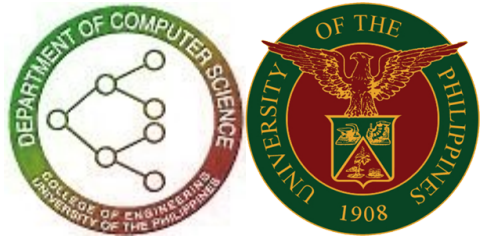
Where Do They Learn?

Investigating the Relationship Between School Facilities and Academic Achievement in the Philippines

Ligaya Leah Figueroa, PhD
llfigueroa@up.edu.ph



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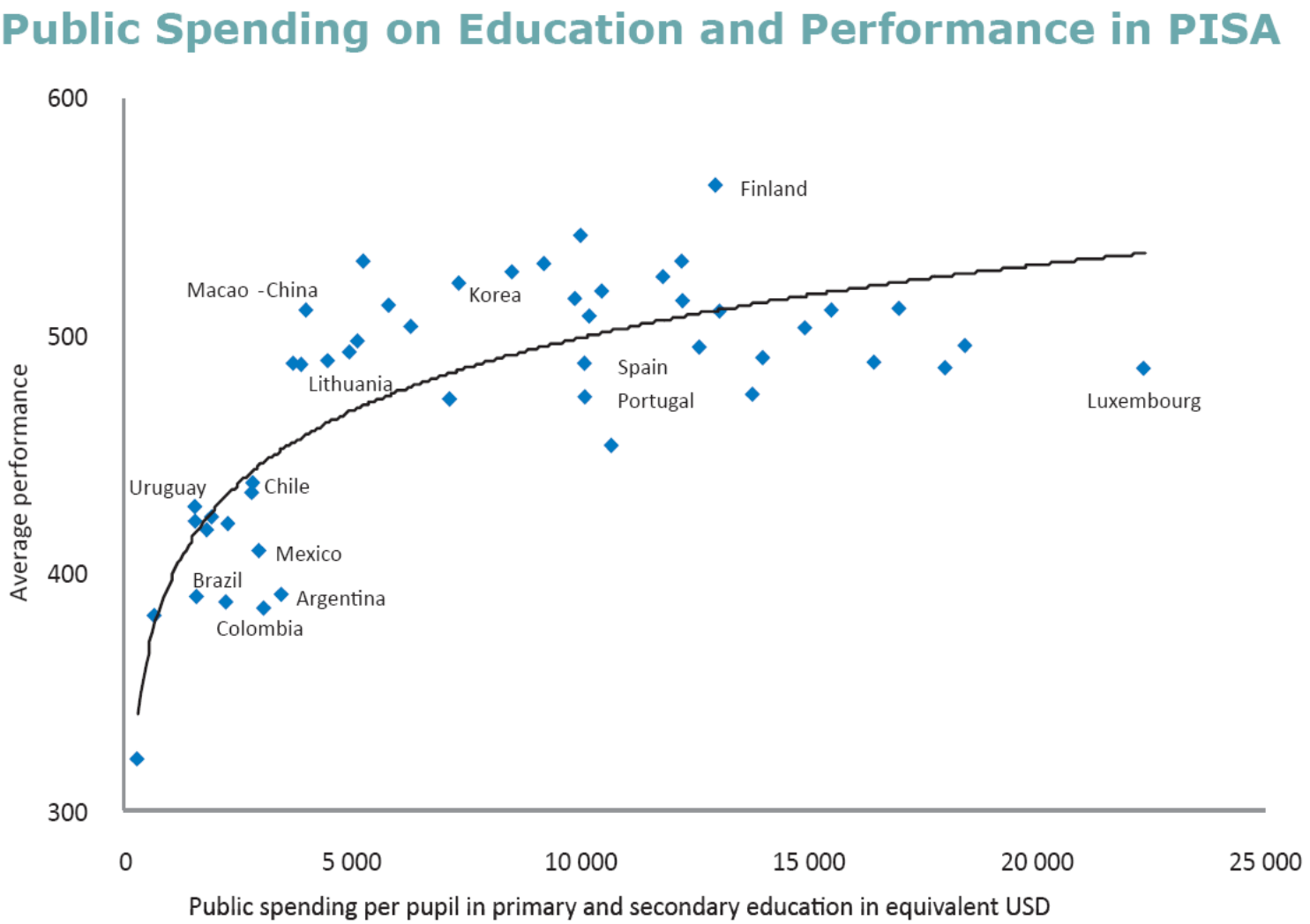
- GeoRabble Sydney

Introduction: Public Education

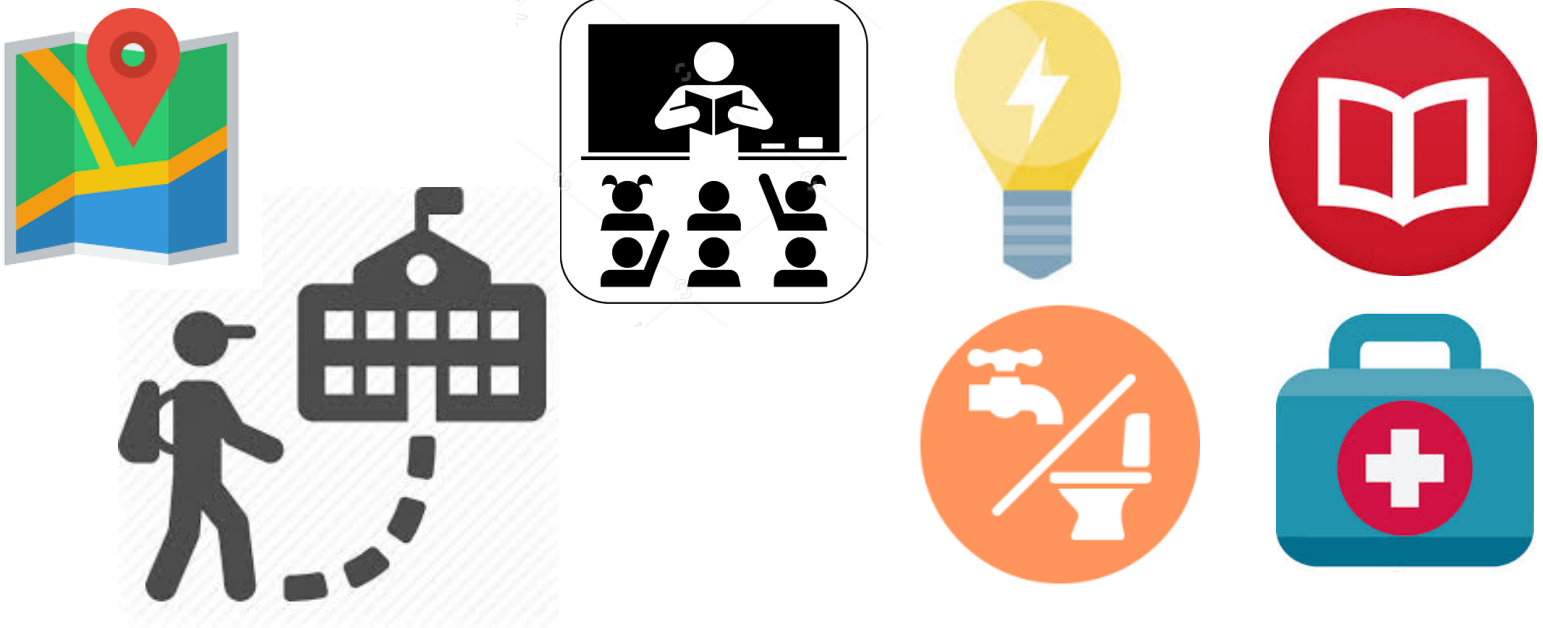


PISA – Programme for International Student Assessment

Image source:
Zoido, P. 2008. Public Spending on Education in Latin America: Does it Pay? Policy Insights, No. 80.
Accessed May 28, 2015. URL: http://www.oecd.org/dev/americas/41588831.gif

Introduction: School Facilities

- Attributes of a school's physical environment: the location, size, capacity, condition of each building; and the available utilities, services and equipment.



Introduction: School Facilities

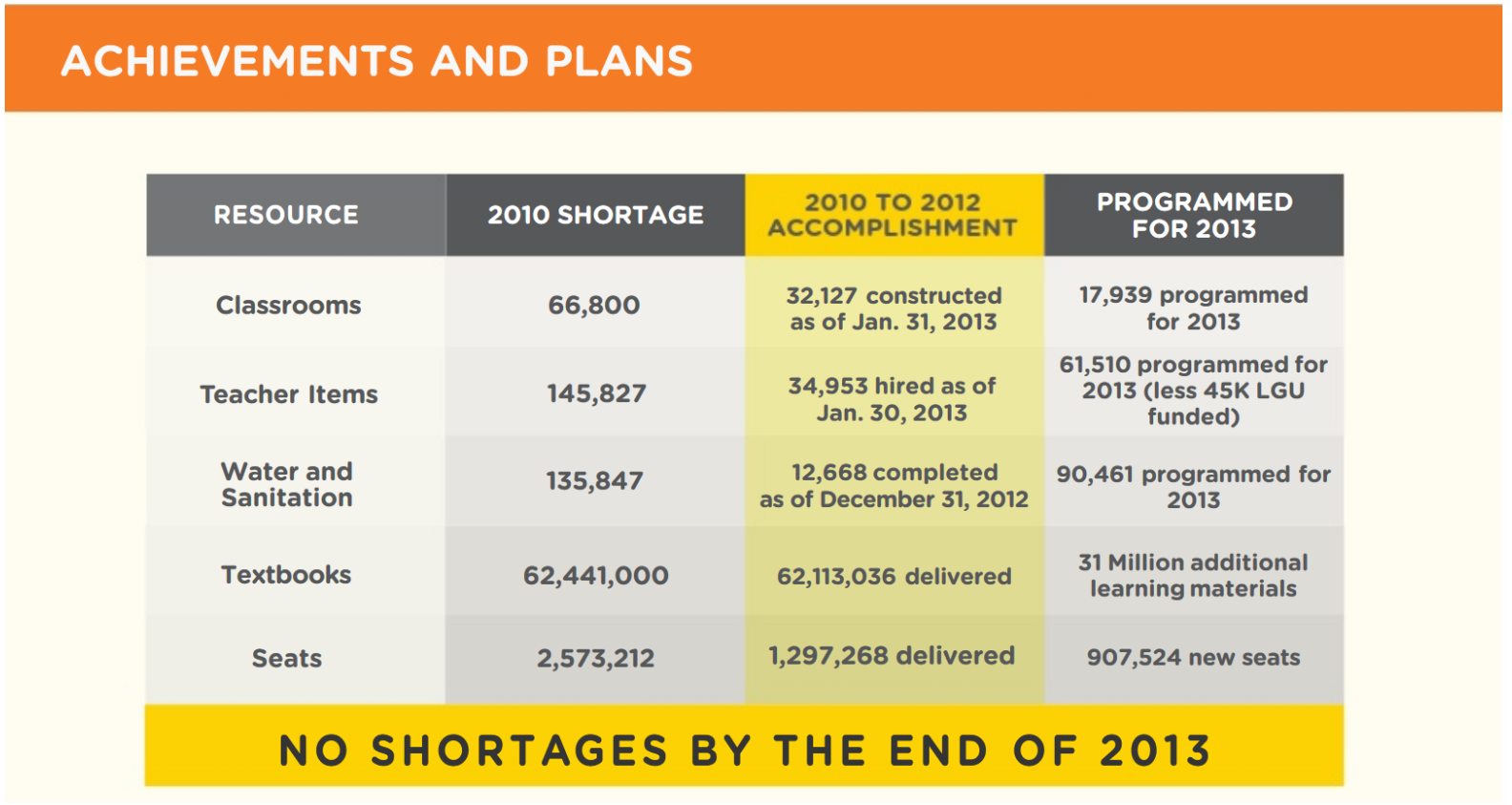
- Several studies confirm the importance of school facilities

Author	Findings
(Harbison and Hanushek, 1992)	Upgrading textbooks and writing materials yield high financial returns
(Glewwe and Jacoby, 1994)	Better school facilities hold students in school longer
(Heneveld and Craig, 1996)	Basic level of school facilities contributes to student learning
(Tan et al., 1997)	Workbooks and classroom furniture give the best payoffs
(Bacolod and Tobias, 2006)	Provision of electricity mattered more than class size or teacher trainings
(Sharon Ghuman, 2006)	Better school facilities had higher enrolments
(Glewwe et al., 2011)	Student learning increased with a fully functioning school

Background: K-12

The Philippines is the last country in Asia, and one of only 3 countries (Angola and Djibouti) worldwide, with a 10-year pre-university cycle.

Background: K-12



ACHIEVEMENTS AND PLANS

RESOURCE	2010 SHORTAGE	2010 TO 2012 ACCOMPLISHMENT	PROGRAMMED FOR 2013
Classrooms	66,800	32,127 constructed as of Jan. 31, 2013	17,939 programmed for 2013
Teacher Items	145,827	34,953 hired as of Jan. 30, 2013	61,510 programmed for 2013 (less 45K LGU funded)
Water and Sanitation	135,847	12,668 completed as of December 31, 2012	90,461 programmed for 2013
Textbooks	62,441,000	62,113,036 delivered	31 Million additional learning materials
Seats	2,573,212	1,297,268 delivered	907,524 new seats

NO SHORTAGES BY THE END OF 2013

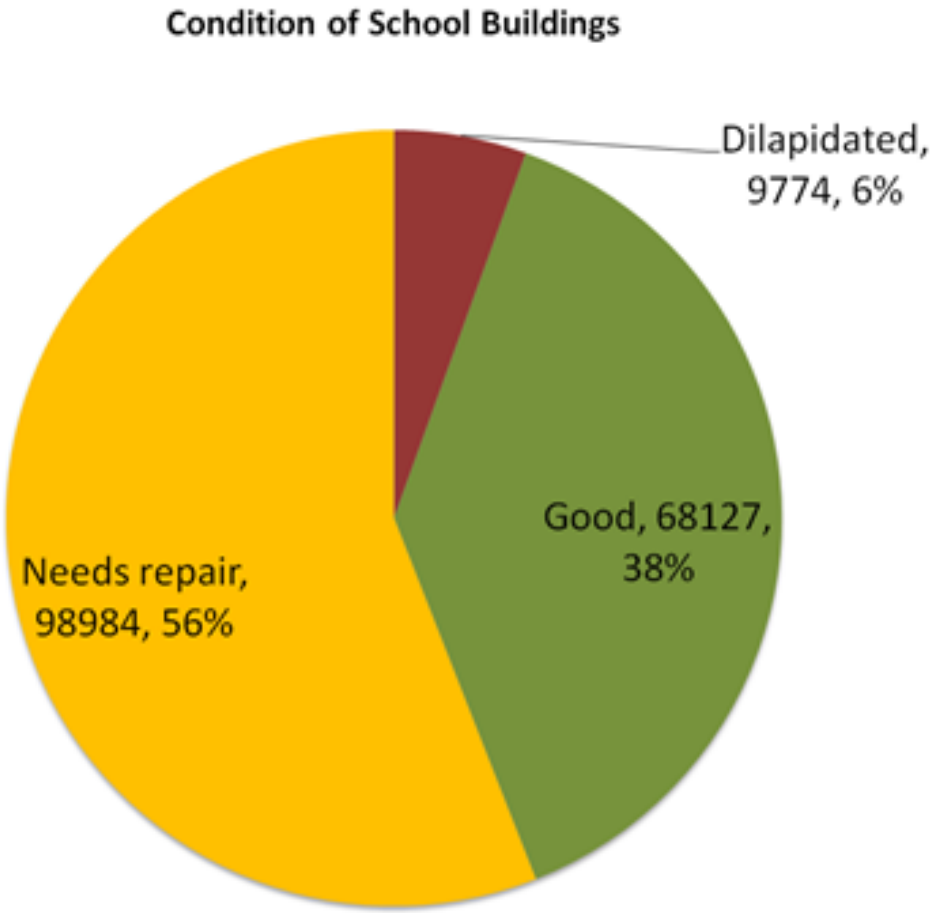
Source: DepEd.gov.ph

Problem

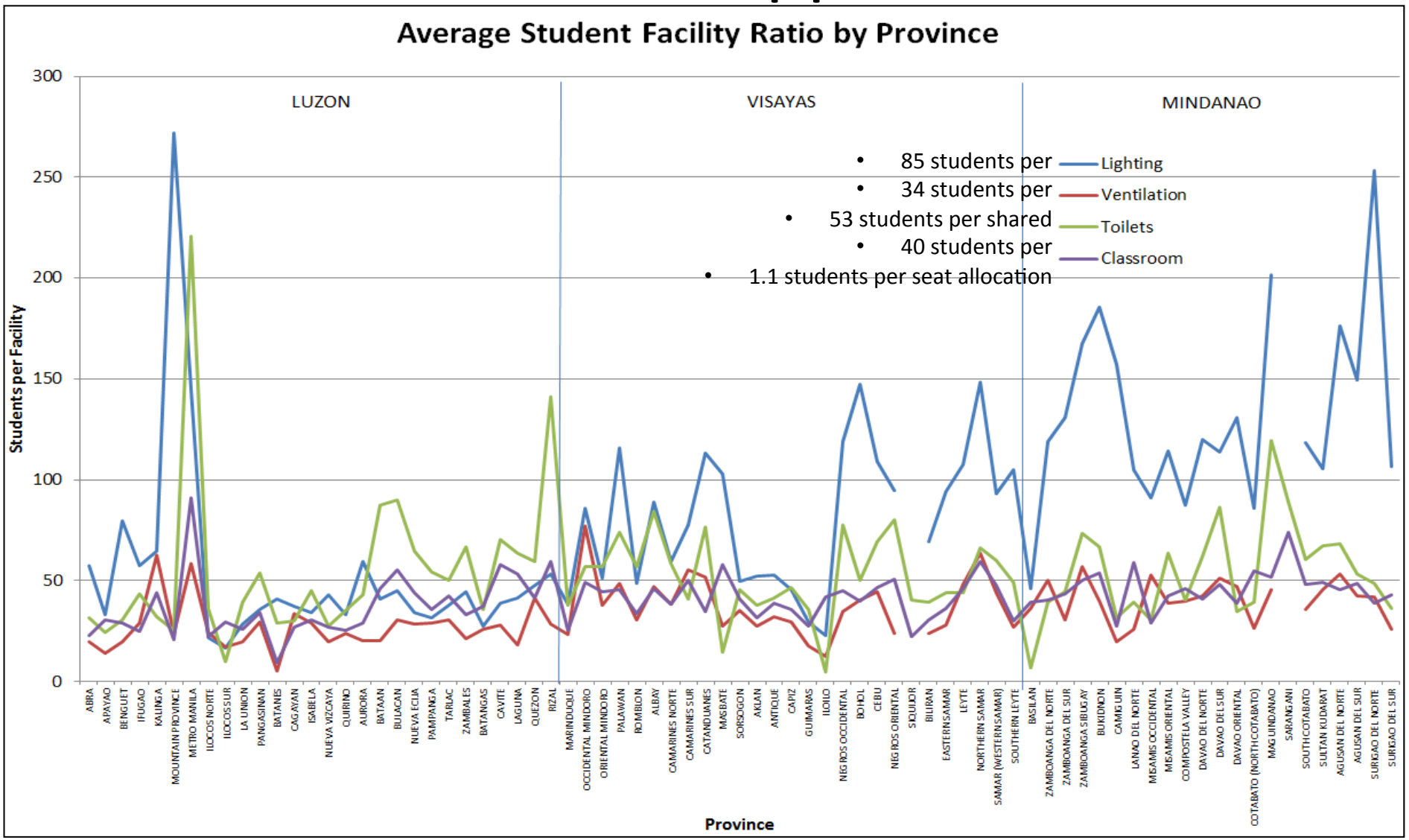
- Do the effects of school facilities vary depending on location?
- At what point is it beneficial to pay attention to the improvement of school facilities in the context of the Philippines? At what point should efforts be directed to other objectives?

Data: Government Primary Schools in the Philippines

- Majority of schools are 2-8kms away from the local town hall
- Bridge crossings and poor road access is common (except in the capital)
- The typical government primary school has:
  - 4 buildings at single level
  - 6 classrooms



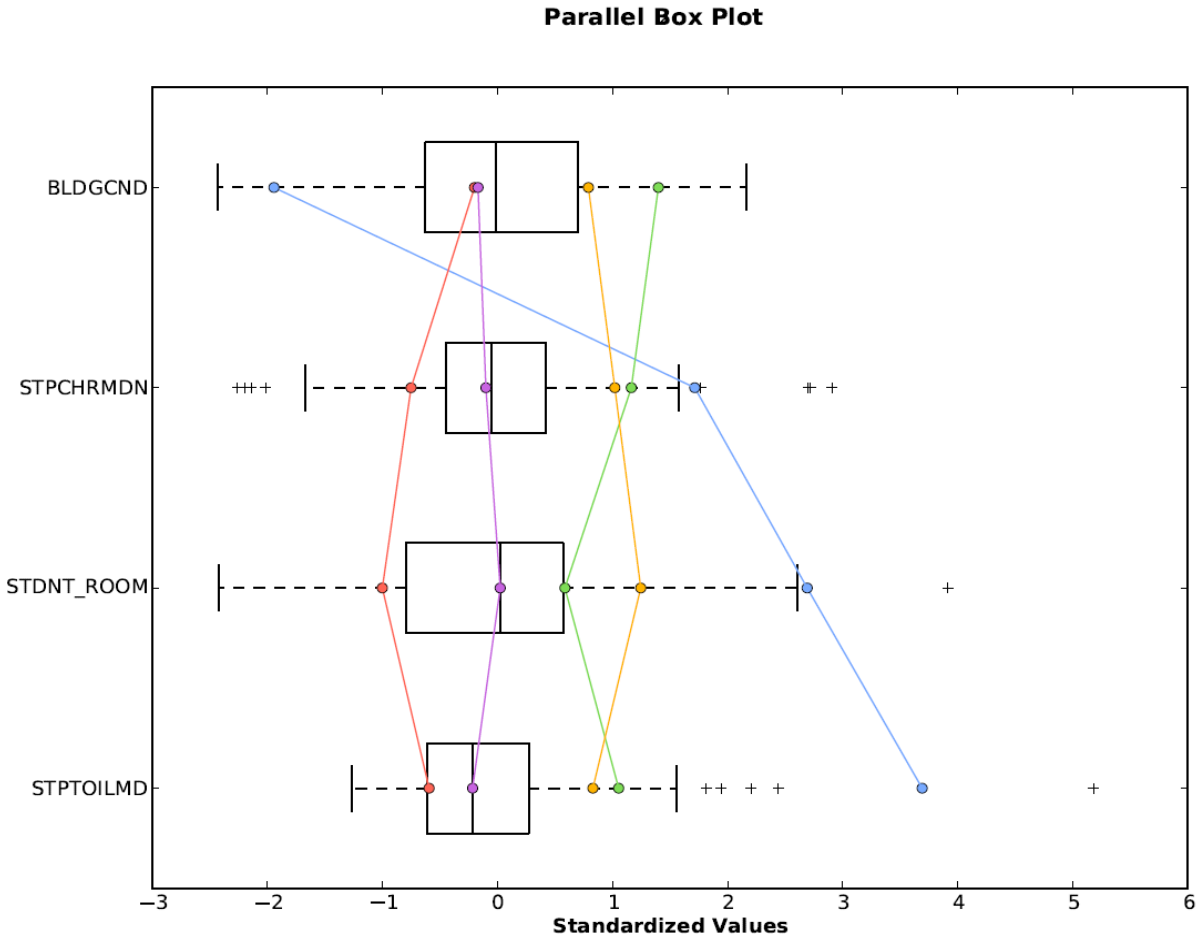
Data: Government Primary Schools in the Philippines

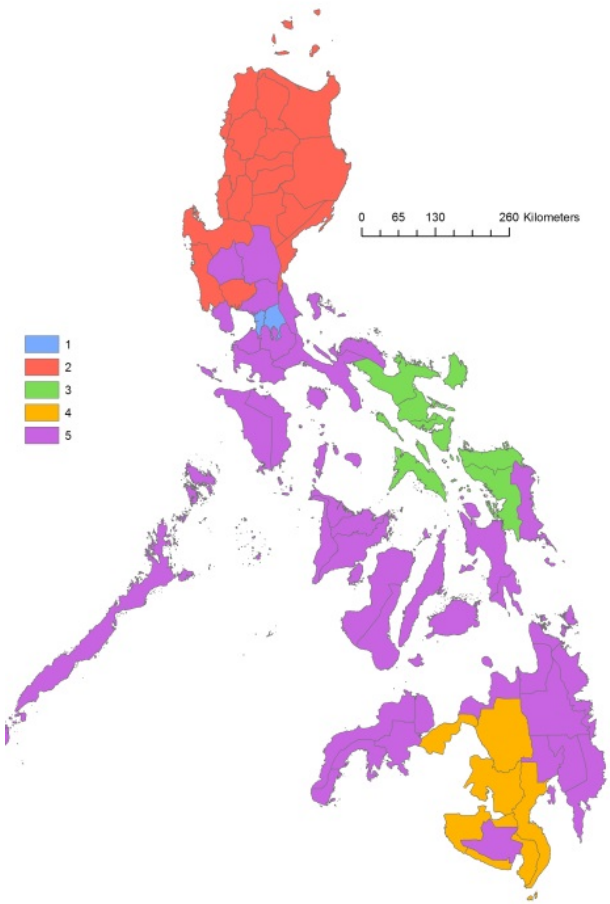


- 85 students per
- 34 students per
- 53 students per shared
- 40 students per
- 1.1 students per seat allocation

Findings

Disparities in Government Primary School Facilities of the Philippines





Esri Grouping Analysis Tool

Effect of School Facilities on Academic Performance in Rural Areas

	OLS	GWR	S-GWR
% Deviance Explained	0.08	0.18	0.18
AICc	4412	4280	**4181**
Bandwidth	NA	431	315
N	3481	3481	3481

GWR 4.0 Regression Modelling

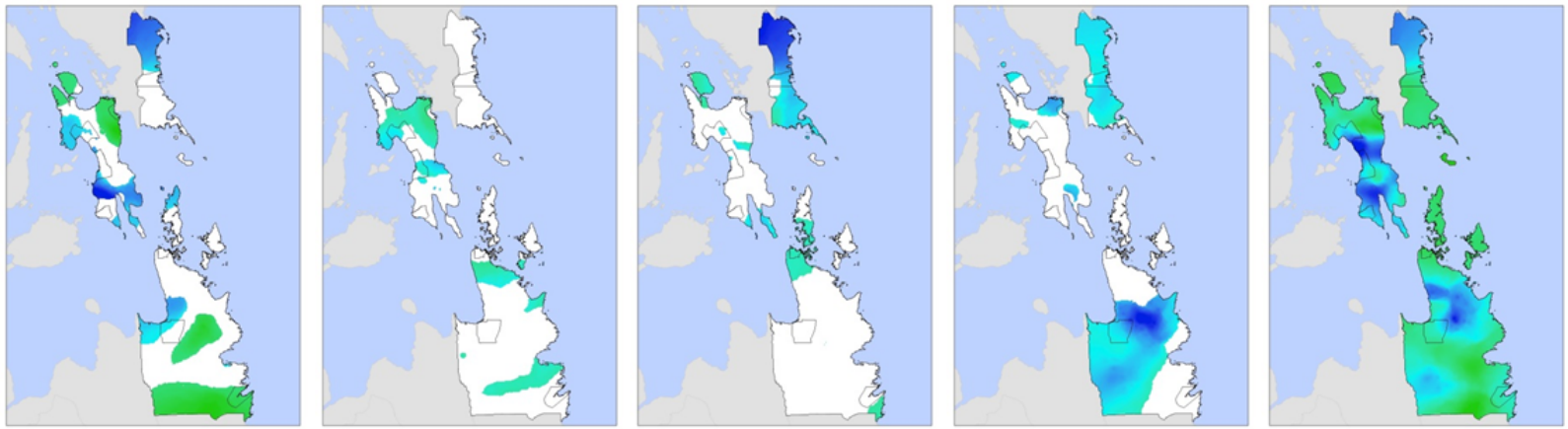
- Ordinary Least Squares
- Geographically Weighted Regression

Semi-parametric Geographically Weighted Regression

Effect of School Facilities on Academic Performance in Rural Areas

Spatial distribution of the spatially varying S-GWR coefficients with significant t-values

Intercept | Rooms | Buildings | Utilities | Spatial distribution of localpdev

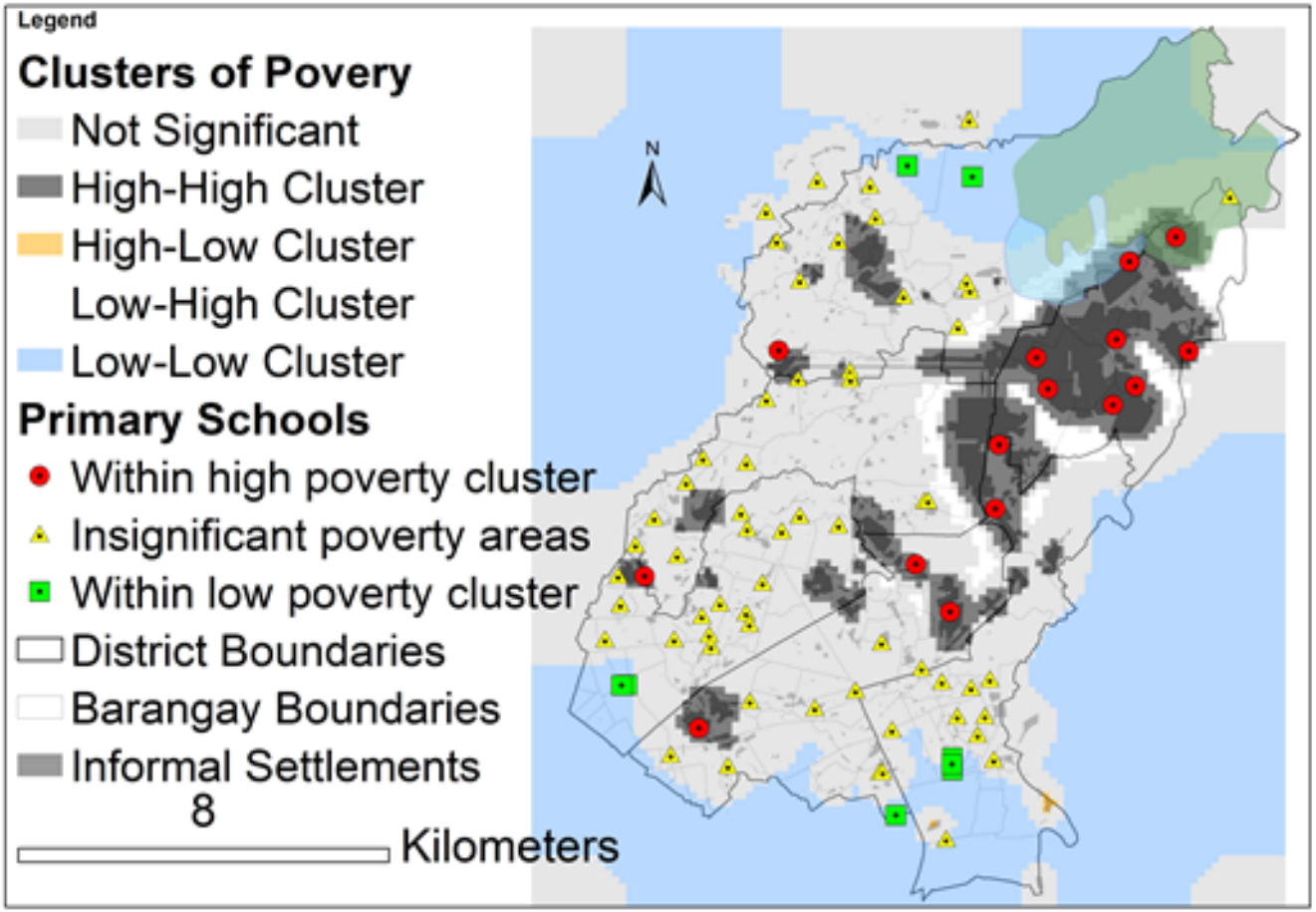


$$TopSch_i = \sum a_0(u_i) + \sum a_1(u_i)\, Room_i + \sum a_2(u_i)\, Building_i + \sum a_3(u_i)\, Utilities_i - 0.147\, Service_i - 0.035\, Proximity_i + 0.036\, Road_i + 0.007\, ToiletP_i + 0.203\, ExcessTchr_i,$$

Blue - high
Green – low
White – not significant

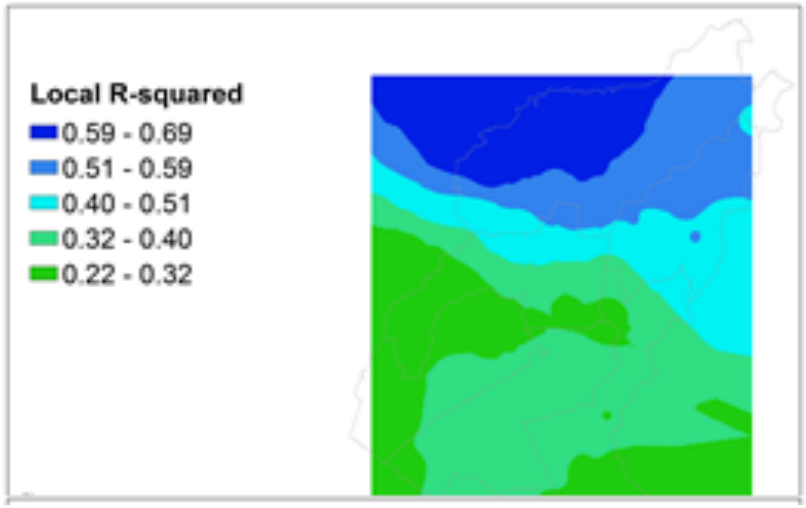
Effect of School Facilities on Academic Performance in Urban Areas

Poverty clusters identified through kernel density estimation (KDE) and local Moran's I (LISA)

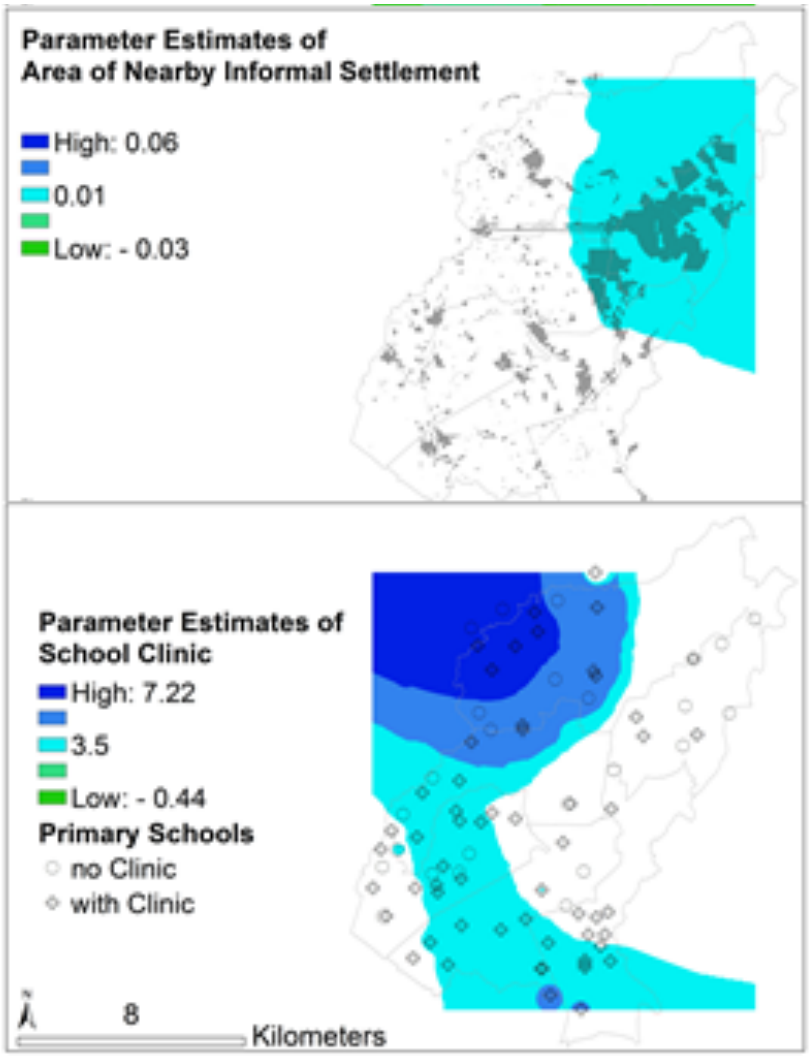


Effect of School Facilities on Academic Performance in Urban Areas

The spatial variation of R^2 and the spatially varying parameters from SGWR modelling



$$Math_i = 83.69 - 0.08Teacher_i + 0.17Room_i - 0.39BC_i + \sum \alpha_4(x_i, y_i)Clinic_i + \sum \alpha_5(x_i, y_i)IS_i$$



The mapping technique for presenting GWR results is adapted from Matthews and Yang (2012).

Conclusion

- Do the effects of school facilities vary depending on location?
  - Yes, the influence of school facilities on academic performance varies depending on human capabilities in the district.
    - Basic utilities like electricity, water and sanitation should be prioritized in rural or far-flung schools where these facilities are deficient.
    - School services like health clinics should be prioritized in urban areas.
  - However, smaller class sizes and more toilet facilities are associated with better academic performance regardless of location.

Conclusion

- Do the effects of school facilities vary depending on location?
  - The government should address disparities in the provision of school facilities by:
    - reducing overcrowding in the capital, and
    - providing funds for the repair and upkeep of schools when they are converted to evacuation centres.

Conclusion

- At what point is it beneficial to pay attention to the improvement of school facilities in the context of the Philippines?
  - Basic school facilities and services have the greatest effect on academic performance in communities that lack these services.

Limitations

- It should be noted that the effect of school facilities is generally miniscule in comparison to family characteristics especially among younger pupils as demonstrated by the research of Hanushek and Luque (2003).

- Variables that influence student learning and engagement (e.g., textbooks, school administration and teacher quality, sense of community) was not used in this research. Based on other papers, these variables also have an effect on academic performance.

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