Lesson 10: The TCP/IP Model

In this lesson, students will learn about the TCP/IP model and its four layers: Link, Internet, Transport, and Application. They will understand the purpose and common use of network protocols such as TCP, IP, and UDP. Students will also explore the protocols that operate at each layer, including HTTP, HTTPS, SMTP, IMAP, FTP at the application layer, TCP and UDP at the transport layer, and IP at the internet layer. They will learn about the contents of a TCP/IP packet and the concept of packet switching for efficient data transmission. Through hands-on activities and independent practice, students will deepen their understanding of the TCP/IP model and its protocols.

## **Objectives:**

By the end of this lesson, students will be able to:

1. Describe the four layers of the TCP/IP model (Link, Internet, Transport, Application).

2. Define the purpose and common use of the network protocols: TCP, IP, and UDP.

3. Describe that the HTTP, HTTPS, SMTP, IMAP, and FTP protocols operate at the application layer.

4. Describe that the TCP and UDP protocols operate at the transport layer.

5. Describe that the IP protocol operates at the internet layer.

6. Explain the typical contents of a TCP/IP packet and packet switching.

## **Materials:**

- Whiteboard or projector

- Markers or chalk

- Handouts with TCP/IP model diagram

- Unplugged activity materials (optional)

- Exit ticket slips

## **Bell-Ringer Activity (5 minutes):**

1. Display the following question on the board: "What is a protocol?"

2. Give students 2 minutes to write down their answers individually.

3. After 2 minutes, ask a few students to share their definitions with the class.

## **Introduction (10 minutes):**

1. Review the definition of a protocol based on student responses.

2. Explain that in the previous lesson, students learned about protocols and their importance in data transmission.

3. Introduce the TCP/IP model as a framework for understanding how protocols operate in a network.

4. Show a diagram of the TCP/IP model on the board or projector.

5. Briefly explain the four layers of the TCP/IP model: Link, Internet, Transport, and Application.

## **Direct Instruction (20 minutes):**

1. Provide a detailed explanation of each layer of the TCP/IP model, including their purpose and function:

- Link Layer: Responsible for physical network connections and data link protocols.

- Internet Layer: Handles the routing of data packets across different networks using IP addresses.

- Transport Layer: Manages the reliable delivery of data between devices using TCP or UDP protocols.

- Application Layer: Supports specific network applications and protocols used by end-user programs.

2. Discuss the common network protocols used at each layer:

- Application Layer: HTTP, HTTPS, SMTP, IMAP, FTP.

- Transport Layer: TCP, UDP.

- Internet Layer: IP.

3. Explain the typical contents of a TCP/IP packet, including headers, data, and checksum.

4. Discuss the concept of packet switching and how it enables efficient data transmission across networks.

## **Guided Practice (25 minutes):**

1. Conduct an unplugged activity to demonstrate how the four layers of the TCP/IP model operate in data transmission.

2. Divide students into small groups and provide them with the necessary materials for the activity.

3. Instruct each group to simulate the transmission of a message from one device to another, following the steps of the TCP/IP model.

4. Monitor and assist groups as they work through the activity, ensuring they understand the role of each layer and the protocols involved.

5. Encourage students to discuss and analyze the process of data transmission at each layer.

## **Independent Practice (25 minutes):**

1. Distribute handouts with a TCP/IP model diagram and a list of protocols.

2. Instruct students to label each layer of the TCP/IP model and write down the corresponding protocols used at each layer.

3. Allow students to work individually or in pairs to complete the task.

4. Circulate the classroom to provide assistance and answer any questions.

5. Collect the completed handouts for assessment purposes.

## **Exit Ticket (5 minutes):**

1. Distribute exit ticket slips to each student.

2. Ask students to write down three protocols they learned about in today's lesson and the layer of the TCP/IP model where each protocol operates.

3. Collect the exit tickets before the end of the class.

## **Closure (5 minutes):**

1. Review the key concepts covered in the lesson, including the four layers of the TCP/IP model and the protocols used at each layer.

2. Emphasize the importance of understanding these concepts in the context of network communication.

3. Encourage students to continue exploring and researching network protocols to deepen their understanding.

4. Thank the students for their participation and effort in the lesson.

**Common Core Standards:**

- CCSS.ELA-LITERACY.RST.9-10.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

- CCSS.ELA-LITERACY.RST.9-10.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.