**DATABASE WEEK 8 ASSIGNMENT ON SOLVING AN SDG PROBLEM WITH DATA (QUALITY EDUCATION)**

**Requirements**

**Part 1: SDG Selection and Problem Definition**

**SDG Selection:**

**SDG 4: Quality Education**

**Problem Definition:**

**Enhancing Digital Teaching in Public Schools in Kenya through Internet Access**

In Kenya, the adoption of the Competency-Based Curriculum (CBC) aims to provide a more practical and skill-oriented education. However, a significant challenge is the lack of digital infrastructure connectivity in public schools, which limits the effective use of digital tools and resources necessary for modern teaching practices. This digital divide affects the quality of education, especially in under-resourced schools where internet access is either non-existent or unreliable.

**Specific Problem:**

The absence of internet access in public schools hinders the implementation of digital teaching methods that are crucial for the success of the CBC. This problem can be addressed by systematically improving internet connectivity, which will allow for the integration of digital resources into the classroom, thereby enhancing the overall quality of education. By using data to identify the schools most in need of connectivity improvements, we can develop targeted interventions that will have the greatest impact on educational outcomes.

**Objective:**

The goal is to leverage data to identify gaps in internet access across public schools in Kenya and to analyze how improving connectivity can foster better educational outcomes, particularly in the CBC sector. This will involve designing a database to manage relevant data, performing analyses to understand the impact of internet access on education, and using data visualization tools to communicate these findings effectively.

**Part 2: Database Design**

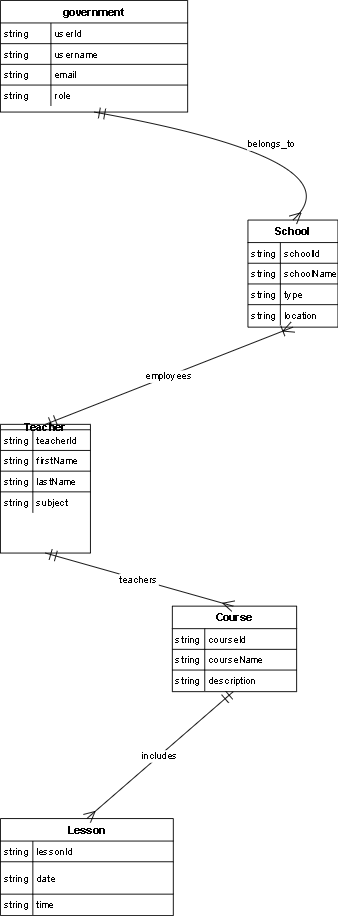
**ERD: Design an ERD for your project, including entities relevant to your SDG problem.**

**Schema: Write SQL statements to create the database schema based on your ERD.**

**Sample Data: Populate the database with relevant sample data.**

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**SQL Statements to Create the Database Schema:**

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-- Create the database

CREATE DATABASE SDG\_Quality\_Education;

USE SDG\_Quality\_Education;

-- Create the Schools table

CREATE TABLE Schools (

School\_ID INT PRIMARY KEY AUTO\_INCREMENT,

School\_Name VARCHAR(255) NOT NULL,

Location VARCHAR(255) NOT NULL,

Student\_Population INT NOT NULL,

Teacher\_Population INT NOT NULL

);

-- Create the Internet\_Access table

CREATE TABLE Internet\_Access (

Access\_ID INT PRIMARY KEY AUTO\_INCREMENT,

School\_ID INT NOT NULL,

Internet Availability BOOLEAN NOT NULL,

Bandwidth\_Speed VARCHAR(50),

Provider\_Name VARCHAR(255),

FOREIGN KEY (School\_ID) REFERENCES Schools(School\_ID)

);

-- Create the Digital\_Resources table

CREATE TABLE Digital\_Resources (

Resource ID INT PRIMARY KEY AUTO\_INCREMENT,

School\_ID INT NOT NULL,

Resource Type VARCHAR(255) NOT NULL,

Quantity INT NOT NULL,

Utilization -Rate DECIMAL (5,2),

FOREIGN KEY (School\_ID) REFERENCES Schools(School\_ID)

);

-- Create the Teacher Training table

CREATE TABLE Teacher Training (

Training\_ID INT PRIMARY KEY AUTO\_INCREMENT,

School\_ID INT NOT NULL,

Number\_of\_Trained\_Teachers INT NOT NULL,

Training\_Type VARCHAR(255) NOT NULL,

Training\_Date DATE NOT NULL,

FOREIGN KEY (School\_ID) REFERENCES Schools(School\_ID)

);

-- Create the Student\_Performance table

CREATE TABLE Student\_Performance (

Performance\_ID INT PRIMARY KEY AUTO\_INCREMENT,

School\_ID INT NOT NULL,

Subject VARCHAR(255) NOT NULL,

Average\_Grade DECIMAL(4,2) NOT NULL,

Assessment\_Type VARCHAR(255) NOT NULL,

Year YEAR NOT NULL,

FOREIGN KEY (School\_ID) REFERENCES Schools(School\_ID)

);

**Sample Data:**

-- Insert sample data into Schools table

INSERT INTO Schools (School\_Name, Location, Student\_Population, Teacher\_Population) VALUES

('Kisumu Primary', 'Kisumu', 800, 35),

('Mombasa High', 'Mombasa', 1200, 50),

('Nairobi Academy', 'Nairobi', 1500, 60);

-- Insert sample data into Internet\_Access table

INSERT INTO Internet\_Access (School\_ID, Internet\_Availability, Bandwidth\_Speed, Provider\_Name) VALUES

(1, TRUE, '10 Mbps', 'Safaricom'),

(2, FALSE, NULL, NULL),

(3, TRUE, '5 Mbps', 'Zuku');

*-- Insert sample data into Digital\_Resources table*

INSERT INTO Digital\_Resources (School\_ID, Resource\_Type, Quantity, Utilization\_Rate) VALUES

(1, 'Laptops', 50, 80.00),

(1, 'Smartboards', 5, 70.00),

(3, 'Tablets', 100, 85.50);

*-- Insert sample data into Teacher\_Training table*

INSERT INTO Teacher\_Training (School\_ID, Number\_of\_Trained\_Teachers, Training\_Type, Training\_Date) VALUES

(1, 10, 'Digital Literacy', '2024-01-15'),

(3, 20, 'Advanced ICT', '2024-02-20');

*-- Insert sample data into Student\_Performance table*

INSERT INTO Student\_Performance (School\_ID, Subject, Average\_Grade, Assessment\_Type, Year) VALUES

(1, 'Mathematics', 78.5, 'Exams', 2023),

(2, 'English', 65.0, 'Projects', 2023),

(3, 'Science', 82.3, 'Exams', 2023);

**Part 3: SQL Programming**

**Data Retrieval: Write SQL queries to retrieve relevant data based on your problem definition.**

**Data Analysis: Write SQL queries to analyze data and generate insights related to your SDG problem.**

**All Schools with Internet Access:**

SELECT s.School\_Name, s.Location, ia.Internet\_Availability, ia.Bandwidth\_Speed, ia.Provider\_Name

FROM Schools

JOIN Internet\_Access ia ON .School\_ID = ia.School\_ID

WHERE ia.Internet\_Availability = TRUE;

**Digital Resources Available in Schools with Internet Access:**

SELECT School\_Name, dr.Resource\_Type, dr.Quantity, dr.Utilization\_Rate

FROM Schools s

JOIN Internet\_Access ON School\_ID = ia.School\_ID

JOIN Digital\_Resources dr ON s.School\_ID = dr.School\_ID

WHERE ia.Internet\_Availability = TRUE;

**Retrieve Teacher Training Data for Schools with Internet Access:**

SELECT s.School\_Name, tt.Number\_of\_Trained\_Teachers, tt.Training\_Type, tt.Training\_Date

FROM Schools s

JOIN Internet\_Access ia ON s.School\_ID = ia.School\_ID

JOIN Teacher\_Training tt ON s.School\_ID = tt.School\_ID

WHERE ia.Internet\_Availability = TRUE;

**Project Documentation: Integration and Testing of Google Sheets Dashboard**

**Project Overview**

This document provides an overview of the steps taken to integrate data into Google Sheets, ensure its consistency, and test the functionality of the dashboard created for analyzing internet access in public schools in Kenya and its impact on quality education.

**1. Data Importation**

**Objective:**

**To import data related to schools, internet access, digital resources, and student performance from a CSV file into Google Sheets for further analysis.**

**Process:**

**Data Extraction:**

Data was first extracted from a database and exported as a CSV file.

The CSV file contains columns for school names, internet access status, number of digital resources, and student performance metrics.

**Data Importation:**

**The CSV file was imported into Google Sheets using the Import function.**

Data was placed in a new sheet within the document to maintain organization and ensure that raw data remains unaltered.

**Verification:**

The imported data was reviewed to ensure that all columns and rows were correctly aligned.

Basic Google Sheets functions such as COUNTA() and SUM() were used to verify the total number of entries and the sum of numerical columns, ensuring that no data was lost or altered during the import.

**2. Ensuring Data Consistency**

**Objective:**

To ensure that the imported data is consistent and accurately reflects the data from the original source.

**Process:**

**Data Integrity Checks:**

Cross-checked the data in Google Sheets with the original database to ensure that all entries match.

Verified key metrics, such as the number of schools and their respective internet access status, against the original dataset.

**Standardization:**

Formats for dates, percentages, and numerical values were standardized across the sheet.

Conditional formatting was applied to highlight key metrics, such as schools with the highest and lowest student performance.

**3. Testing the Dashboard**

**Objective:**

To test the functionality and responsiveness of the dashboard in Google Sheets**.**

**Process:**

**Pivot Table Validation:**

Created Pivot Tables to summarize data, such as comparing average student performance across schools with and without internet access.

Tested the Pivot Tables to ensure they correctly reflect the data, with correct totals, averages, and summaries.

**Chart Validation:**

Developed charts to visualize key data insights, including a bar chart comparing digital resources across schools and a line chart showing student performance trends over time.

Ensured that the charts are accurate and update dynamically with changes in the underlying data.

**Formulas and Conditional Formatting:**

Formulas were used to calculate additional metrics like the percentage of schools with internet access.

Conditional formatting was applied to key data points, such as highlighting schools with the lowest performance.

Tested all formulas and conditional formatting rules to ensure they worked as expected.

**Interactivity and Cross-Platform Testing:**

Tested the interactivity of the dashboard, including the responsiveness of filters and dropdowns.

Opened the Google Sheets on different devices (desktop, tablet, mobile) and browsers to ensure the dashboard was responsive and functional across platforms.

**4. Issues Encountered and Resolutions**

**Issue 1: Data Misalignment**

Problem: During the initial import, there was an issue where data columns were misaligned due to an error in the CSV formatting.

Resolution: Re-imported the data after correcting the CSV file format, ensuring all columns matched their respective headers.

**Issue 2: Conditional Formatting Glitch**

Problem: Conditional formatting initially highlighted incorrect rows due to overlapping rules.

Resolution: Refined the rules and applied them to specific ranges, resolving the issue.

**Issue 3: Chart Updating Lag**

Problem: The charts initially lagged when filtering data.

Resolution: Simplified the data range and optimized the chart settings to improve responsiveness**.**

**5. Conclusion**

The integration of the data into Google Sheets and the subsequent creation of the dashboard was successfully completed. All data was verified for consistency, and the dashboard was thoroughly tested for functionality, responsiveness, and accuracy. Any issues encountered during the process were addressed, ensuring a reliable and effective tool for analyzing the impact of internet access on quality education in public schools in Kenya.

**PITCH DECK GAMMA LINK----https://gamma.app/docs/Enhancing-Quality-Education-through-Internet-Access-in-Public-Sch-68bqb7atklgyrh6**