

Data Visualization for the New Age:  
**An Experimental Study**  
**Exploring the Merits of Human Perception**  
**on Visualization Techniques**  
**for Improved Statistical Communication**



**Sean Escalante**

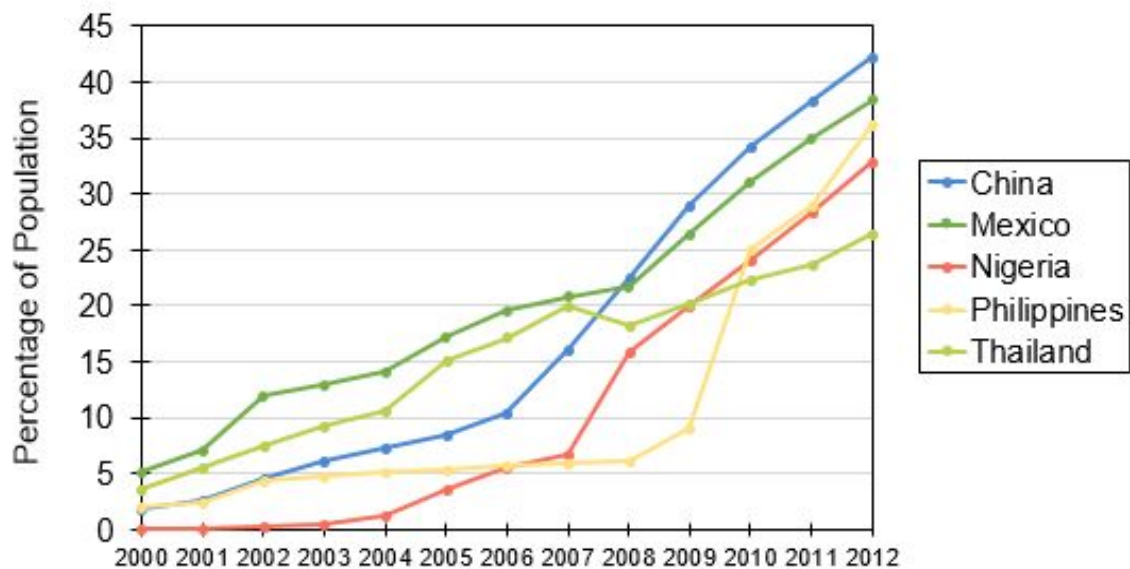
Patricia Rose Donato

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.**

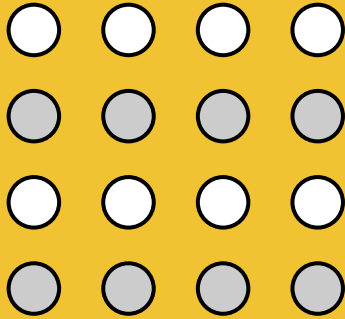
(Pandey, et. al., 2014; Alexandre & Tavares, 2010)

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

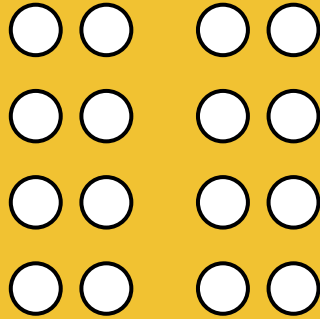
Grounded on the principle that the whole speaks more than its parts



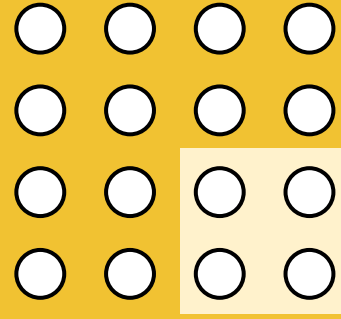
# Gestalt Theories



**Similarity**



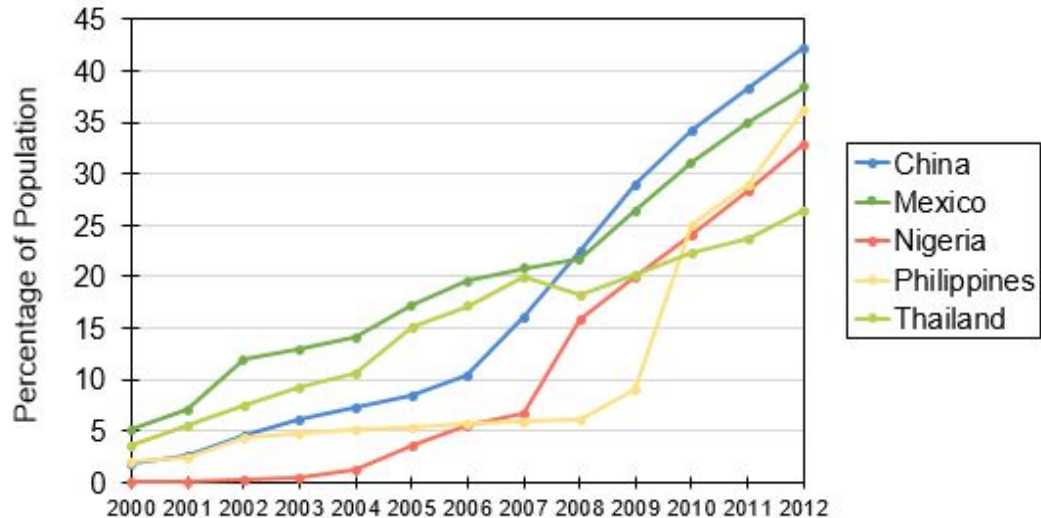
**Proximity**



**Enclosure**

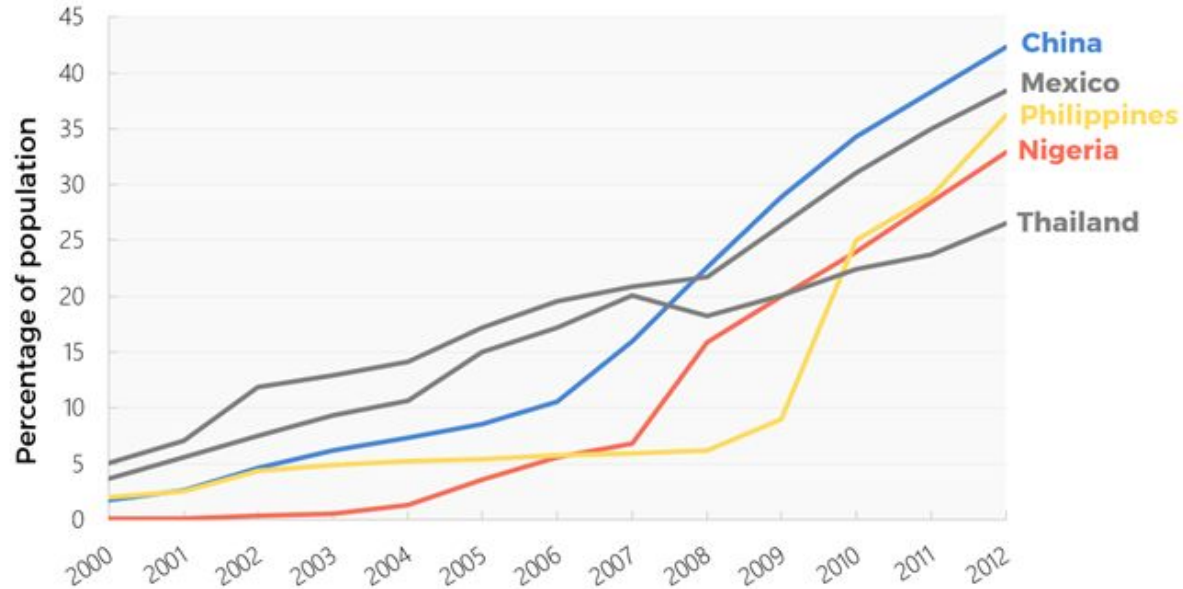
# Standard charts

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



# Enhanced charts

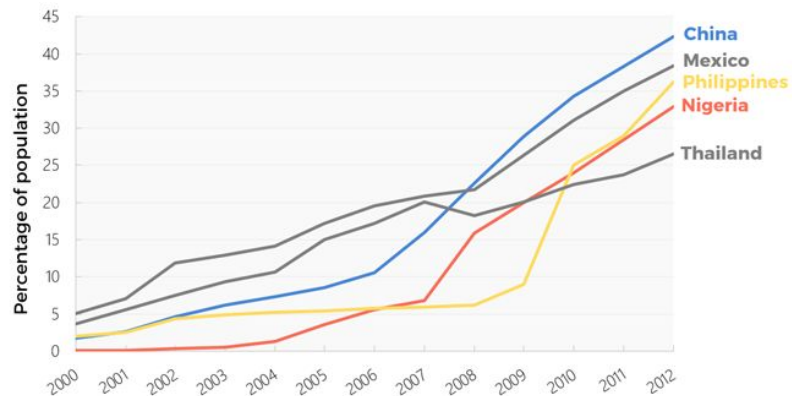
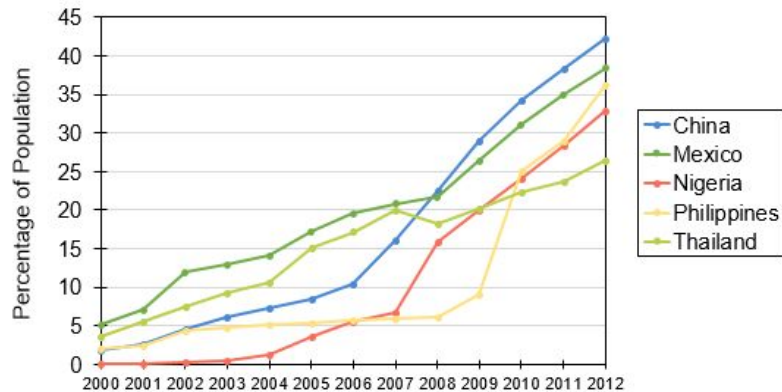
**Percentage of Internet Users in the Population  
by Country (2000-2012)**





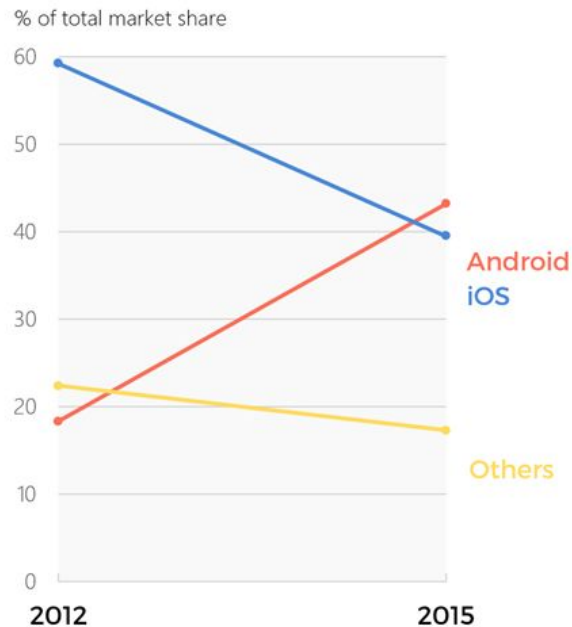
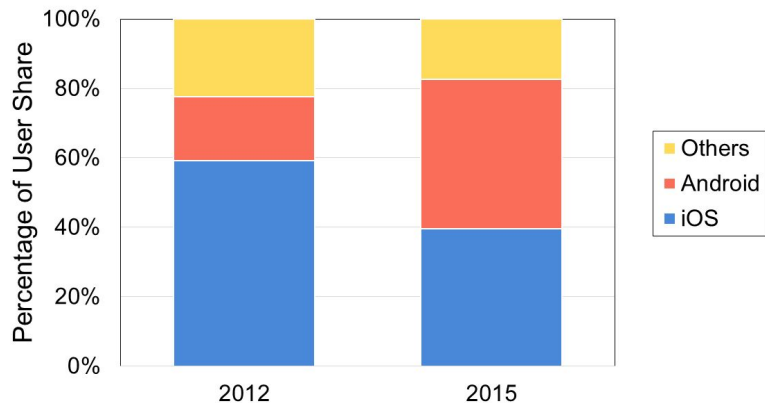
# Enhancing a chart

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



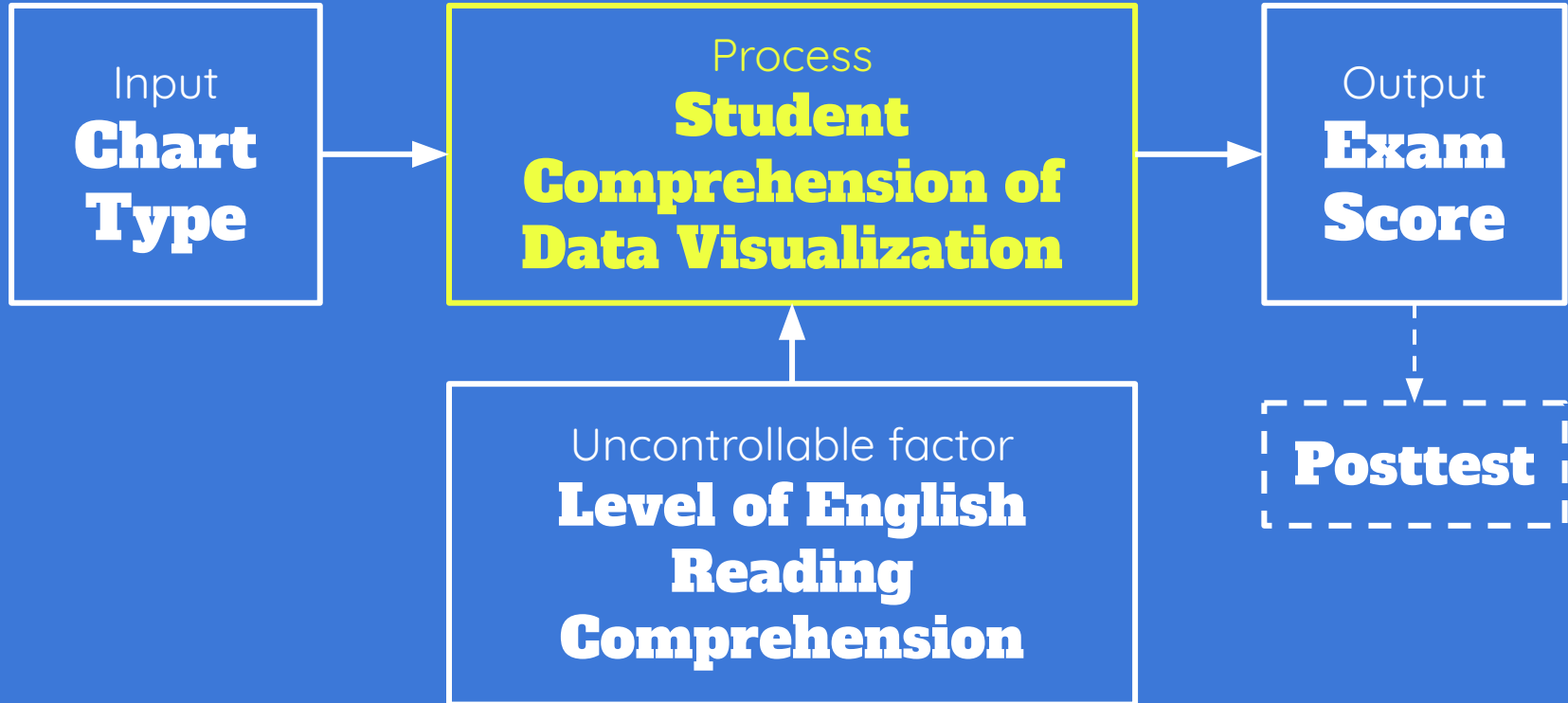
18 ninth grade students divided into 2 groups of 9



Private school in San Juan, Metro Manila, Philippines

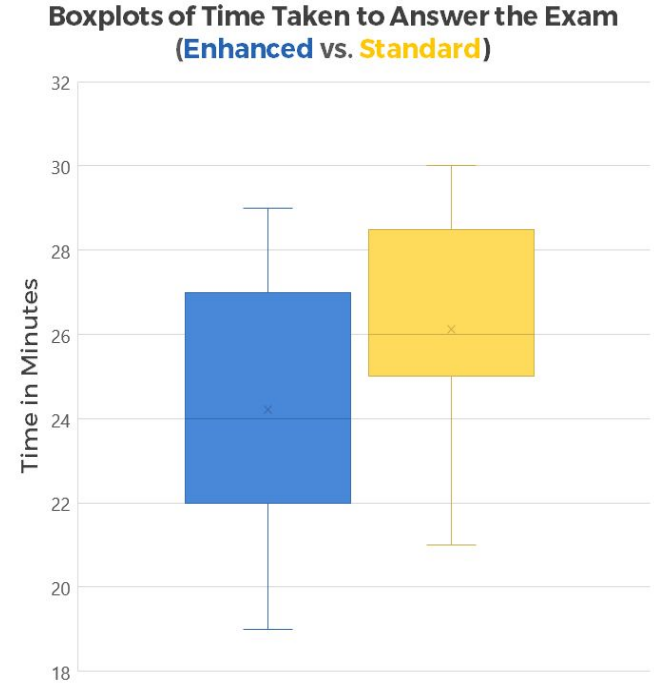
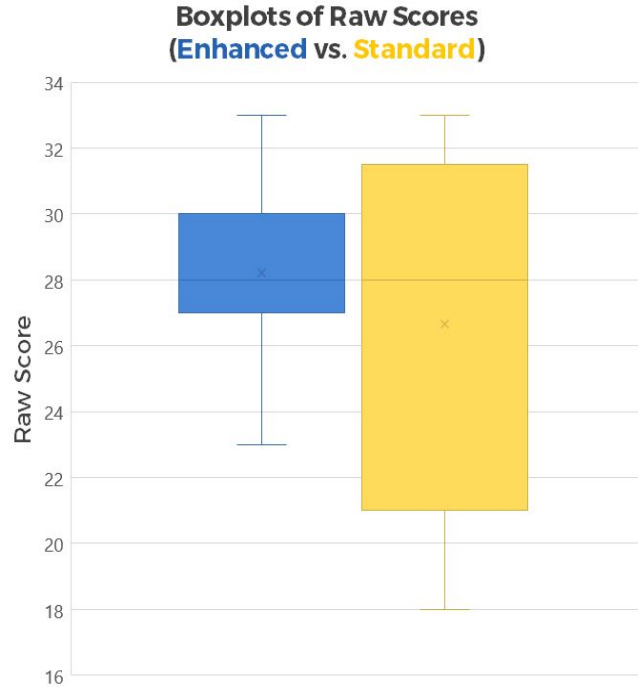
$$\begin{aligned} &\text{Final Score} \\ &= (\% \text{ Correct}) * (1 - W) + (1 - \text{Time Percentile}) * W \end{aligned}$$

# Methodology



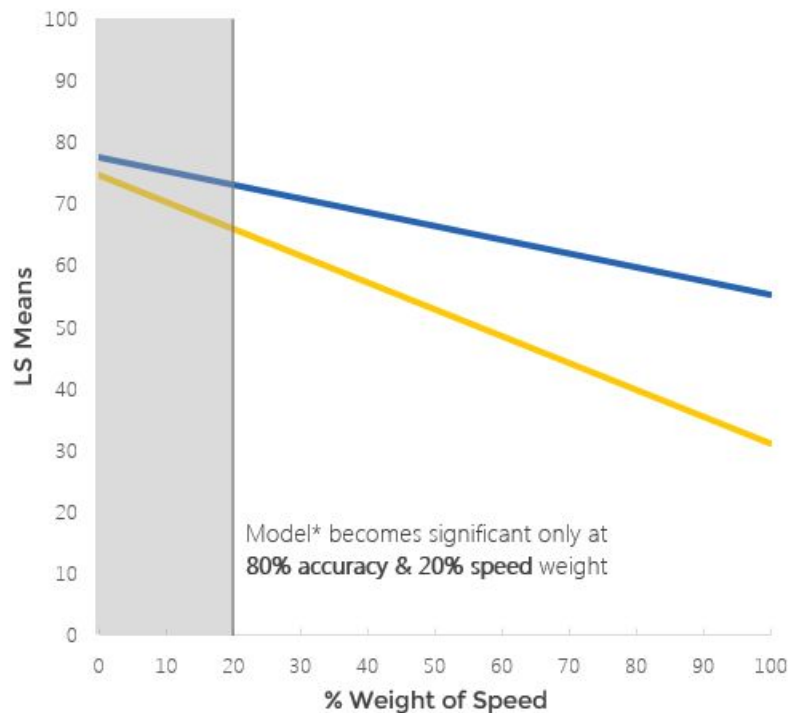
# Discussion of Results

# Differences in raw scores & times



# LS Means: Diverging Performances

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



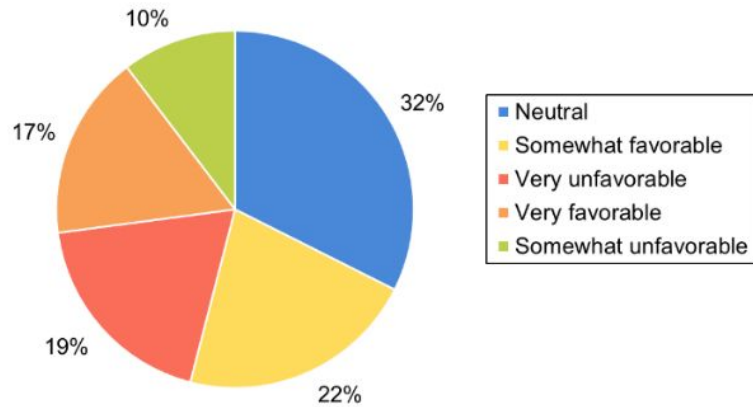
\*Model considers together the significance of model, exam type, and pretest.



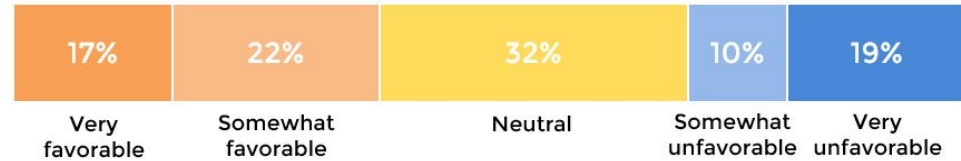
# Enhanced or Standard?

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

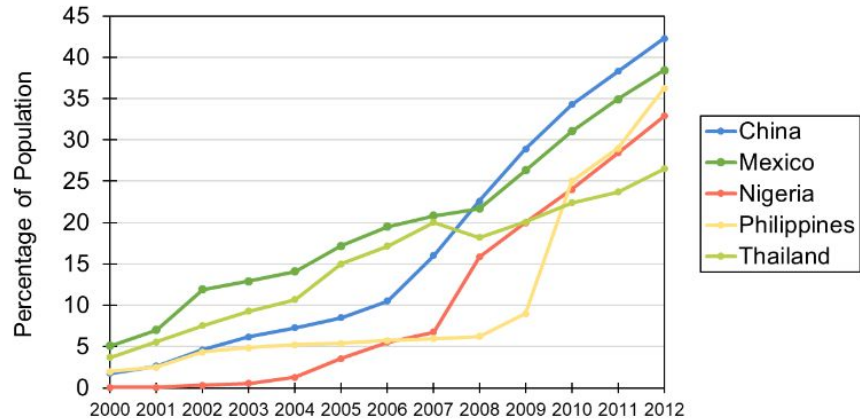
### Emperor Palpatine 's Favorability Ratings by Star Wars Enthusiasts



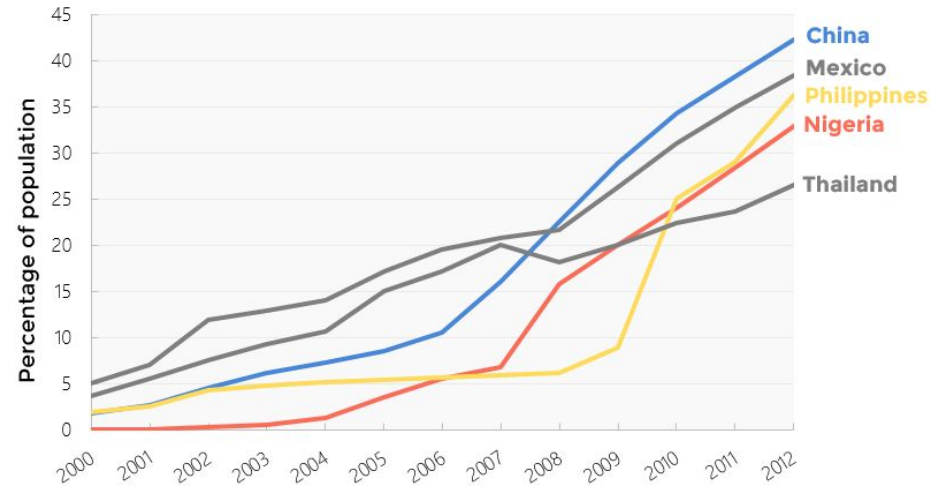
### Emperor Palpatine's Favorability Ratings by Star Wars Enthusiasts



**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)