Lesson 6: Network performance and routing costs

In this lesson, students will learn about the factors that affect network performance and routing costs. They will explore concepts such as bandwidth, range, latency, and the number of devices, and understand how these factors impact the efficiency and speed of a network. Students will also learn how to calculate transmission time using the formula Transmission Time = File Size / Transmission Rate. Additionally, they will investigate different methods of routing traffic on a network, including static and dynamic routing, and calculate routing costs for different paths. Through hands-on activities and discussions, students will gain a deeper understanding of network performance and routing in the field of computer science and information technology.

## **Objectives:**

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

1. Describe the factors that affect network performance, including bandwidth, range, latency, and the number of devices.

2. Determine how network speeds are measured and construct expressions involving file size, transmission rate, and time.

3. Determine methods of routing traffic on a network and calculate routing costs.

## **Materials:**

- Whiteboard or projector

- Markers or chalk

- Handouts with keyword matching exercise

- Calculators

- Computers with Packet Tracer software installed

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

1. Display a list of transmission media types covered in the previous lesson on the board or projector.

2. Ask students to individually write down as many transmission media types as they can remember from the list.

3. After 2 minutes, ask students to share their answers with a partner and compare their lists.

4. Discuss the correct answers as a class and clarify any misconceptions.

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

1. Review the concept of network performance and its importance in computer networks.

2. Explain that network performance is influenced by several factors.

3. Introduce the four main factors that affect network performance: bandwidth, range, latency, and the number of devices.

4. Provide brief definitions and examples for each factor.

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

1. Distribute handouts with a keyword matching exercise.

2. Instruct students to match each factor affecting network performance with its corresponding definition.

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

4. Review the answers as a class, discussing the correct matches and providing explanations for each factor.

## **Guided Practice (20 minutes):**

1. Introduce the concept of transmission time and its calculation.

2. Display the formula for calculating the transmission time of a file over a network: Transmission Time = File Size / Transmission Rate.

3. Provide an example scenario, including the file size and transmission rate, and guide students through the calculation of the transmission time.

4. Give students additional scenarios to practice calculating the transmission time on their own or in pairs.

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

## **Independent Practice (30 minutes):**

1. Divide students into pairs or small groups.

2. Instruct each group to use the Packet Tracer software to investigate routing costs across a network.

3. Provide a scenario or network diagram for students to work with.

4. Ask students to determine the routing costs for different paths within the network and calculate the total cost for each path.

5. Encourage students to document their findings and discuss their observations within their groups.

6. Monitor the groups and provide guidance as needed.

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

1. Distribute exit tickets to each student.

2. Ask students to write a brief summary of the factors that affect network performance and the methods of routing traffic on a network.

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

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

1. Review the main concepts covered in the lesson, including the factors affecting network performance and the methods of routing traffic on a network.

2. Emphasize the importance of understanding these concepts in the field of computer science and information technology.

3. Encourage students to continue exploring and learning about network performance and routing in their own time.

4. Thank the students for their participation and effort during 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.