Communicating Data Findings PISA Study

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Introduction

PISA is a survey of students' skills and knowledge as they approach the end of compulsory education. This study was conducted to analyse the data of around 500,000 students, to find their readiness for the life beyond school. Around 500,000 students in 65 economies took part in the PISA 2012 for proficiency in Mathematics, Reading and Science representing about 28 million 15-year-olds globally. Of those economies, 44 took part in an assessment of creative problem solving and 18 in an assessment of financial literacy.

Research Questions

- **Question 1:-** Does gender have any effect on the performance in math, reading and science? Is there any gender gap in participant's countries?
- **Question 2:-** Does Immigration status and parent's math likliness has an influence on student performance?
- **Question 3:-** Does location has an influence on Math, Reading and Science Scores?

Investigation Overview

I used Jupyter notebook to analyze the relationship between the features of interest. The investigation started with data wrangling and then the cleaned up data was used to generate visualizations to get insight into PISA study This presentation includes the interesting features and key findings shown with the help of visualizations. I have zoomed in on USA and Canada for one part of this investigation, where we are analysing the relationship of Immigration status and math likliness on math scores of the participants.

- Influence of Gender on students performance in Math, Reading and Science literacy and the presence of gender gap in different parts of the world.
- Influence of location on student performance
- Influence of Immigration Status and Parent's Math Likliness on Math Scores for participants from USA and Canada
- Conclusion

Data Set Overview

Data Distribution

- There were more than 48,500 participants in this study and this plot shows that maximum number of participants were from Mexico and the least number of participants were from Liechtenstein. Italy, Spain, Canada and Brazil were next. Whereas form Qatar, Australia, UK, UAE and Switzerland there were around 10,000 to 15,000 students who participated in PISA study. There is a large number of countroes from where the participants were around 5000 and below.

Features of Interest

- Data distribution shows that there were more or less the same number of male and female participants, the age range is 15 to 16 year old.
- We took the average of the MAth, Science and Readign scores from five different score categories.
- Immigration status was another column of interest with a lot of null data values and we filled them with "Native" as this was the most common value in the column.
- There are more students in the score range of 500 to 600 in reading and then in math and the last one is science.

Influence of Gender on students performance in Math, Reading and Science literacy and the presence of gender gap in different parts of the world.

- The results show that gender does not seem to play a significant role in student performance. The interesting thing to note down here is that male particioants scored higher thatn the female participants in Math, whereas the female participants scored higher in reading. Although we have seen a positive correlation between different categories and would have expected the same result in each of them
- Another important pattern that we observed that there is a gender gap between most of the countries that participate din the study and some showed a reversal of gender gap and only three had none. The countries where girls perform better in math than boys are Jordan, Qatar, Thailand, Malaysia, United Arab Emirates, Singapore. The countries in which there is no significant gender gap are Albania, Lithuania and Kazakhstan. While Colombia and Chile are among the top countries in terms of gender gap.

Gender Gap

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Influence of Immigration Status and Parent's Math Likliness on Math Scores for participants from USA and Canada

Influence of immigration Status on student's Math proficiency
Influence of Parents Math Likliness on participant's Math Scores

Influence of immigration Status on student's Math proficiency

Immigration status for the USA and Canada showed interesting features

- **Natives:** Natives are showing higher scores than the first generation and the second generation in USA and it's states. Canada, Chile and Florida are different.
- **First Generation:** Is behind in scores. Peru, Canada, Chile and Florida are different.
- **Second Generation:** Is n the middle of natives and first generation. Canada, Chile, Florida, Costa Rica are different.
- **Canada and Florida:** There is no significant difference in math scores for the three generations of these two countries
- **Costa Rica and Peru:** First generation showed better performance in math as compared to the second generation.
- **Chile:** Chile is the only country where natives are behind the other two geneartions

Influence of Parents Math Likliness on participant's Math Scores

There is positive influence of math likeness of parents on student's math scores all across US it's states and Canada

Influence of Location on student's performance in Math, Reading and Science literacy

Location has an influence on the overall scores of students. Hong Kong China have shown extremely high scores in math, reading and science. Estonia, is next as it is on the 2nd place for Math and Science and on the 3rd place for Reading.

The relationship of Math Scores and Math Anxiety

- Correlation between math performance and math anxiety is (-0.54).If the students can control their anxiety levels they can score better in Math.
- A negative math anxiety index shows the student's with high scores, and as we go to a higher anxiety the scores tend to be lower.
- We can see how location is also affecting the math scores of participants.

Conclusion

The student's performance in Math, Reading and Science is influenced by location, gender and immigration status. The academic categories seem to follow a pattern in terms of performance of the students, the ones performing well in one are showing the same in the other two categories. An interesting feature was noticed in Immigration Status, Natives showed high Math Scores, whereas Chile, Canada, Peru and Florida showed a mixed relationship.Canada and Florida have same Math Scores for all three generations. I found out that most of the parents were math friendly and lesser number of parents did not like math and just a very little number strongly disliked math. Qatar is one of the countries showing a reversal in gender gap, the reason might be that Qatar's female population is more thatn the male population. These features can be further investigated.