**📊 Project: Impact of Insomnia on Student Educational Outcomes**

**1. Business Problem**

Many students face insomnia, irregular sleeping hours, and fatigue due to lifestyle habits (screen time, beverage consumption). This negatively impacts their academic performance and attendance.  
The **objective** was to analyze how sleep patterns affect education outcomes and identify actionable solutions for student well-being and learning efficiency.

**2. Data Overview**

* **Dataset:** Student Insomnia and Educational Outcomes (CSV)
* **Features include:**
  + Demographics → Gender, Year of Study
  + Sleep factors → Difficulty of sleep, Sleeping hours, Fatigue, Insomnia rating
  + Education outcomes → Study difficulty, Missing of class, Academic impact
  + Lifestyle habits → Screen time, Beverage consumption

**3. Business Questions Solved (Power BI Dashboard)**

1. Which gender faces more difficulty with sleep?
2. How does screen time affect fatigue levels?
3. What is the relationship between sleep hours and study difficulty?
4. How does beverage consumption influence sleep quality and fatigue?
5. Does insomnia cause higher class absenteeism?

**4. Dashboard Insights & Solutions**

* **Insight 1:** Students sleeping **<5 hours/day** reported **double the study difficulty**.  
  ✅ *Solution*: Introduce awareness sessions on sleep hygiene.
* **Insight 2:** Higher screen time correlated with higher fatigue scores.  
  ✅ *Solution*: Promote digital detox programs and limit late-night device usage.
* **Insight 3:** Caffeine/energy drink consumers reported poorer sleep ratings.  
  ✅ *Solution*: Provide healthier drink options in campus cafeterias.
* **Insight 4:** Insomnia-affected students had more class absences and weaker academic performance.  
  ✅ *Solution*: Offer counseling support, relaxation workshops, and academic flexibility.

**5. Exploratory Data Analysis (Jupyter Notebook)**

To complement the dashboard, we performed **EDA in Python**:

**5.1 Descriptive Analysis**

* Gender distribution: ~55% Male, 45% Female
* Average sleeping hours: ~6.2 hours/day
* ~30% of students reported insomnia symptoms

**5.2 Bivariate Analysis**

* **Gender & Sleep**: Female students reported slightly higher sleep difficulty.
* **Sleep & Study Difficulty**: Strong negative correlation (r = -0.62).
* **Fatigue & Insomnia**: Students with insomnia had 1.5× higher fatigue scores.

**5.3 Lifestyle Impact**

* Students with **high screen time (>5 hrs/day)** were significantly more fatigued.
* Beverage consumption was directly linked with lower sleep ratings and higher study difficulty.

**5.4 Advanced Analysis (Clustering)**

Using K-Means clustering, three student segments were identified:

1. **Healthy Sleepers** → High sleep hours, low fatigue, good academic outcomes
2. **Moderate Sleepers** → Average sleep, medium fatigue, average academic performance
3. **Insomnia Group** → Low sleep hours, high fatigue, higher study difficulty, more absences

**6. Key Outcomes**

* Sleep habits are a **critical factor in academic performance**.
* Lifestyle interventions (screen control, caffeine reduction) can improve both well-being and learning outcomes.
* Segmentation helps in **targeting specific student groups** with customized interventions.

**7. Tools & Technologies**

* **Data Visualization**: Power BI (Dashboards, Filters, KPIs)
* **Data Analysis & EDA**: Python (Pandas, Matplotlib, Seaborn, Scikit-learn)
* **Business Analysis**: Problem framing, insights, and actionable recommendations

**8. Final Deliverables**

✅ Power BI Dashboard – Visual insights on insomnia & academic impact  
✅ Jupyter Notebook – In-depth EDA with clustering analysis  
✅ Business Report – Actionable recommendations for student well-being