

Data Visualization for the New Age:

An Experimental Study

Exploring the Merits of Human Perception on Visualization Techniques for Improved Statistical Communication

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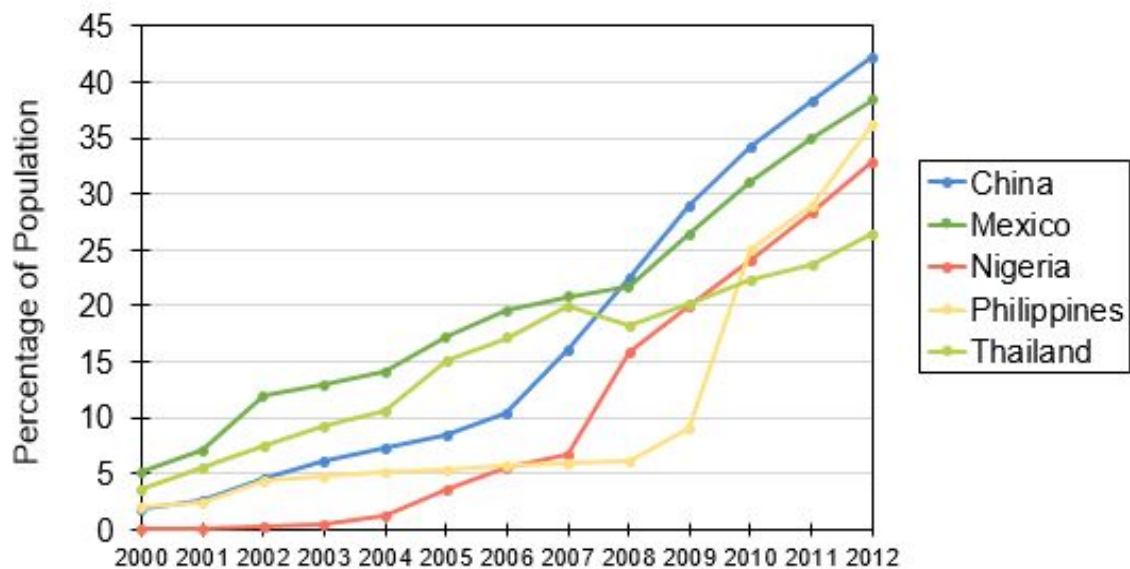
Dominic Dayta

Isabella Benabaye



**We are living in the
age of big data.**

Percentage of Internet Users in the Population by Country (2000-2012)



Recent studies have been suggesting that **traditional representation approaches can be improved to become more effective and efficient.**

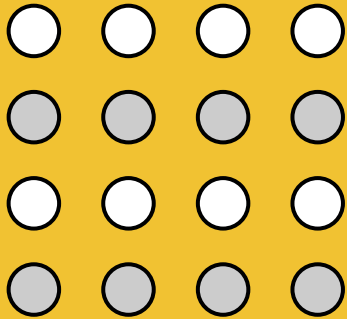
(Pandey, et. al., 2014; Alexandre & Tavares, 2010)

A way to improve standard charts is inspired by **Gestalt perception theories**

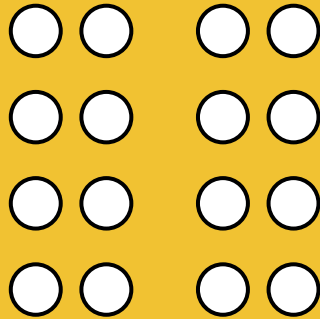
Grounded on the principle that the **whole speaks more than its parts**



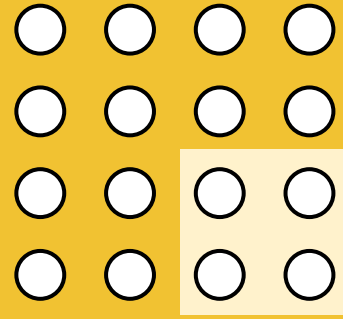
Gestalt Theories



Similarity



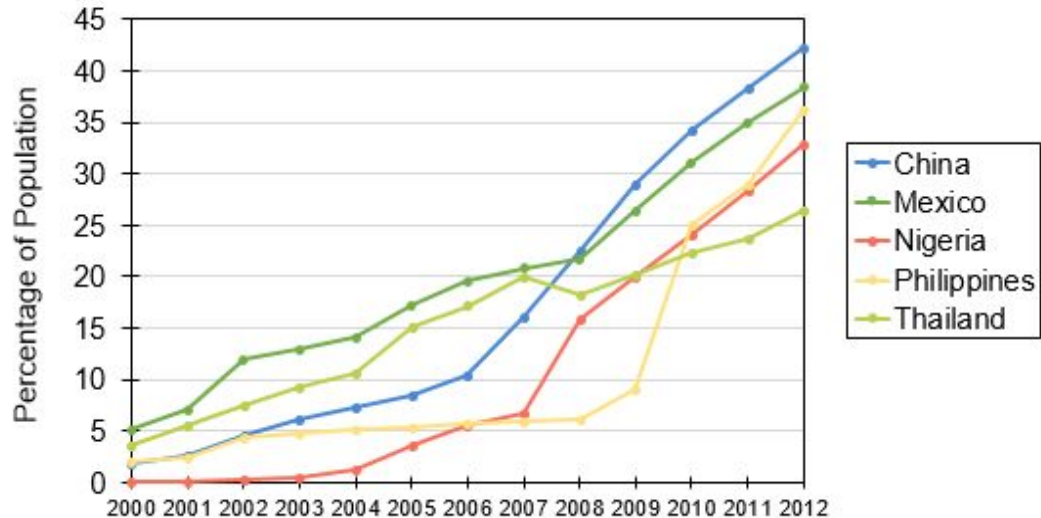
Proximity



Enclosure

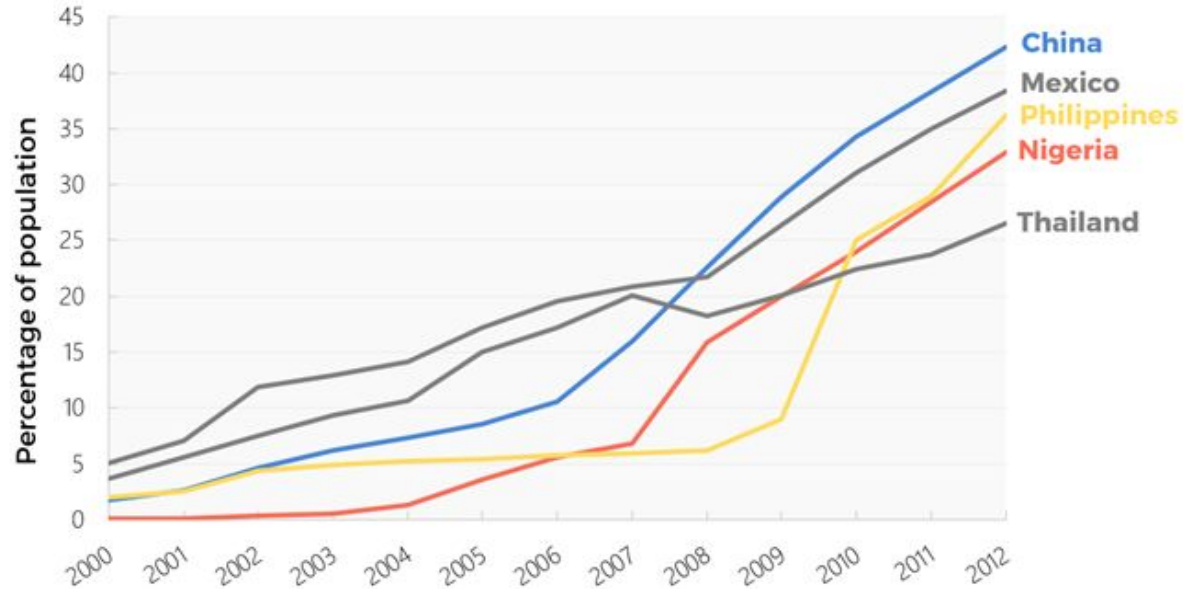
Standard charts

Percentage of Internet Users in the Population
by Country (2000-2012)



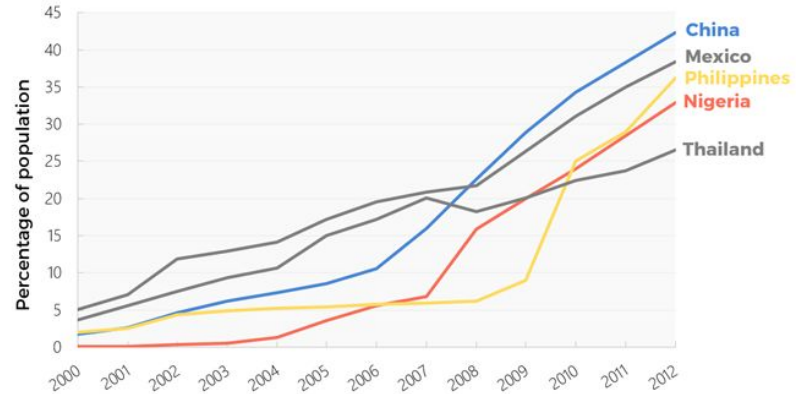
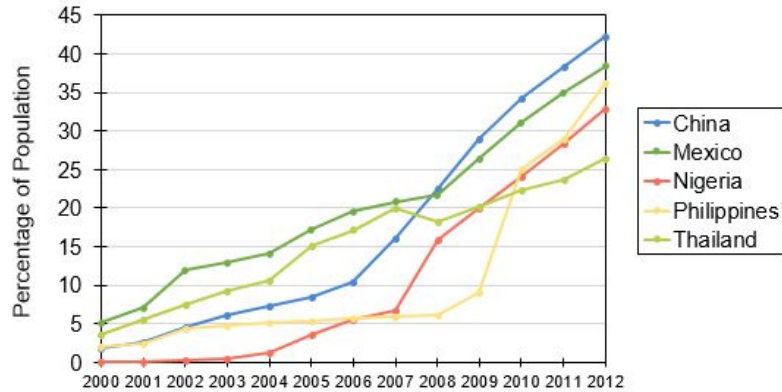
Enhanced charts

**Percentage of Internet Users in the Population
by Country (2000-2012)**



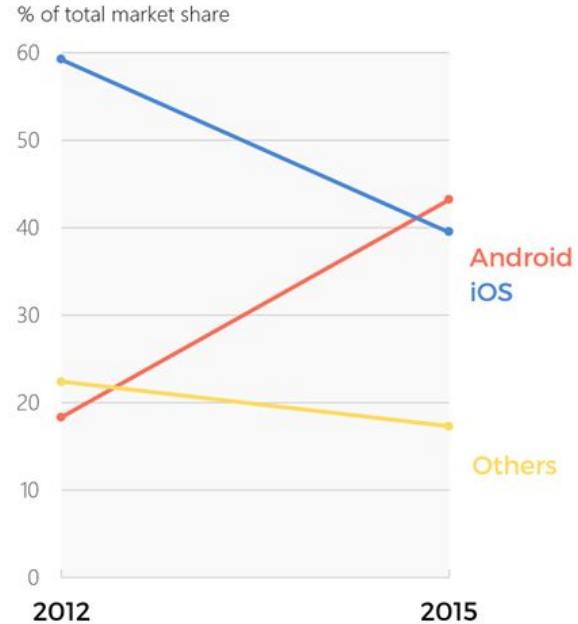
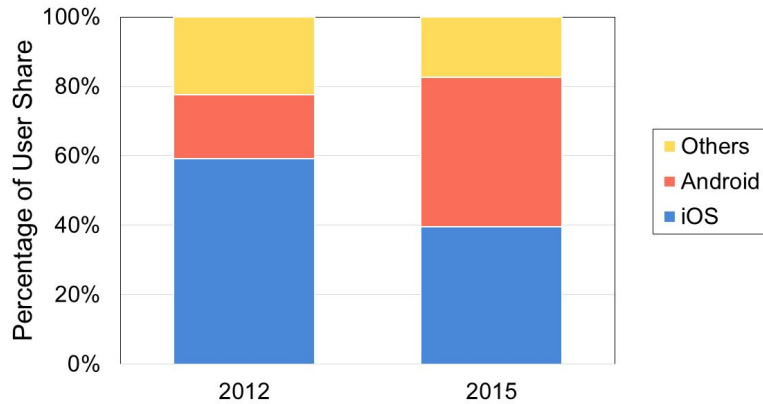
Enhancing a chart

Improving the **visuals** (standard chart + Gestalt)



Enhancing a chart

Improving the **chart** (new chart + Gestalt)



This study aims to provide scientific evidence of better data comprehension through chart enhancement.

Methodology



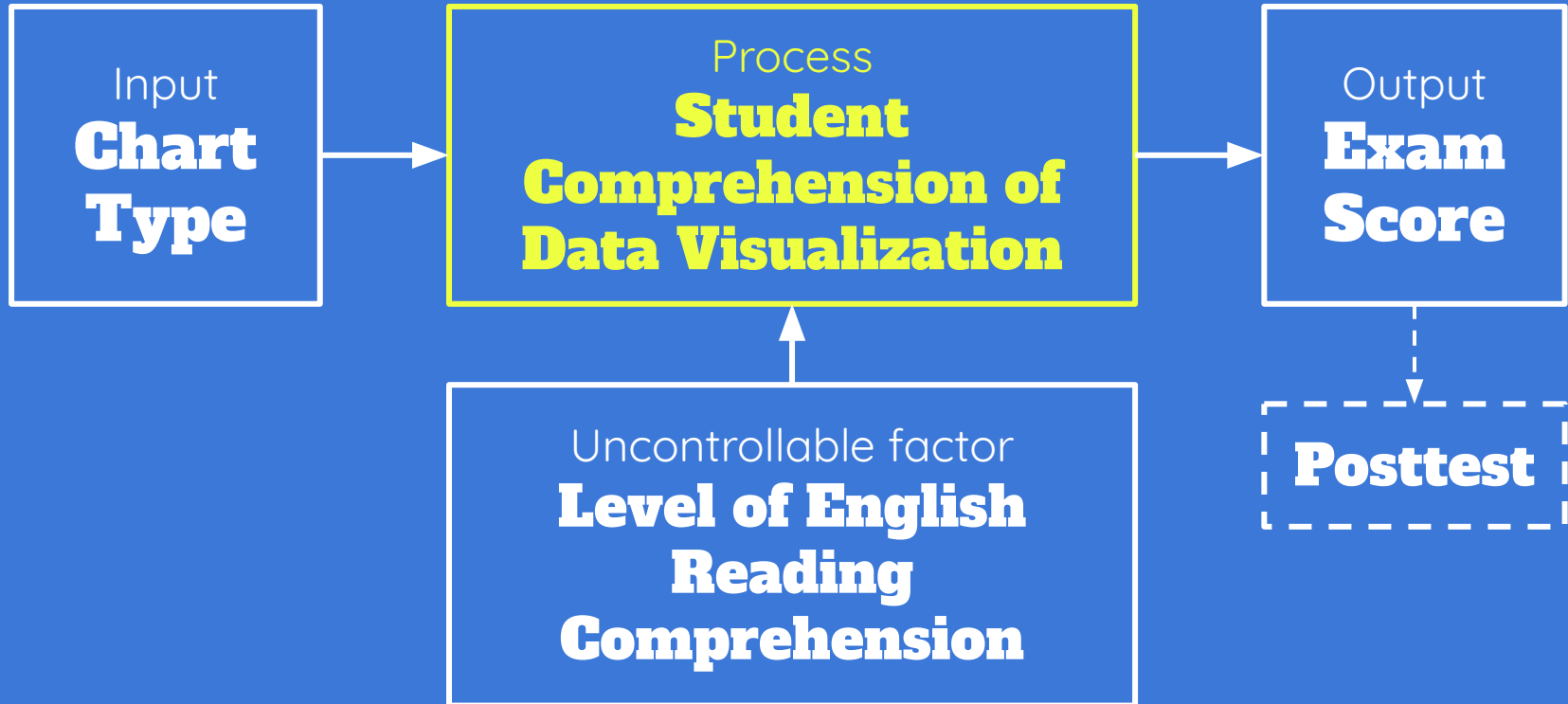
18 ninth grade students divided into 2 groups of 9



Private school in San Juan, Metro Manila, Philippines

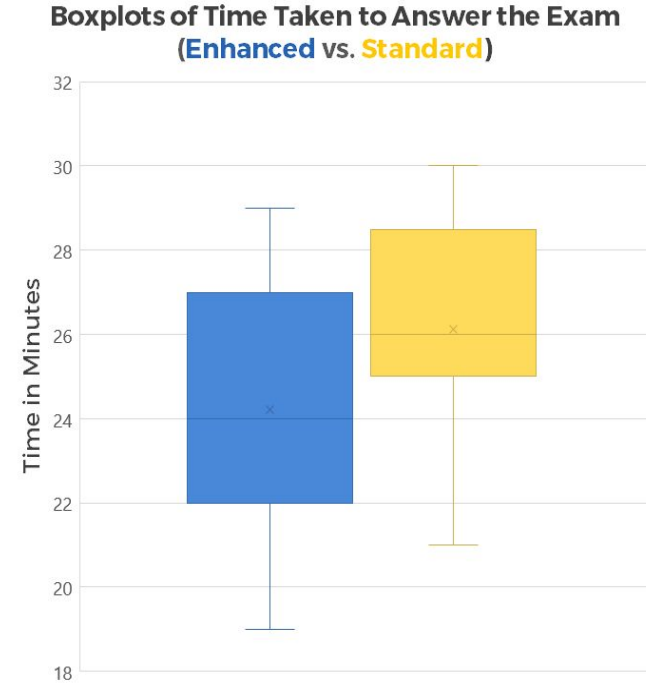
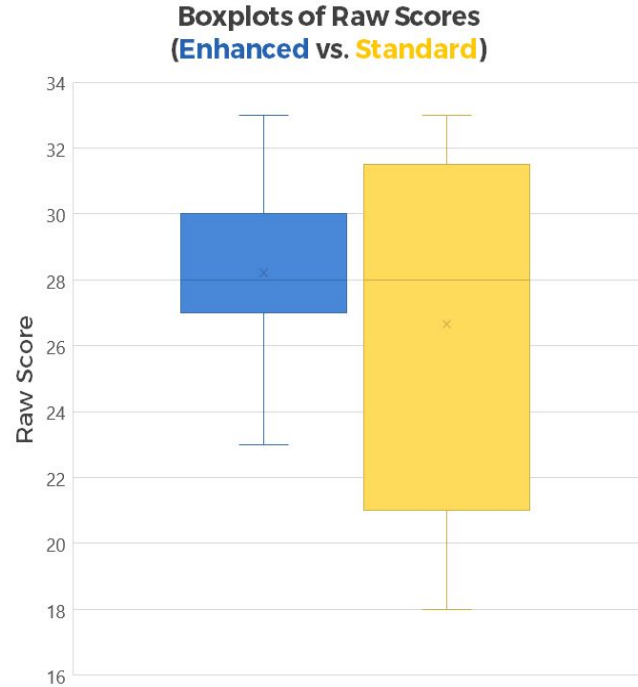
$$\text{Final Score} = (\% \text{ Correct}) * (1 - W) + (1 - \text{Time Percentile}) * W$$

Methodology



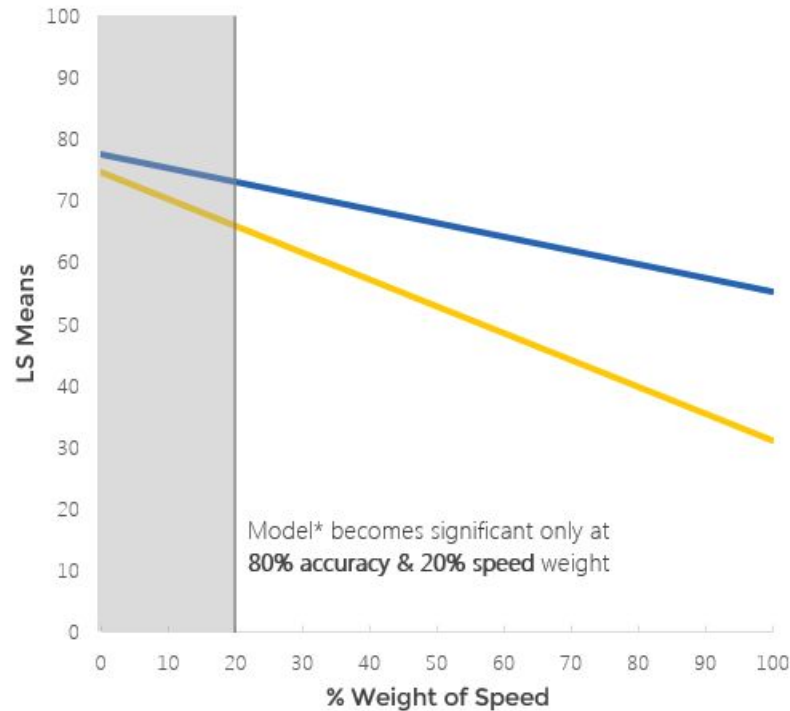
Discussion of Results

Differences in raw scores & times



LS Means: Diverging Performances

LS Means of Final Scores at Varying Speed Weights
(Enhanced vs. Standard)

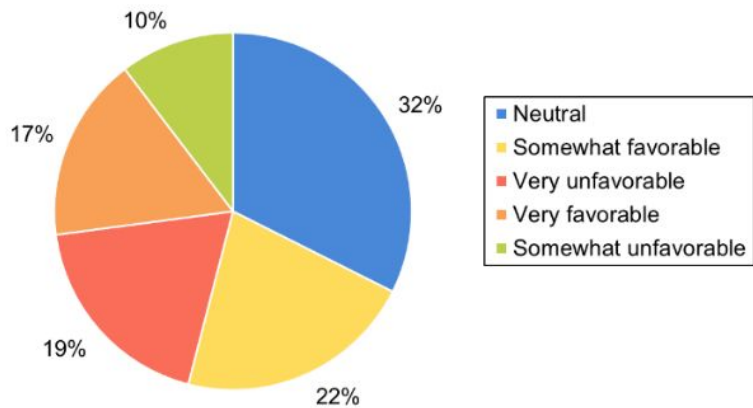


*Model considers together the significance of model, exam type, and pretest.

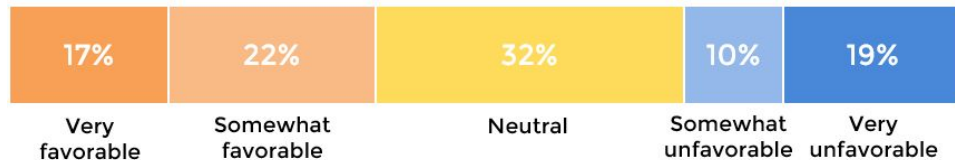
Enhanced or Standard?

The post-test showed that the students generally prefer standard charts over enhanced charts.

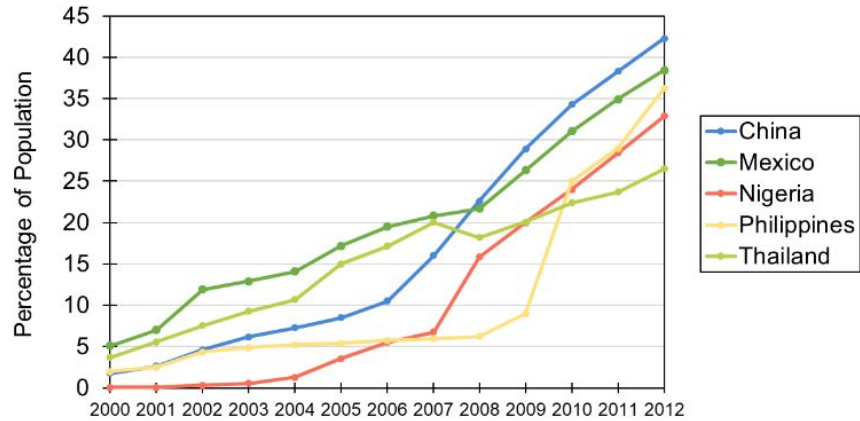
Emperor Palpatine 's Favorability Ratings by Star Wars Enthusiasts



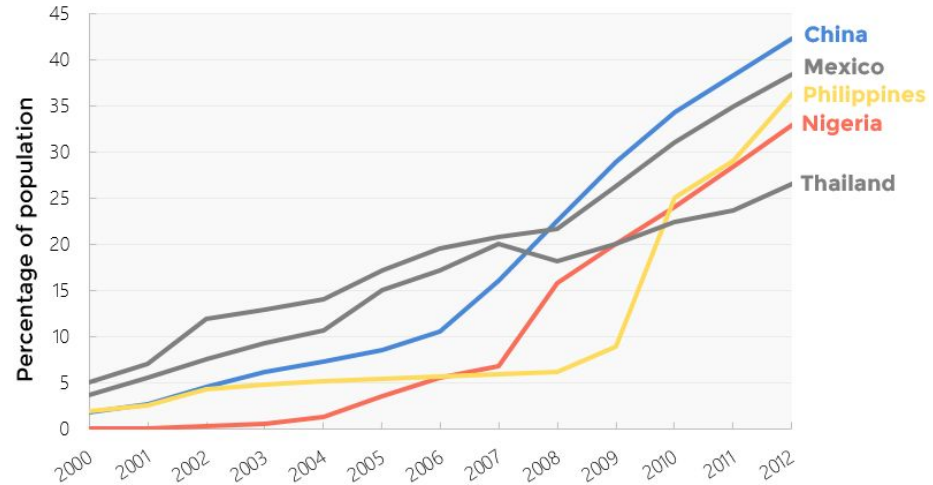
Emperor Palpatine's Favorability Ratings by Star Wars Enthusiasts



Percentage of Internet Users in the Population by Country (2000 to 2012)



Percentage of Internet Users in the Population by Country (2000 to 2012)



Enhanced or Standard?

In these instances, however, the proportion of correct answers was still higher for those who had the enhanced charts.

Enhanced or Standard?

The students' comprehension of the data was made generally more efficient when the enhanced visualizations were used.

Limitations

- Small sample size was used: 18 students
- Difficult to find qualifying participating schools that would accommodate us
- Limited budget to conduct experiment
- A standard and more comprehensive reading comprehension pretest could be used
- Main chart exam could use further refinement
- A psychological approach could make a more comprehensive analysis of the students' chart-reading ability

Acknowledgements

- University of the Philippines - Office of International Linkages
- International Association for Statistical Education (IASE)