Understanding the Impact of Education on Crime

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Abstract. Here, we explore the impact of education on crime rates in various countries of the world. We have used data sets from UNESCO and UNODC from which we determine the correlation between education level and prices and represent them visually in the form of maps, pie charts, bar charts, and line charts so that policymakers can deftly decide and implement policies and people can easily decide where they want to relocate.

Keywords: Education, Crime Rate, Visualization, Choropleth, Bar Graph, Layout, Line Chart, Maps

1 Introduction

The topic of crime and education can be viewed from various perspectives. However, the primary discussion area is generally the impact of educational attainment on criminal behavior and crime. Is it actually possible to lower crime rates by raising the education of potential criminals?

While this issue is debatable, there is profound consensus among parents, teachers, academics, and public officials that post secondary education is one of the most cost-effective and successful methods of preventing crime. One main reason for this consensus is that higher educational attainment results in higher earnings on average and thus increases the opportunity cost of crime. Moreover, incarceration is likely to be more costly for those who have more education. Imprisonment means time out of the labor market, which is more costly for high earners.

We aim to explore and present the impact of education on crime in various countries worldwide for the period 2005-2017 using visualization techniques.

1.1 Dataset

For this project, the data for enrolment in primary, secondary, and tertiary education levels were obtained from the UNESCO Institute for Statistics (UIS). The data for intentional homicides and other crimes were obtained from the UNODC

Statistics database.

The data pre-processing steps included joining the two datasets, education and crime, with each other using the Pandas library from Python on MySQL using a join based on year, country and gender.

1.2 Project Audience

Our application is not just for governors, policymakers, and educationists but also for everyone who is interested in the topic. These include individuals and families who wish to relocate to a particular country and want to learn which countries are better to live in in terms of crime rate and get a better education. We aim at providing a system that can be used intuitively, is easy to interact with and can be easily comprehended.

1.3 Related Work

The paper The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports (2004) use regression methods such as ordinary least squares regress to assess the impacts of education on incarceration.

Another paper titled The Crime Reducing Effect of Education investigated the crime reducing the potential of education and framed the analysis in a regression-discontinuity setting. The paper's findings revealed that improving education can yield significant social benefits and can be an important policy tool in the drive to reduce crime.

2 Determination Analysis of Factors

Safety and crime rates is one of the main concerns when deciding a new place to travel or live. Hence, the crime rate is an extremely important factor for us. In the papers we reviewed how education attainment correlates with crime rates. Therefore, we can observe and determine how our data support these correlations.

We suspect that the crime rate and literacy rate would be correlated as in countries where the literacy rate is high, people would not have high paying jobs and might resort to criminal activities.

3 Design Considerations

3.1 Story

We wanted to highlight the high-level global view of education and data crime through a D3 choropleth map before diving into granular details such as how two countries compare to each other in terms of education and crime.

3.2 Visualization Wheel

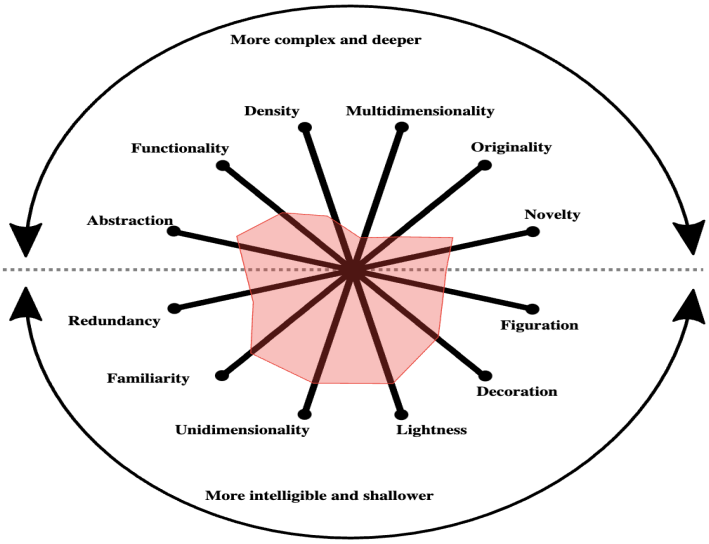

Fig1.Visualization Wheel

As exhibited In Fig-1, our design is towards the more intelligible and shallower side as we use charts which are pretty common such as Bar Charts, Line Charts and Maps (Familiarity). We use the same maps and bar charts to display crime and education data but since the data being displayed depends on the option selected on the drop down menu, at one time we display only one variable (Unidimensionality).

3.3 Color Schemes

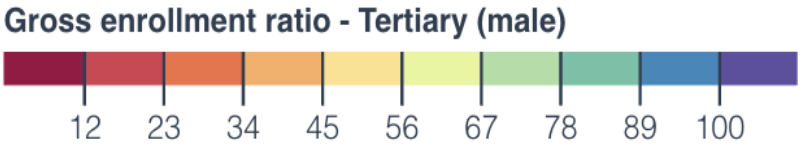

Fig2.Map Color Scale

The color schemes are used according to the variable type being displayed. In the bar chart blue bars depict that education data is being displayed whereas red bars display that crime data is being shown on the screen. Similarly for the maps we have a color which represents the color of a specific range of data which is also mentioned in the legend on the graph itself. (Fig-2b) The color scheme used is such that people with common types of visual impairments would be able to decipher the meaning of the maps and charts.

3.4 Interactivity

All of the charts present on our website are interactive.

1. World Map.
   (a) Drop down menu to control which data would the user like to see on the world map. 3 options are available which are:
      i. Gross Enrollment Ratio – Tertiary (Male)
      ii. Gross Enrollment Ratio – Tertiary (Female)
      iii. International Homicide Rates per 100,000
   (b) The year radio button controls which years data we want to visualize on the map. The options are all the years which were present in our data source (2005, 2010, 2014, 2015, 2017)
2. Bar Charts
   (a) The same drop down that controls the data presented on the world map also controls the bar charts.
   (b) The Top 20/Bottom 20 radio button controls what data do we want to filter and then display on the bar charts. The options are:
      i. The 20 Most Literate Countries (Year – Gender) ii. The 20 Most Illiterate Countries (Year – Gender) iii. The 20 Most Dangerous Countries (Year) iv. The 20 Most Safest Countries
   (c) The year button for the world map is also responsible for filtering the data for that specific year for the bar charts as well.
3. Line Charts If we want to directly compare two specific countries we can do so with the help of line charts.
   (a) Two drop menus. One to select the first country (Country 1) and the other to select the second country (Country 2)
   (b) A radio button to specify the gender that we want to filter our data on before visualizing.
4. Mapbox Maps
   (a) Two maps displayed side by side for the countries that we want to compare.
   (b) The 2 selected countries are highlighted in the graph through an API GET request to the MapBox API, which returns coordinates of the country queried.
   (c) Upon hovering the mouse pointer over these countries, we can observe statistics related to these countries.

4 Future Scope

In the future, we can add more variables to compare countries on. For example, we can present the user with a multitude of options that they can visualize on for example education, crime, pollution, GDP etc. This way the user can visualize all of these variables on the charts and can compare specific countries on specific variables.

5 Conclusion

Overall, there is a significant link between high enrollment and low crime rate i.e. homicide rate, and even though this doesn't signal causation, it is evident that both are correlated

References

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