DATA ANALYSIS AND VISUALIZATION PROJECT REPORT
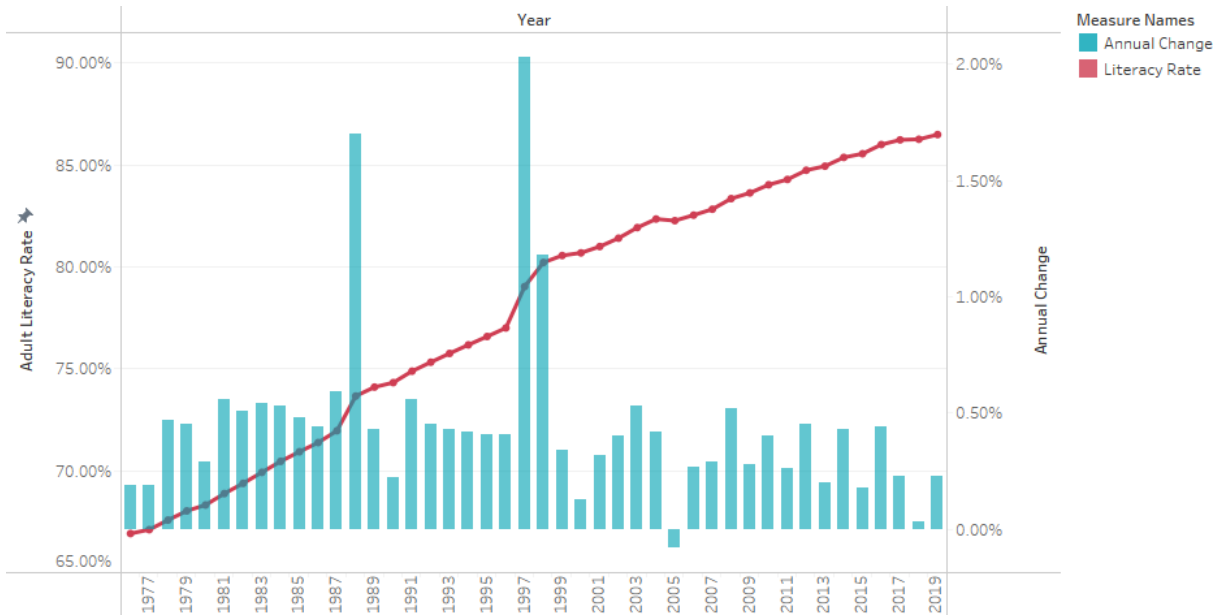
GLOBAL EDUCATION

Education is regarded as a quintessential resource for people and civilizations alike. Indeed, in most countries, basic education is now seen not just as a right, but also as a responsibility: governments are often expected to ensure access to basic education, and citizens are frequently required by law to obtain education up to a particular degree.

We begin by offering an overview of long-term trends in education outcomes and outputs around the world, concentrating on both quantity and quality indicators of educational attainment; and then we analyze the data available on the determinants and consequences of education.

With each country's population in mind, we analyze literacy rates, government expenditure on education, which country ranks highest in terms of education spending, what percentage of a country's population receives the minimum vs advanced education, primary and secondary schooling with years and finally we compare countries based on average harmonized learning score.

In this project, we have created six visualizations.
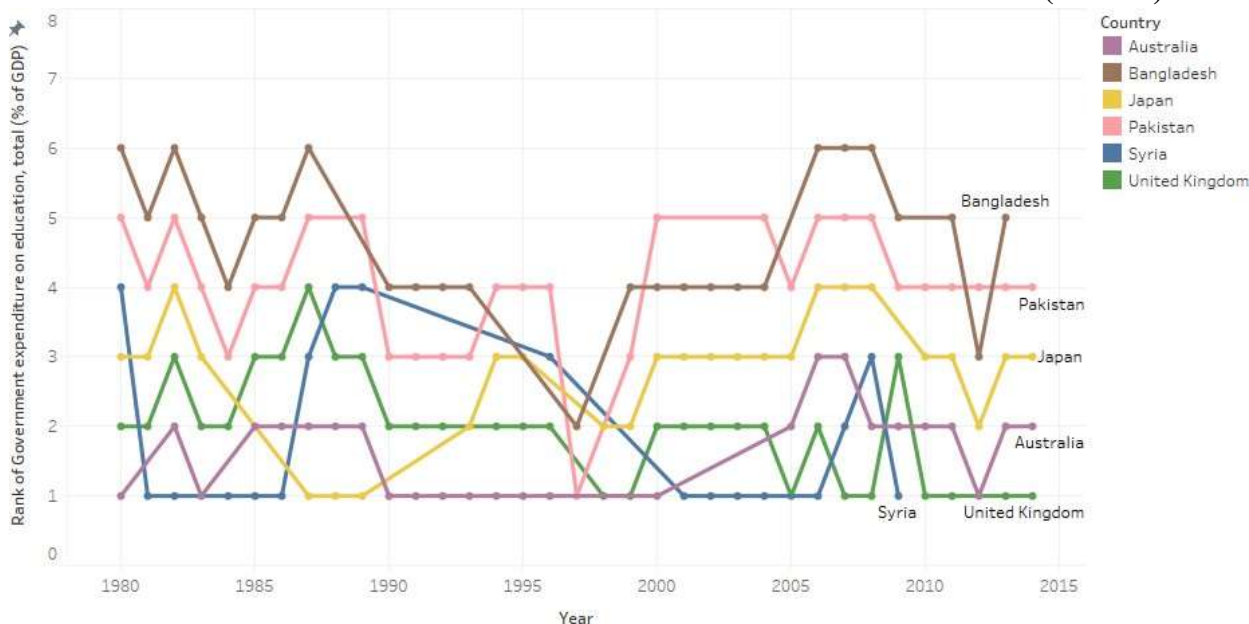
1. **WORLD LITERACY RATE 1976-2021**

a. Visualization type and description –

- This is a combination chart consisting of a bar chart and a line graph where line is representing the adult literacy rate and the bar represents the annual change in literacy rate. This is plot from the year 1976 to 2021.
- The literacy rate is defined by the percentage of the population of a given age group that can read and write. The adult literacy rate corresponds to ages 15 and above, the youth literacy rate to ages 15 to 24, and the elderly to ages 65 and above. It is typically measured according to the ability to comprehend a short simple statement on everyday life.
- The annual change is calculated as the percent increase or decrease in the literacy rate from the previous year.
- The map is showing literacy rate by country.
- The darker shades represent high literacy rates.

b. Insights –

- World literacy rate for 2005 was 82.26%, a 0.08% decrease from 2004.
- World literacy rate for 2018 was 86.25%, a 0.03% increase from 2017. There is a sharp dip.
- World literacy rate for 2019 was 86.48%, a 0.23% increase from 2018. But it recovered quickly in 2019.
- There is a fluctuation in annual change from 2005 to 2015, but overall, the literacy rate seems to be increasing.
- From the line graph we can infer that the literacy rate has increased with time.
- The year 1997 marks as the highest rise in annual change of literacy rate.

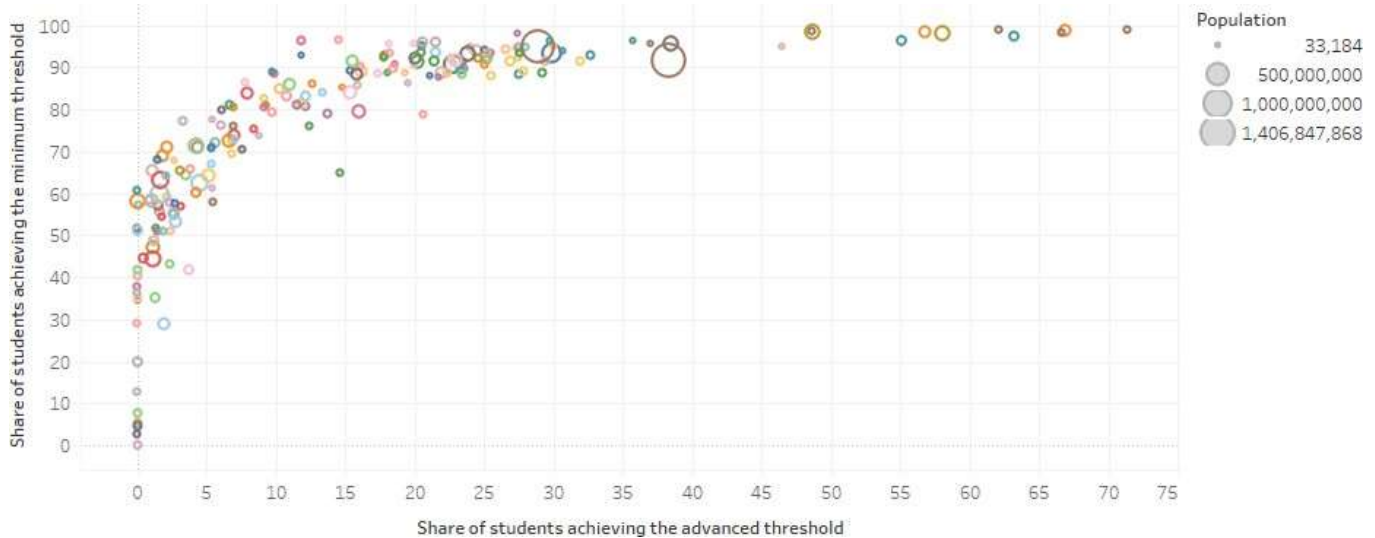## 2. RANKING OF COUNTRIES BASED ON EXPENDITURE ON EDUCATION (%GDP)

a. Visualization type and description –

- This is a bump chart representing the ranking of countries based on expenditure on education as the percentage of GDP. This is plotted from the year 1980 to 2015.
- The countries selected are Syria, United Kingdom, Australia, Japan, Pakistan, Bangladesh. They are a mix of developed and developing nations.
- The Y axis shows the ranking.

- It is evident from the chart, Syrian government put a lot of efforts in supporting the education despite facing socio-economic problems. But with the start of war in 2011, Syria lost its majority student population by 2015 due to displacement of millions of Syrians.
- Countries like UK and Australia seem to be making consistent efforts in expenditure on education.
- The rank of Japan and Pakistan showed a good amount of fluctuation throughout the years.

3. **SHARE OF STUDENTS ACHIEVING THE MINIMUM THRESHOLD VS ADVANCED THRESHOLD**
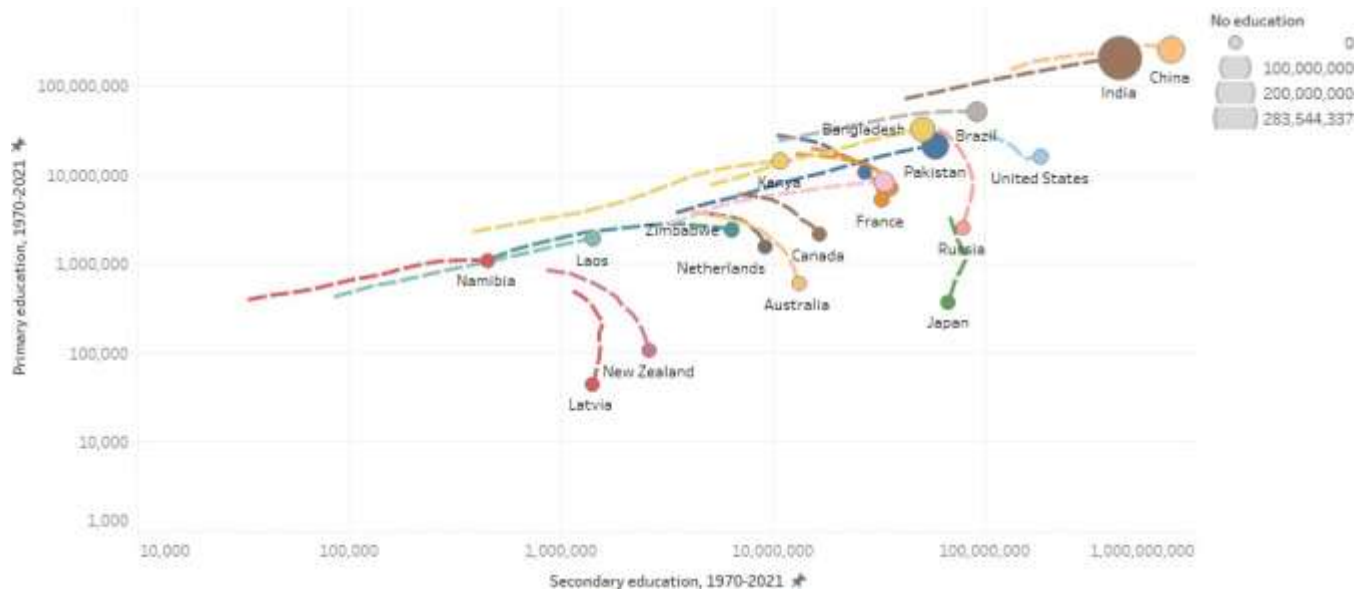

a. **Visualization type and description –**
- This is a scatterplot representing the share of students who achieved minimum education vs the share of students that achieved advanced education.
- The size of the circles represents the populations of each country. So, we can say that larger the circle, larger the population.
- The Y axis shows the minimum threshold and x axis shows the advanced threshold of education.
- Minimum Threshold is defined as the proportion of population who pass a global benchmark for minimum skills and the proportion who pass a global benchmark for advanced skills is Advanced Threshold.

b. **Insights –**
- The larger circles of India and China show that their populations are the highest but despite that it is evident that the advanced learning outcome threshold is considerably low.
- Highly developed nation like Singapore has a low population but a very high share of students who achieved advanced education.
- From this, we can infer that the advanced achievement is irrespective of the population of the country.
- Apart from a few countries in the African continent, the share achieving minimum threshold of other countries represents a good number.

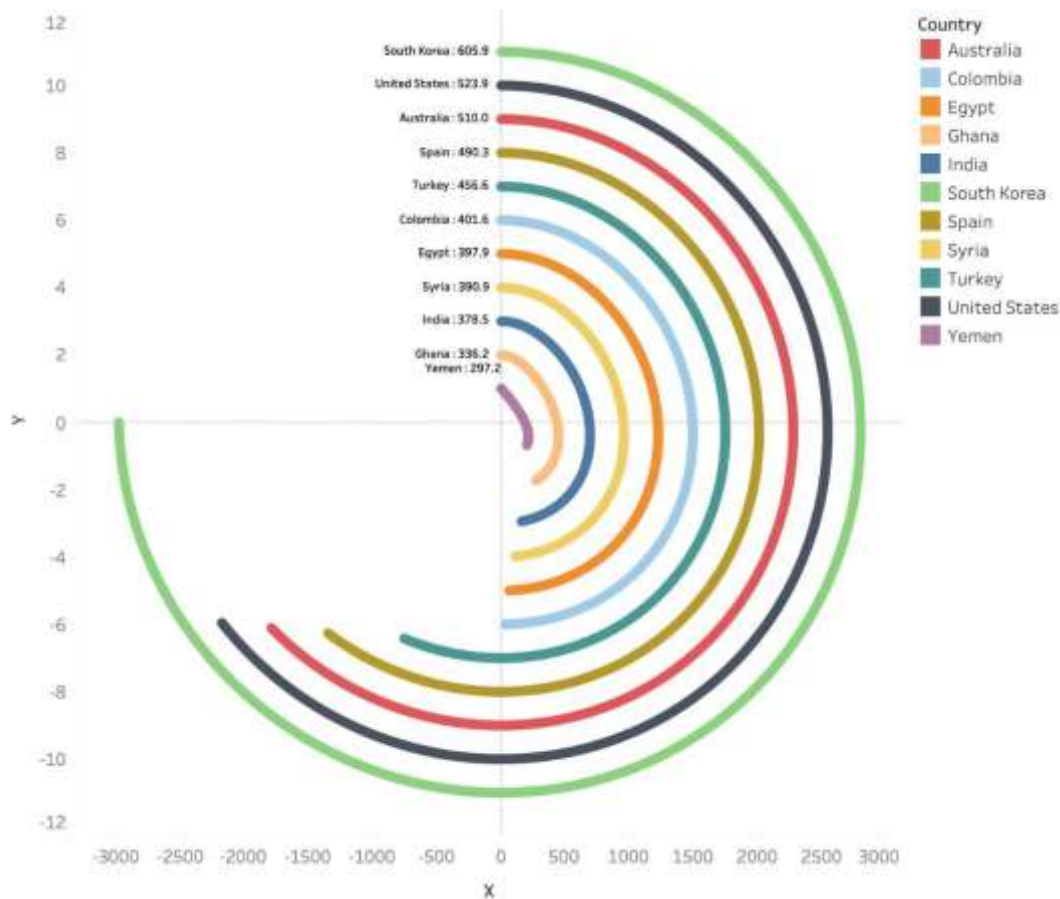## 4. PRIMARY AND SECONDARY EDUCATION OVER THE YEARS

a. Visualization type and description –

- This is an interactive visualization consisting of connected scatterplot which shows primary and secondary education of different countries through 1970 to 2021.
- The size of the circles represents the share of people with no education of each country. So, we can say that larger the circle, larger the population with no education.
- The Y axis shows the primary education x axis shows the secondary education.
- The proportion of population who completed first stage of formal education which is about 10 years of schooling life is defined as primary education.
- The proportion of population who completed the second stage in formal education, beginning at the age of 11 and ending at the age of 18 is defined as secondary education.

b. Insights –

- By looking at India and China we can say that they have a large population who completed primary and secondary education but at the same time, their larger circles show that they have the largest population with no education as well.
- Pakistan, Kenya, and India show consistent growth in primary and Secondary education over the years.
- There is a significant drop in the number of students attending primary school. The reason for this dropout rate could be unhealthy
- The overall rate of education in the African countries is low but is increasing with years.

5. AVERAGE HARMONISED LEARNING OUTCOME SCORE

Country
- Australia
- Colombia
- Egypt
- Ghana
- India
- South Korea
- Spain
- Syria
- Turkey
- United States
- Yemen

South Korea : 605.9
United States : 523.9
Australia : 510.0
Spain : 490.3
Turkey : 456.6
Colombia : 401.6
Egypt : 397.9
Syria : 390.9
India : 378.5
Ghana : 336.2
Yemen : 297.2

a. Visualization type and description –
- This is an interactive visualization consisting of a radial chart which shows the average harmonized learning outcome score of different countries.
- The longer the radial line, the higher the harmonized learning outcome score.
- The Harmonized Learning Outcome is a score that measure education not by years in school or degrees earned, but by actual learning outcomes. Learning outcomes are statements of the knowledge, skills and abilities individual students should possess and can demonstrate upon completion of a learning experience or sequence of learning experiences.
- Average scores across standardized, psychometrically robust international and regional student achievement tests. To maximize coverage by country, tests have been harmonized and pooled across subjects (math, reading, science) and levels (primary and secondary education).

b. Insights –
- By looking at the radial chart, we can see that Korea has the highest score and Yemen has the lowest score among these countries.
- United States despite being a developed country with a good literacy rate, the average harmonized score is decent enough but not impressive.
- Some nations with a higher GDP show a good score probably due to a significant expenditure by the government done on education and higher standards of education.
- Despite unfavorable conditions persisting in Syria, we notice that the score is good.