Socioeconomic Status at Age One, Opportunities to Learn and Achievement in Mathematics Ten Years Later: A Study in Peru
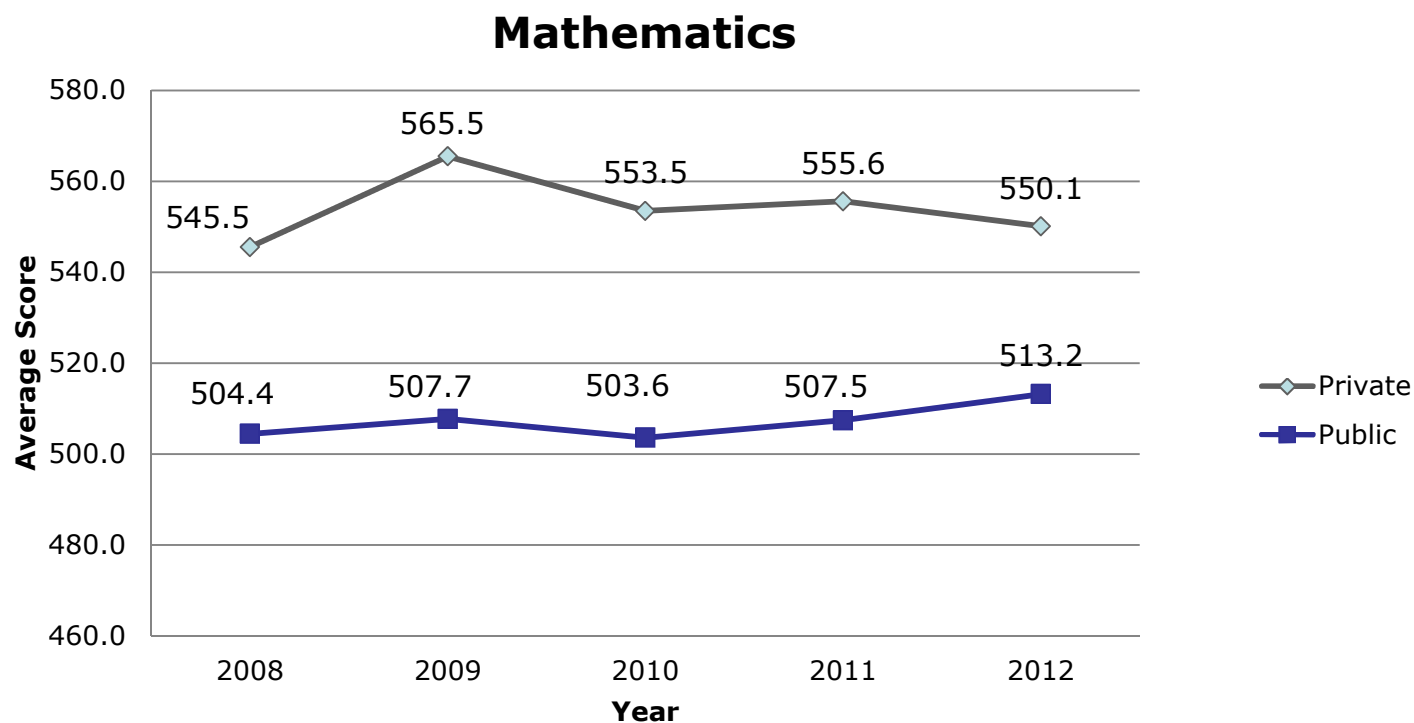
Santiago Cueto

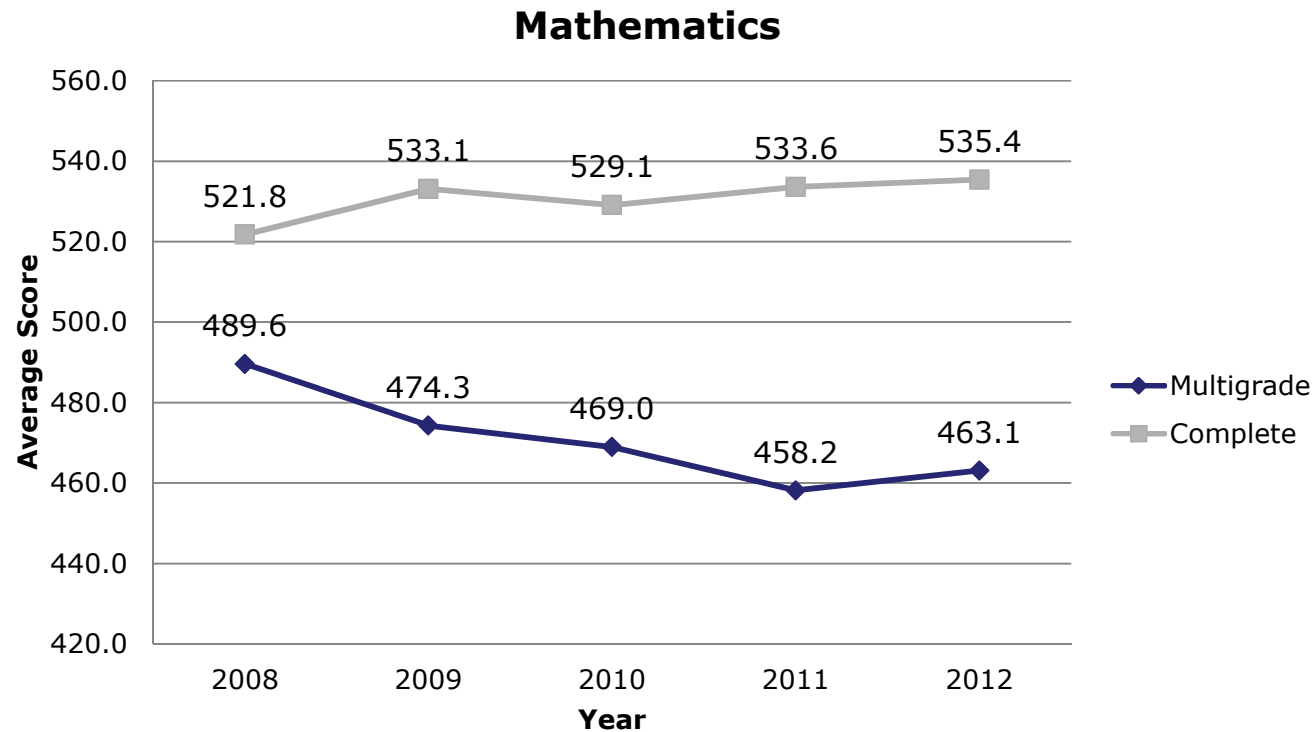GRADE - Young Lives (Peru)

Census evaluation of student achievement (2nd grade)
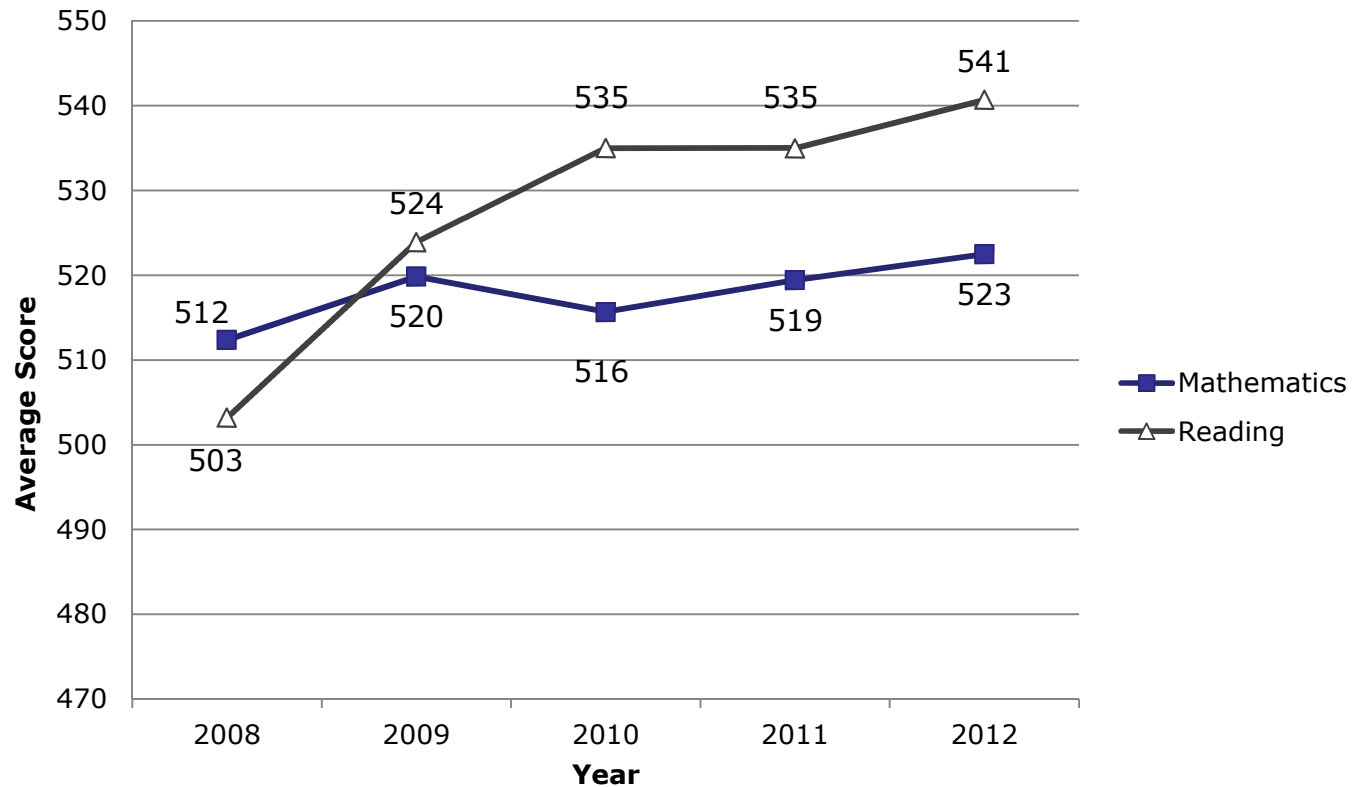
September, 2013

Census evaluation of student achievement by type of school

Mathematics

September, 2013

Census evaluation of student achievement by type of school

Mathematics

Average scores by year and school type:

Year	Multigrade	Complete
2008	489.6	521.8
2009	474.3	533.1
2010	469.0	529.1
2011	458.2	533.6
2012	463.1	535.4

September, 2013

Fourth grade evaluation at Bilingual Intercultural schools

Reading Comprehension in native language

	Aimara	Shipibo	Awajún	Quechua
Level 2 (Adequate)	4.0	3.6	5.1	11.0
Level 1 (In process)	40.3	10.7	21.1	44.1
< Level 1 (Starting)	55.7	85.7	73.8	44.8

Niños del Milenio
Información para el desarrollo

September, 2013

Young Lives
An International Study of Childhood Poverty
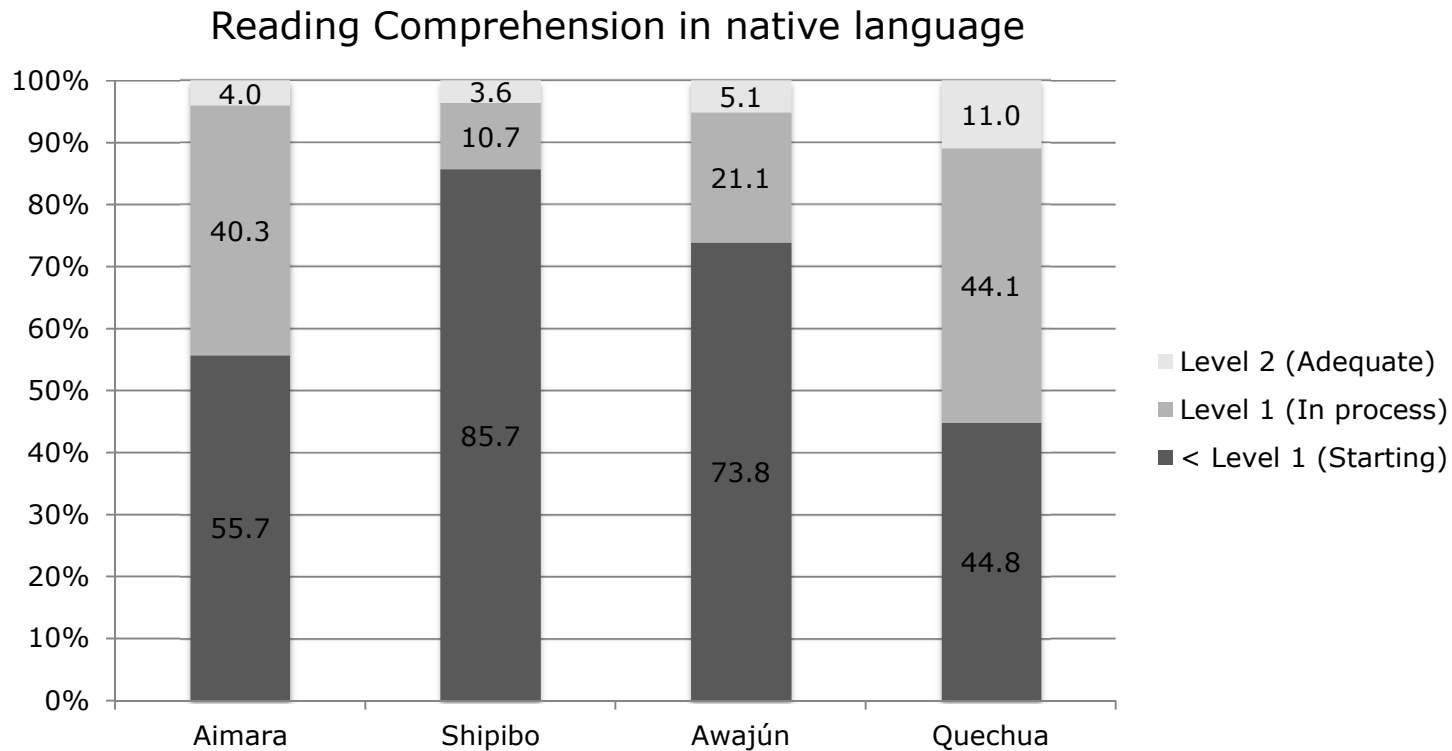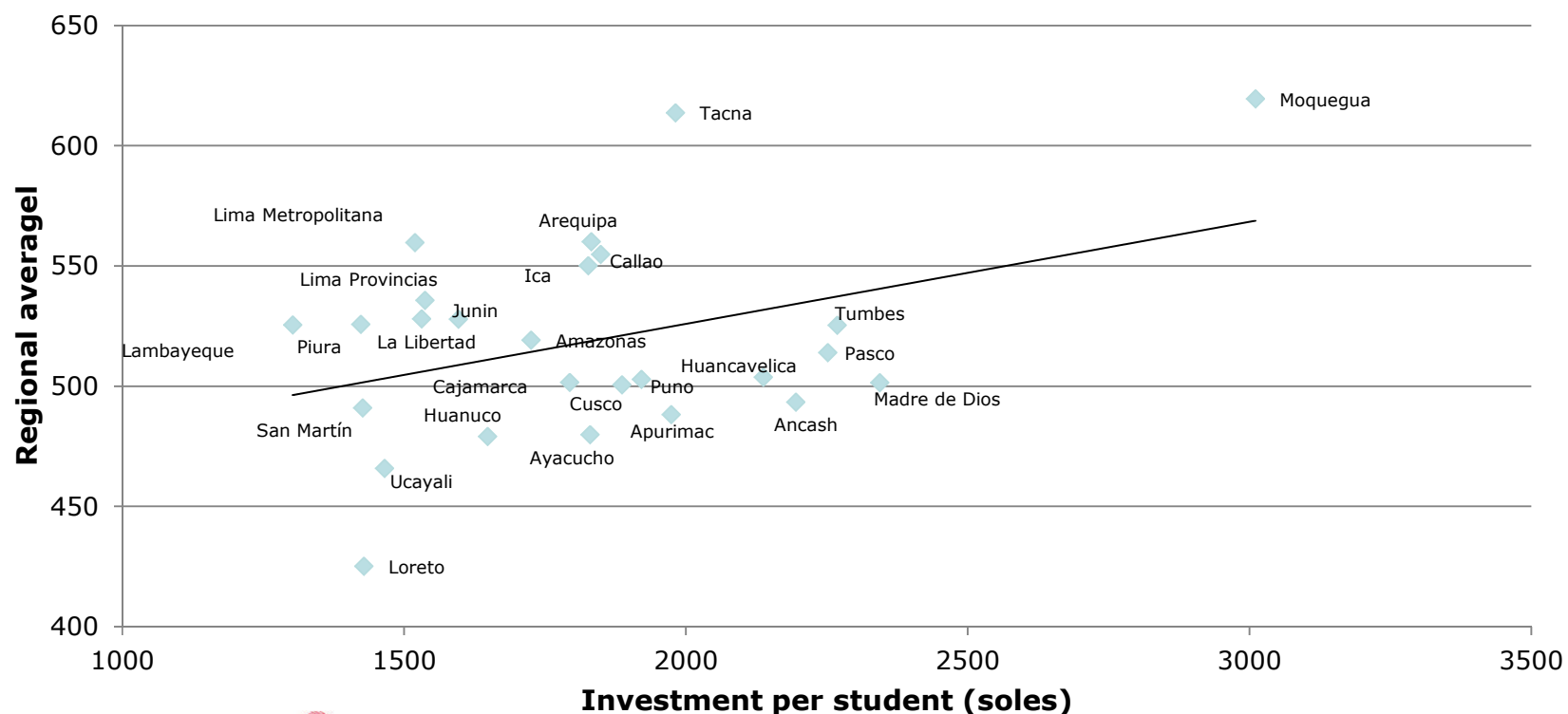
Relationship between regional average in reading and poverty rate (2012)

(r= -0.67)

September, 2013
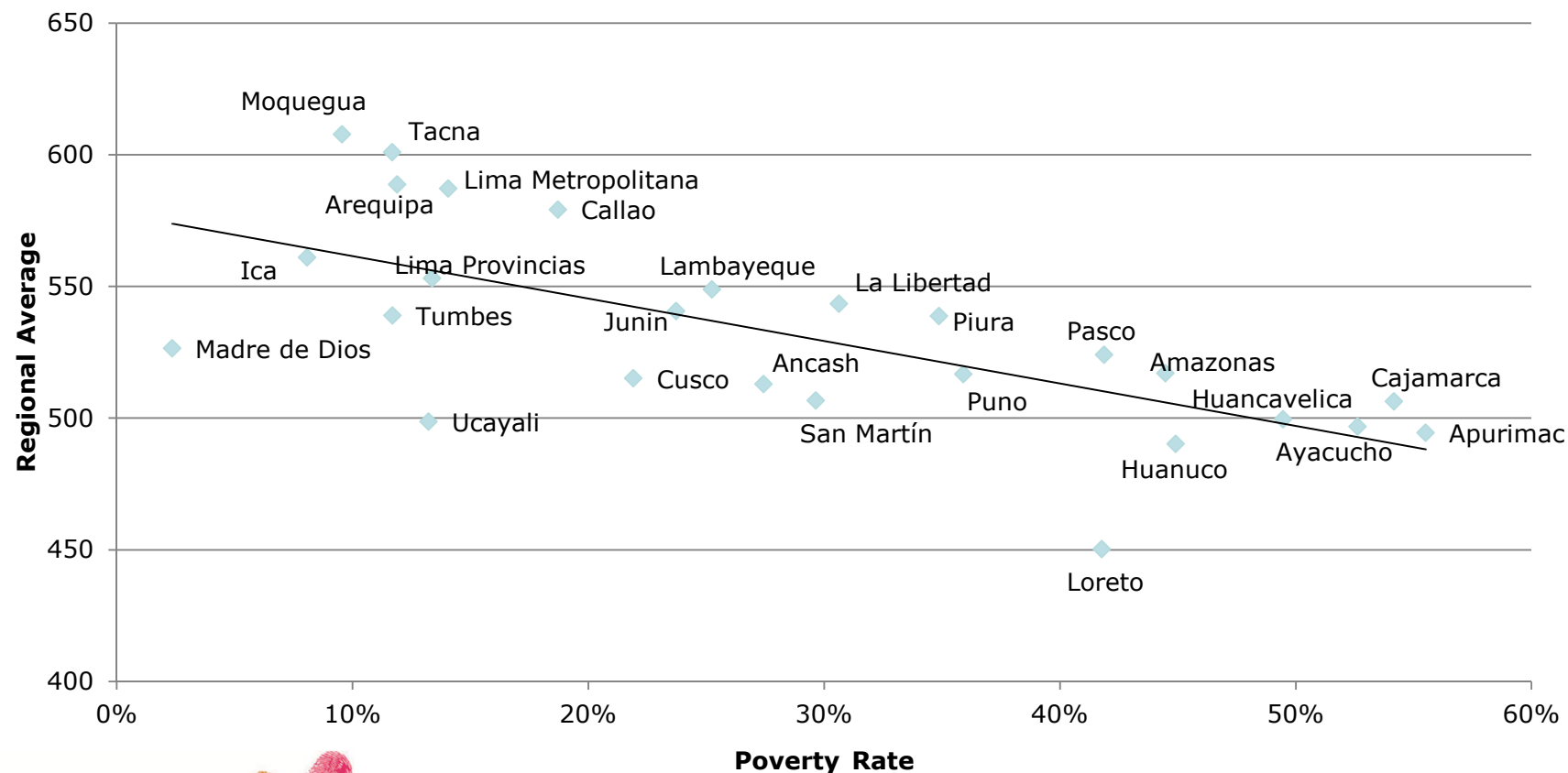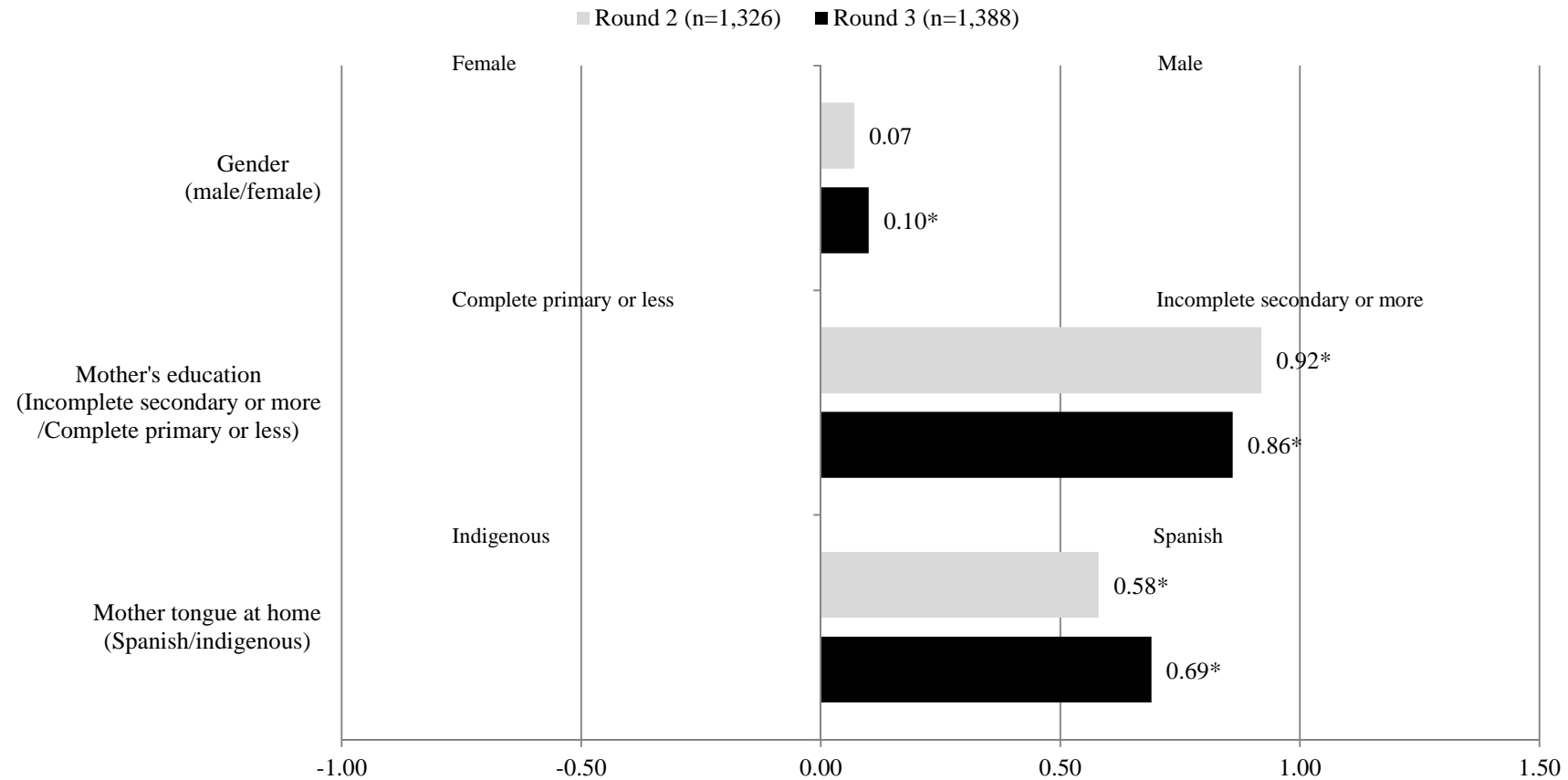
Relationship between regional average in reading and public investment (2012)

(r= 0,38)

Achievement gaps over time in the PPVT (R2 and R3)

Round 2 (n=1,326)   Round 3 (n=1,388)

*The gap between groups is significant at 5% according the t-test for independent samples

Opportunities to Learn (OTL)

- We use a longitudinal household survey carried out in Peru (Young Lives) in combination with recently collected information within the same study on some of the educational processes occurring in primary schools, in order to analyze factors related to OTL.

September, 2013

Sample by type of school

Mathematics notebooks and workbooks were collected and photocopied from up to two randomly selected YL children in fourth grade per school, towards the end of the 2011 school year.

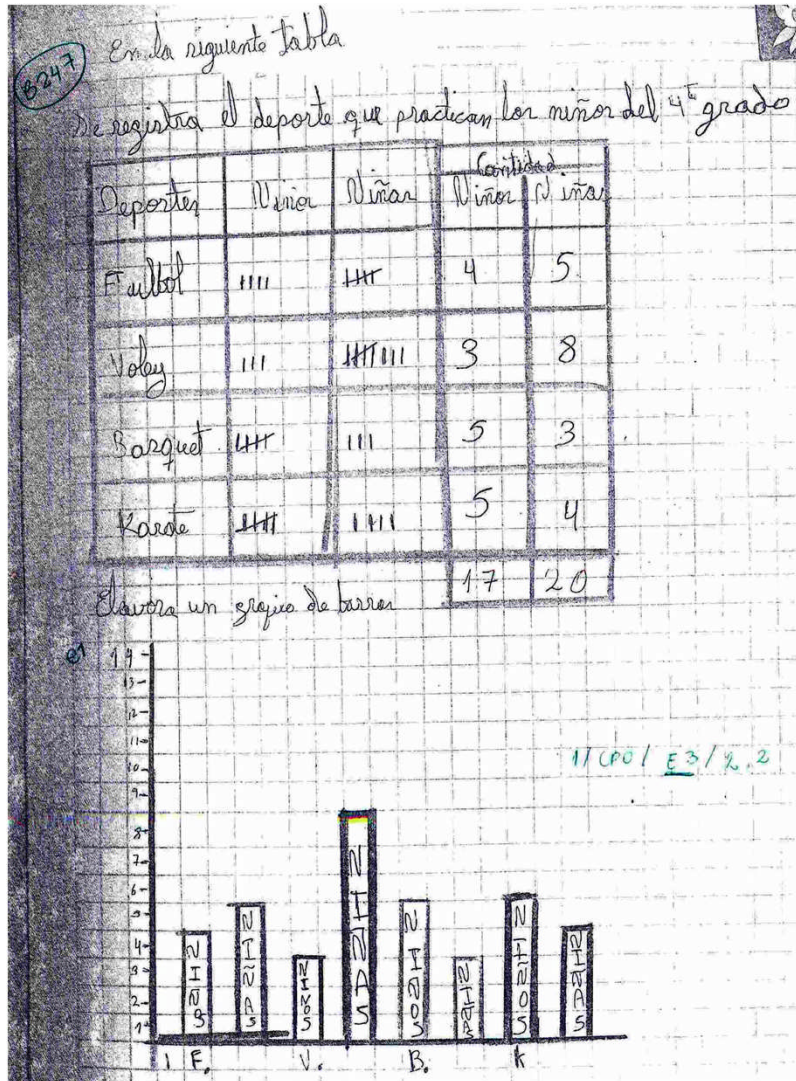|	Children		School	
	n	%	n	%
Private	17	16	13	20
Urban Public	48	46	29	44
Rural Public	12	12	7	10
EIB Rural Public	27	26	17	26
Total	104	100	66	100

Students' characteristics by SES

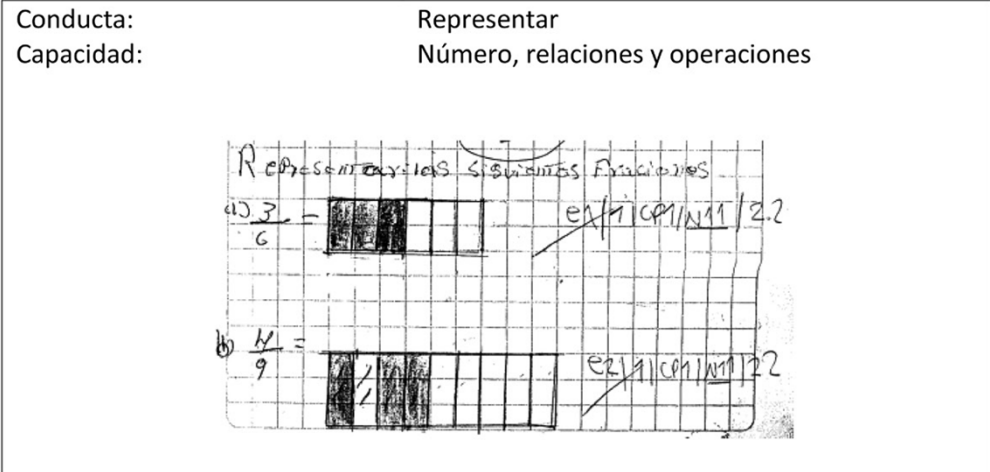|	First tercile	Second tercile	Third tercile
Indigenous mother tongue (%)	32.4	23.5	0.0
	(47.5)	(43.1)	(0.0)
CDA standardised score (round 2)	276.0	287.2	318.4
	(57.8)	(42.9)	(49.3)
Mother has complete secondary (%) (round 2)	5.9	23.5	73.5
	(23.9)	(43.1)	(44.8)
Father has complete secondary (%) (round 2)	26.5	38.2	76.5
	(44.8)	(49.3)	(43.1)
Wealth index (round 1)	0.2	0.4	0.6
	(0.1)	(0.1)	(0.1)
Wealth index (round 3)	0.4	0.5	0.7
	(0.1)	(0.2)	(0.1)
Observations	34	34	34

School characteristics by SES

	First tercile	Second tercile	Third tercile
Public	100.0	91.2	58.8
Rural	73.5	38.2	0.0
EIB Rural Public	50.0	26.5	0.0
Infrastructure			
Library (%)	41.2	44.1	55.9
Computer lab (%)	32.4	52.9	79.4
Playground/field (%)	41.2	61.8	47.1
Basic services			
Electricity (%)	91.2	94.1	100.0
Piped water (%)	41.2	70.6	100.0
Sewage (%)	11.8	58.8	100.0
Telephone (%)	14.7	35.3	91.2
Internet (%)	20.6	35.3	88.2
Observations	34	34	34

Analysis of students´ notebooks: Knowing facts and procedures (i)

Numeracy

Geometry

Students´notebooks: Using concepts (ii)

Statistics

Conducta:	Representar
Capacidad:	Número, relaciones y operaciones

Numeracy

Students´notebooks: Solving routine problems (iii)

Measurement

Statistics

Students´notebooks: Reasoning (iv)

2 Descubre el patrón y continúa cada sucesión.

¿Son crecientes o decrecientes?

3; 5; 7; [9] ; [11] ; [13] ; [15]

1; 3; 9; [27] ; [81] ; [243] ; [729]

3; 6; 12; [24] ; [48] ; [96] ; [192]

Son sucesiones _____

25; 23; 21; [ ] ; [ ] ; [ ] ; [ ]

35; 31; 27; [ ] ; [ ] ; [15] ; [ ]

320; 160; 80; [ ] ; [ ] ; [ ] ; [5]

Son sucesiones _____

Analiza y aplica

Numeracy

Level of cognitive demand of mathematics exercises by SES
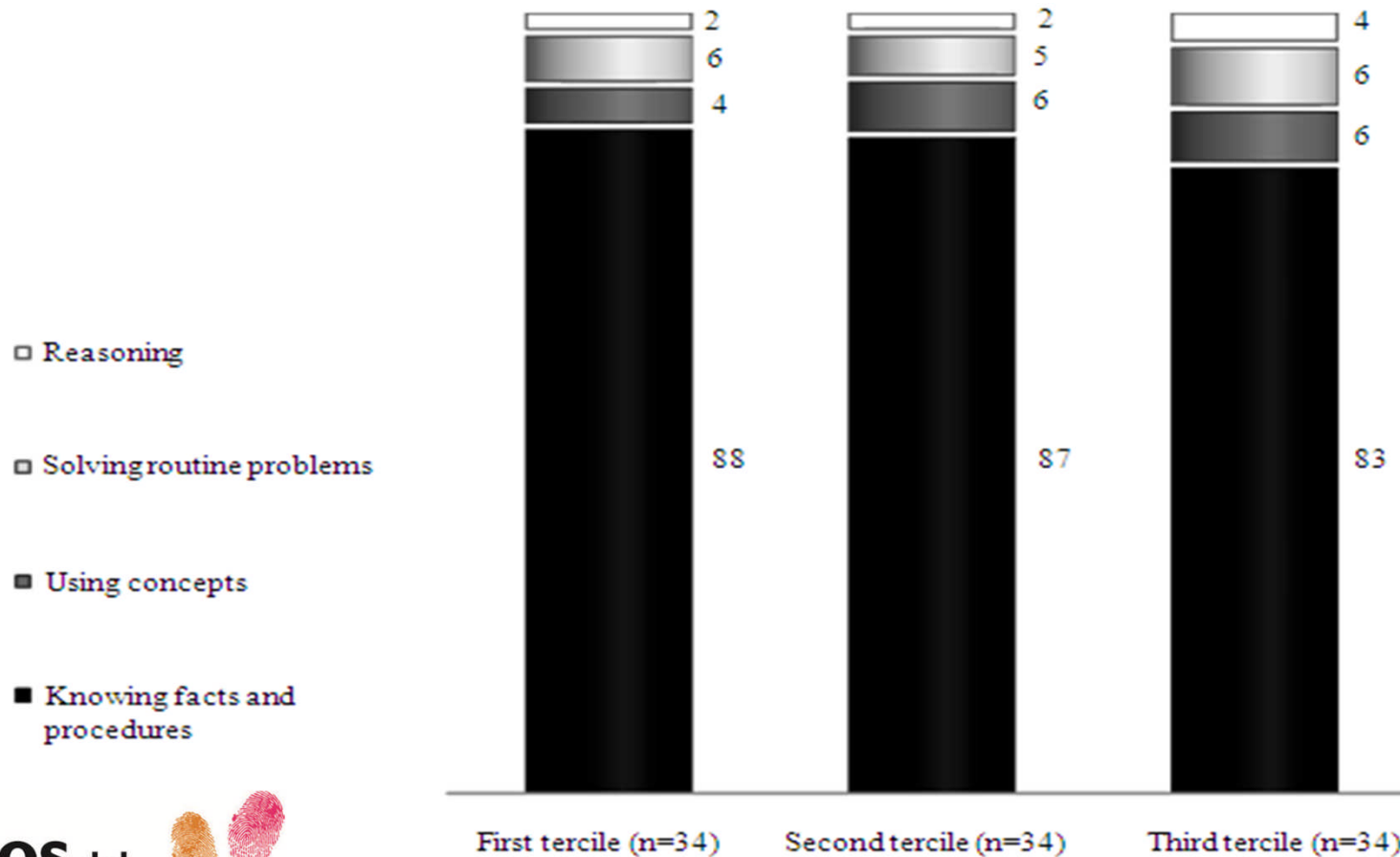
Number of mathematics exercises by content and SES

September, 2013
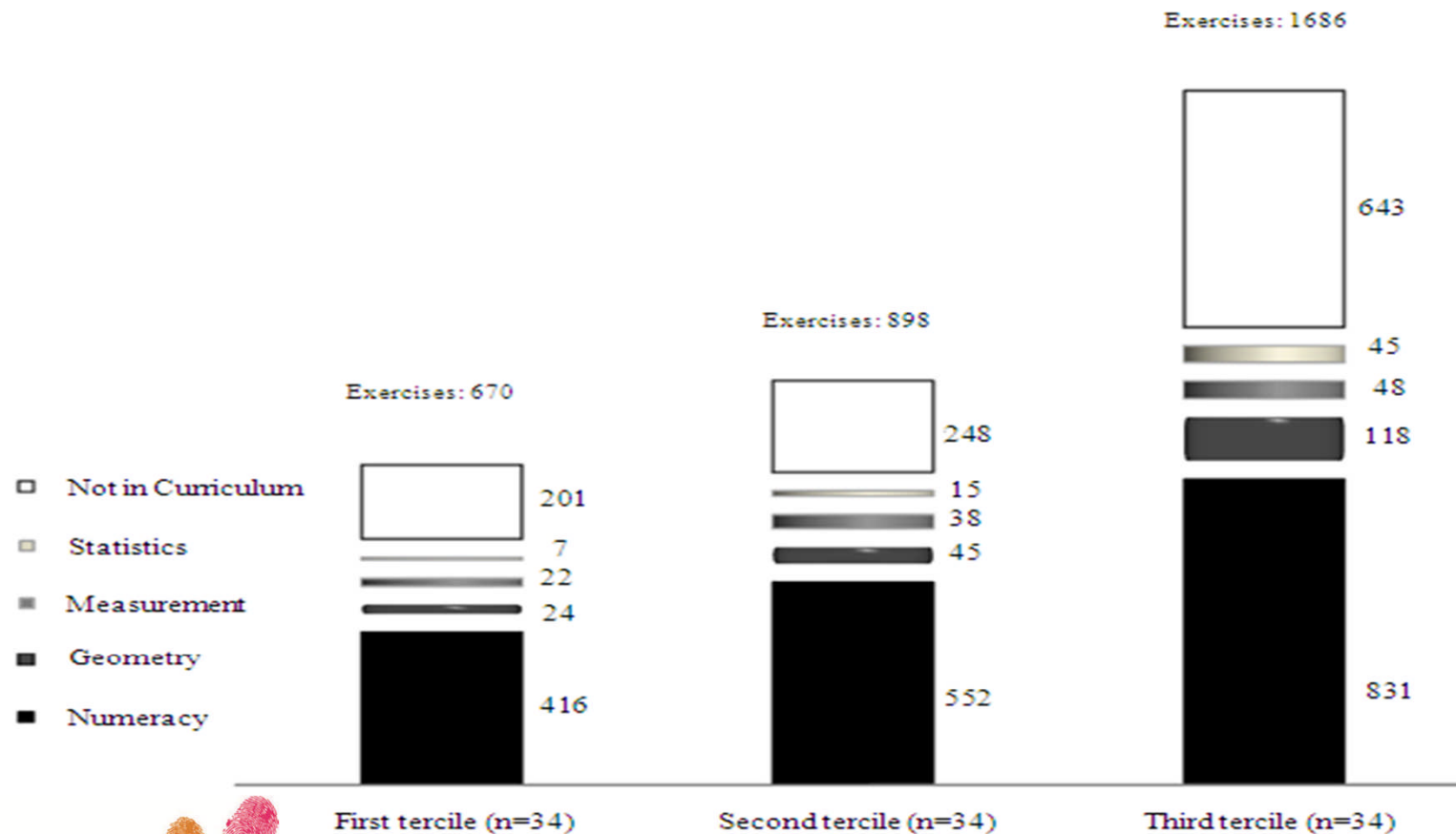
Mathematic achievement by study group.

	First tercile (n=34)	Second tercile (n=34)	Third tercile (n=34)	Total (n=102)
Percentil 90	304	367	383	375
Percentil 10	227	249	281	242
Average	261	306	336	301

September, 2013
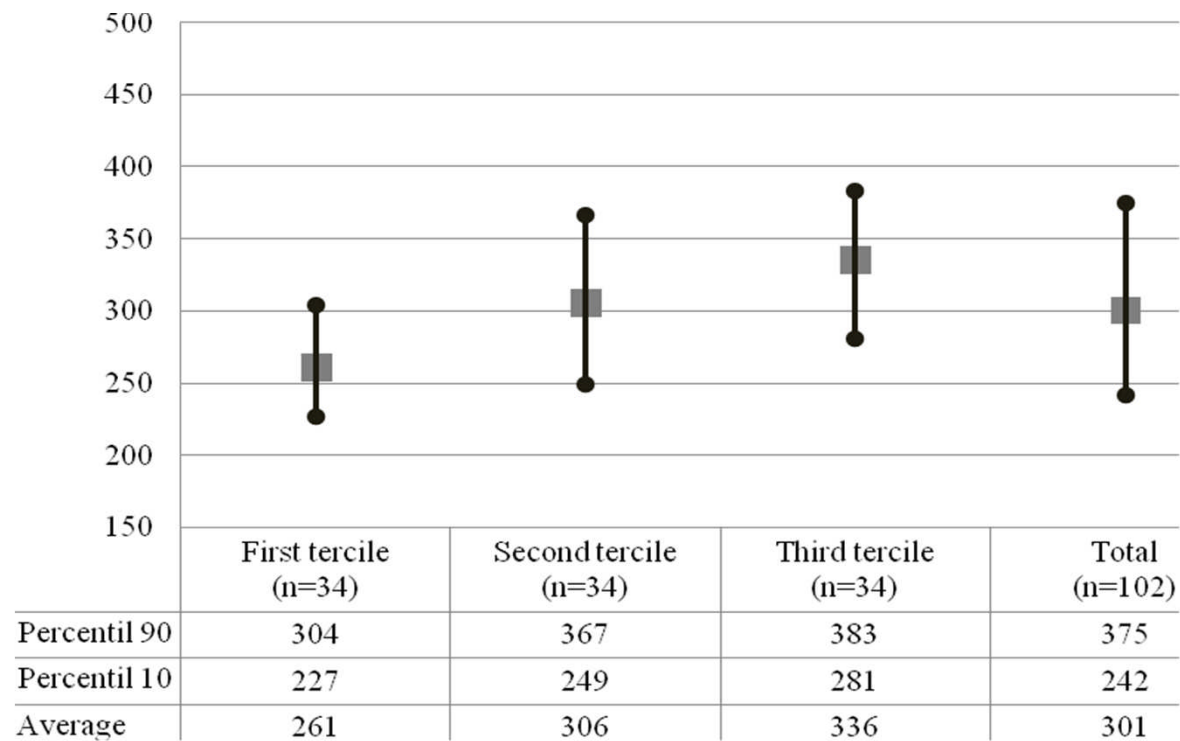
Effect of OTL variables in mathematics achievement controlling for additional characteristics

	M1		M2		M3		M4		M5	
OTL (Factor Score)	0,53	***	0,30	**	0,25	+	0,26	*	0,28	*
Socioeconomic Status (SES) in 2002			0,39	**	0,17		0,29		0,22	
CDA score (5 years old) in 2006					-0,02		-0,06		-0,02	
Female					-0,16	+	-0,16	+	-0,16	*
Age in months					0,06		0,07		0,05	
Indigenous mother tongue					0,04		0,02		0,03	
Mother has completed secondary					0,24	*	0,19	+	0,24	*
Number of siblings in 2002					0,02		0,01		0,02	
Attends a public school					-0,10		-0,09		-0,14	
Attends a rural school					-0,16		-0,08		-0,11	
Differential in wealth index (2009-2002)							0,13			
Interaction: OTL*SES 2002									-0,14	
Teacher variables	No		No		Yes		Yes		Yes	
Observations	102		102		100		100		100	
R-squared	0,29		0,38		0,48		0,49		0,49	

Note: Teacher variables are: age (years), sex (female), mother tongue (indigenous) and years of teaching experience in basic education.

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

Conclusions

- The significance of the association depicts a highly unequal system of education in which poorer children have less OTL in school than their peers. This tends to be reinforced by an unequal provision of basic school services and unequal government investment.

- As shown in previous studies conducted in Peru and elsewhere, teachers tend to concentrate on Numbers and Arithmetic, usually assigning students with mechanical exercises of low cognitive demand. Few exercises required students to solve problems.

- Given our results, what policy alternatives could be explored to increase educational achievement for all students?

September, 2013