Lesson 2: Dictionary Challenge

In this lesson, students will learn about the Caesar cipher encryption method and how to implement it using dictionaries in Python. The lesson will begin with a brief discussion on encryption and the concept of a Caesar cipher. Students will then be introduced to dictionaries as a powerful data structure in programming and how they can be used to store key-value pairs. The teacher will provide a step-by-step demonstration of creating a dictionary and using it to encrypt a message using the Caesar cipher algorithm. Students will then work in pairs or small groups to write their own Caesar cipher encryption program using dictionaries. They will have the opportunity to test their programs and present them to the class. The lesson will conclude with an exit ticket to assess students' understanding of dictionaries and their application in the Caesar cipher encryption program.

## **Objectives:**

* Describe the dictionary data structure
* Use a dictionary to produce key–value pairs

## **Materials:**

- Whiteboard or blackboard

- Markers or chalk

- Computers or laptops with Python programming environment installed

- Handouts with Caesar cipher encryption program instructions

- Rubric for assessment

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

- Display the words "Caesar cipher" on the board.

- Ask students if they have heard of the term before and if they know what it means.

- Allow a few students to share their responses.

- Explain that a Caesar cipher is a simple method of encryption where each letter in the plaintext is shifted a certain number of places down the alphabet.

- Ask students if they can think of any real-life examples where encryption is used.

- Discuss their responses briefly.

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

- Explain to students that in this lesson, they will be using a dictionary data structure to create a Caesar cipher encryption program.

- Emphasize that dictionaries are a powerful tool in programming as they allow for efficient storage and retrieval of key-value pairs.

- Define key vocabulary terms: Caesar cipher, dictionary, key, key-value pair.

- Provide examples of key-value pairs using everyday objects or concepts (e.g., a dictionary entry for a word, a phone contact list).

- Explain that the Caesar cipher encryption program will use a dictionary as the cipher wheel, where each letter of the alphabet is mapped to another letter based on a given shift value.

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

- Demonstrate how to create a dictionary in Python and assign key-value pairs.

- Show students how to use the dictionary to encrypt a message using the Caesar cipher algorithm.

- Explain the steps involved in the encryption process, including shifting the letters and replacing them with the corresponding letters from the dictionary.

- Write the code on the board or projector screen and explain each line to the students.

- Encourage students to ask questions and clarify any doubts they may have.

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

- Divide the students into pairs or small groups.

- Distribute the handouts with the instructions for the Caesar cipher encryption program.

- Instruct the students to work together to write the code for the program using the dictionary data structure.

- Circulate around the classroom to provide assistance and guidance as needed.

- Encourage students to test their program with different shift values and messages to ensure it is functioning correctly.

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

- Ask each group to present their completed Caesar cipher encryption program to the class.

- After each presentation, allow the class to ask questions and provide feedback.

- Assess the programs based on the rubric provided, focusing on the correct implementation of the dictionary data structure and the accuracy of the encryption process.

- Provide constructive feedback to each group to help them improve their programs.

## **Exit Ticket (10 minutes):**

- Distribute exit tickets to each student.

- Ask students to write a brief explanation of how dictionaries are used in the Caesar cipher encryption program.

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

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

- Recap the main points of the lesson, emphasizing the use of dictionaries as a powerful data structure in programming.

- Ask students if they have any remaining questions or if there is anything they would like to review in the next class.

- Thank the students for their participation and effort in completing the Caesar cipher encryption program.

- Remind them to practice using dictionaries in their future programming projects.

## **Common Core Standards:**

- CCSS.ELA-LITERACY.RI.9-10.4: Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).

- CCSS.ELA-LITERACY.RI.9-10.6: Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

- CCSS.ELA-LITERACY.W.9-10.2: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.