# Lesson Plan: Strings Manipulation in Python

Teacher: Marcello Goccia Grade Level: Grade 9 Students of IGCSE Computer Science Number of Students: 20 Lesson Duration: 80 minutes

#### 1. Lesson Overview

This lesson focuses on understanding and implementing string manipulation techniques in Python. Students will explore real-world applications of string manipulation and practice writing Python programs to enhance their computational thinking skills. Through a mix of guided instruction, hands-on coding, and peer collaboration, students will develop a deeper understanding of how text data is processed in computer programs.

### 2. Desired Learning Outcomes

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

- Understand the concept of string manipulation.
- Identify and apply essential string manipulation functions in Python such as length calculation, substring extraction, and case conversion.
- Solve problems collaboratively through hands-on exercises.

## 3. Teaching and Learning Strategies

This lesson follows the **EIPM (Explore, Investigate, Practice, Make)** framework and incorporates **differentiation strategies** to accommodate various learning styles and abilities.

## 1) Explore (10 minutes)

**Objective**: Introduce the concept of strings and their manipulation.

- Begin with a real-world example:
  - Ask students, "How would a computer process a username or password?"
  - Discuss how strings are used in programming (e.g., usernames, passwords, messages).
- Show a simple Python program that uses strings and ask students to predict the output and discuss what a string is

## 2) Investigate (15 minutes)

**Objective**: Explore string manipulation methods.

Introduce the concept of strings and their manipulation: String Length, Substring Extraction, Uppercase and

Lowercase Conversion. Explain the syntax and purpose of each method.

- Provide a handout with syntax and examples for students who need extra support.
- Challenge advanced learners to predict the output of more complex examples.

# 3) Practice (25 minutes)

**Objective**: Apply string manipulation techniques in coding exercises.

Students will complete progressively challenging string manipulation problems on an Online Judge (OJ) platform:

- Students work individually or in pair to solve the challenges required by the OJ platform.
- Problems are structured with multiple levels of difficulty, ensuring that all students, regardless of skill level, can engage at an appropriate level.
- Advanced students can attempt additional challenges to extend their learning.

## 4) Make (25 minutes)

**Objective**: Give the opportunity to students to apply string manipulation creatively.

Students will modify an existing Python script to extend its functionality. Given a basic function (for example, check a string is palindrome), they must enhance it by adding new features.

- Example for students who need additional support: Modify the script to convert all letters to lowercase before checking.
- Example for intermediate students: Modify the script to remove spaces.
- **Example for advanced students:** Modify the script to use recursion instead of loops.

# 5) Recap (5 minutes)

Brief summary of the key string manipulation concepts. Students will share their understanding and the challenges faced during coding tasks.

## 4. Resources & Materials

- Online Coding Platforms (like <u>Online Python</u>) or Python IDE (<u>PyCharm</u>)
- Presentation Slides (for theoretical concepts and explanations)
- Online Videos (for students needing additional practice)

## 5. Vocabulary & Cross-Curricular Links

- New Vocabulary: string, size, length, manipulation, concatenation, substring, upper, lower, slicing.
- Cross-Curricular Connections:
  - Mathematics (pattern recognition in text data)
  - English (text processing and analysis)

#### 6. School-Wide Learning Outcomes

- **Confidence:** Students develop problem-solving skills through coding exercises.
- **Communication:** Pair programming enhances collaboration and discussion skills.
- **Creativity:** The mini-project allows students to explore new ways to use string manipulation in real-world contexts.