubleshoot and perform necessary repairs when electrical issues arise. Regular maintenance of electrical systems and collaboration with other construction professionals to ensure proper electrical installation are also part of their duties.

IT Technician

IT technicians provide technical support and assistance with computer hardware, software, and networks. They are instrumental in helping individuals and organizations troubleshoot and resolve technical issues. Their responsibilities include installing, configuring, and maintaining computer systems and peripherals, troubleshooting and resolving hardware or software problems, and setting up and managing computer networks. They also provide technical support to end-users via phone, email, or in-person and keep up-to-date with the latest technology trends and advancements.

Power Plant Operator

Power plant operators operate and maintain power generation plants responsible for producing electricity. They ensure the smooth and efficient operation of turbines, generators, and other

power plant equipment. Their duties include monitoring and controlling power generation processes, performing regular inspections of equipment to detect potential issues, and recording and analyzing data related to power plant operations. Following safety protocols in case of emergencies is also part of their responsibilities.

Telecommunications Technician

Telecommunications technicians install, maintain, and repair communication equipment, including telephone lines, internet cables, and wireless systems. They install and set up telecommunications equipment and networks, troubleshoot hardware and software problems, conduct regular maintenance to ensure optimal performance, and respond to service outages and customer complaints. Collaboration with other technicians to resolve complex issues is also important in their work.

Infrastructure Maintenance Worker

Infrastructure maintenance workers are responsible for the repair and upkeep of various infrastructure components, such as roads, sidewalks, drainage systems, and public facilities. Their duties include inspecting and assessing the condition of infrastructure regularly, repairing and maintaining roads, sidewalks, and drainage systems, and performing general maintenance on public facilities and buildings. Operating machinery and equipment for maintenance tasks, collaboration with other workers, and following safety protocols are also part of their job.

Civil Engineer

Civil engineers design and oversee the construction of infrastructure projects, such as roads, bridges, dams, and public transportation systems. Their responsibilities include developing detailed construction plans and blueprints, analyzing site conditions and environmental factors, ensuring compliance with safety regulations and building codes, and managing construction projects and supervising workers. They collaborate with architects, urban planners, and other professionals to ensure successful project completion.

Water Distribution Technician

Water distribution technicians maintain and repair water distribution systems responsible for delivering water to homes, businesses, and industries. Their duties include inspecting and maintaining water distribution lines and equipment, repairing water leaks and service outages, and coordinating with other technicians and operators. Recording and reporting system performance and issues are also part of their responsibilities.

Math Practice

Directions:
- Solve each multiplication problem. Use strategies based on place value and properties of operations to find the product.

1. The water treatment plant needs to purify 8 batches of water, each containing 70,000 liters. How much water will be treated in total?

2. An electrician is installing 6 sets of LED lights in a commercial building, with each set containing 50 bulbs. How many bulbs will be installed in total?

3. An IT technician is setting up 9 computer labs, and each lab requires 80 computers. How many computers will the technician set up in all the labs?

4. A power plant generates 4 batches of electricity, each producing 90,000 kilowatts. How much electricity will be generated in total?

5. A telecommunications technician is installing 5 communication towers, each with 70 antennas. How many antennas will be installed in all the towers?

6. An infrastructure maintenance worker needs to repair 7 stretches of road, each measuring 60 meters. How many meters of road will be repaired in total?

7. A civil engineer is designing 3 bridges, and each bridge will be 80 meters long. What is the total length of the bridges to be constructed?

8. A water distribution technician is replacing 6 sections of water pipes, each measuring 50 feet. How many feet of water pipes will be replaced in total?

9. An electrician is rewiring 5 floors of a building, and each floor requires 60 electrical outlets. How many electrical outlets will be rewired in all the floors?

10. A power plant operator monitors 8 turbines, each producing 70 megawatts of electricity. How much total electricity is being produced by all the turbines combined?

Reflection Exit Slip

In one sentence, describe what you learned in this lesson.

Today, I learned _____.

Is one of the careers discussed today of interest to you? Why or why not?

I liked / did not like _____ *career because*_____

_____.

Is there anything you still need help understanding?

What's one question you have?

Circle the emoji that shows how you feel about your mastery of content in this lesson.