Lesson 7: Lists and Arrays

In this lesson, students will learn about data structures, specifically arrays and lists, and how to use them in Python programming. They will understand the differences between arrays and lists, including their size and flexibility, and the advantages of using lists in high-level programming languages. Through guided and independent practice activities, students will create a "Simon says..." game using a list of instructions and simulate a shopping list using Python lists and the append() and remove() methods. By the end of the lesson, students will have a solid understanding of data structures and be able to apply their knowledge in practical programming tasks.

## **Objectives:**

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

1. Define the concept of a data structure.

2. Differentiate between lists and arrays.

3. Use lists in a Python program.

4. Apply the append() and remove() methods to manipulate lists.

## **Materials:**

- Whiteboard or blackboard

- Markers or chalk

- Computers with Python IDE installed

- Handouts with code examples and exercises

- Shopping list activity worksheet

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

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

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

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

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

1. Begin by explaining the concept of a data structure: a way of organizing and storing data in a computer program.

2. Discuss the importance of data structures in programming and how they help in efficient data manipulation.

3. Introduce the two data structures for this lesson: arrays and lists.

4. Explain that arrays and lists are both used to store multiple values, but they have some differences.

5. Ask students if they have any prior knowledge or experience with arrays or lists.

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

1. Define an array as a fixed-size collection of elements of the same data type.

2. Explain that arrays are used in low-level programming languages like C and Java.

3. Discuss the advantages and limitations of arrays.

4. Define a list as a collection of elements of any data type, which can grow or shrink dynamically.

5. Explain that lists are commonly used in high-level programming languages like Python.

6. Discuss the advantages of lists over arrays.

7. Provide examples of arrays and lists in Python code.

8. Demonstrate how to create and access elements in arrays and lists.

9. Highlight the syntax and conventions for arrays and lists in Python.

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

1. Divide students into pairs or small groups.

2. Provide each group with a computer and handouts with code examples.

3. Instruct students to work together to create a "Simon says..." game using a list of instructions.

4. The game should randomly select an instruction from the list and prompt the user to follow it.

5. Encourage students to use their creativity to come up with interesting instructions.

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

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

1. Distribute the shopping list activity worksheet to each student.

2. Instruct students to complete the worksheet individually.

3. The worksheet includes a set of instructions to perform various operations on a shopping list using the append() and remove() methods.

4. Encourage students to refer to their Python code examples and the Python documentation for assistance.

5. Monitor the students' progress and provide support as needed.

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

1. Ask students to write a short paragraph summarizing the differences between arrays and lists.

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

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

1. Review the key points covered in the lesson: the definition of data structures, the differences between arrays and lists, and the use of lists in Python.

2. Emphasize the importance of understanding and using data structures effectively in programming.

3. Encourage students to continue exploring and practicing with arrays and lists in their own programming projects.

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.