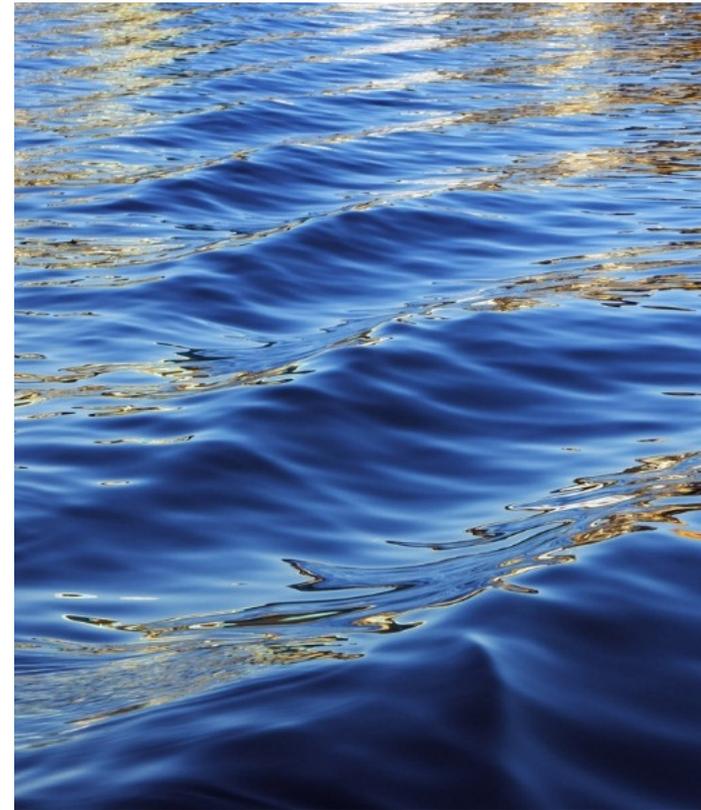


Assessing Educational  
Equality and Equity.  
Ideas for the Effective  
Use of International  
Large Scale  
Assessments

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*University of New Brunswick*



# Outline

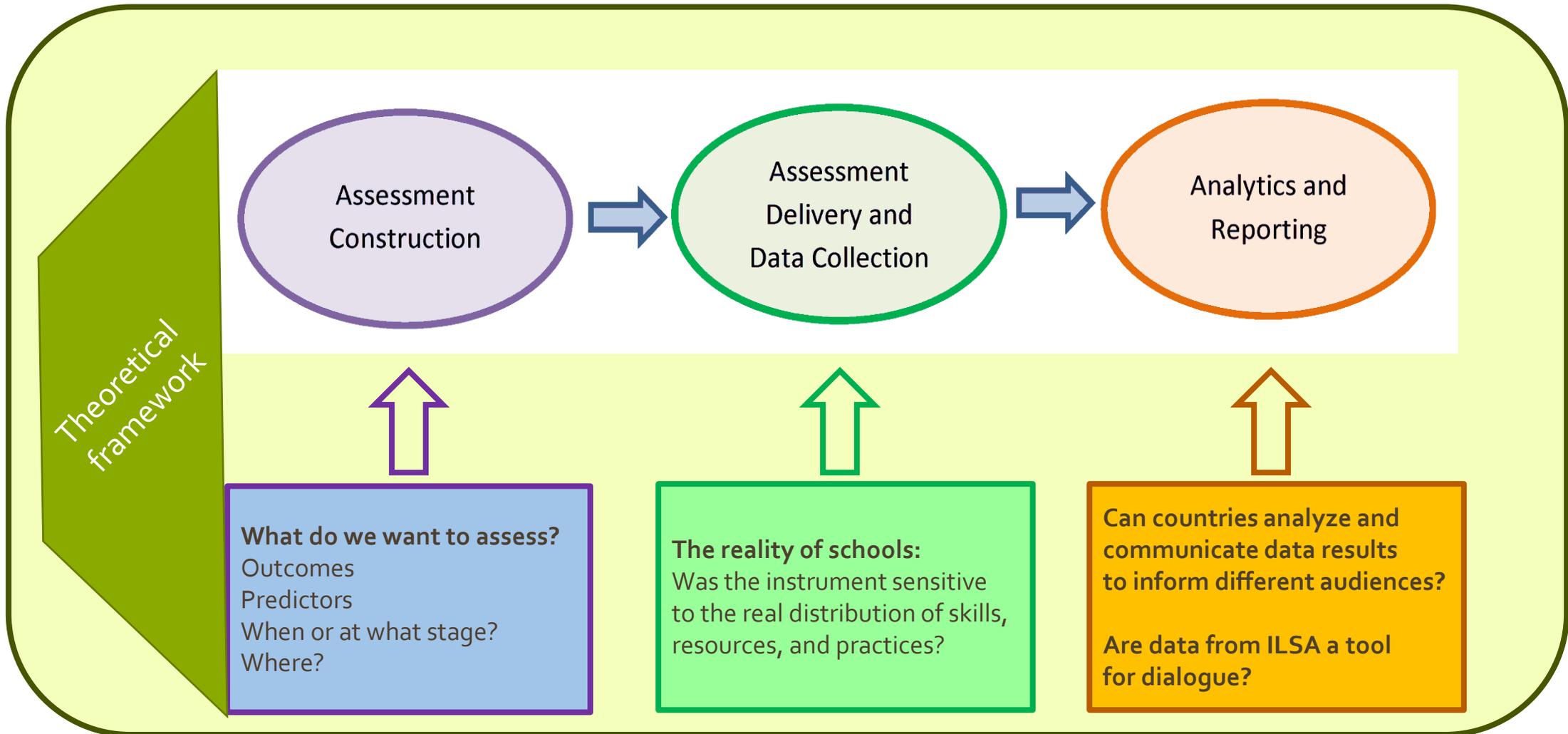
International Large Scale Assessments (ILSA)

Assessing quality, equality and inequity

Trailing and leading indicators

Providing educators with **data** on child development **is essential** to maximizing the accuracy of the educational planning and to inform the design of the decisions they make.

# The ILSA and their usage path



# Equality and Equity

**ILSA are effective at mapping the state of equality and equity.**

**Equality** refers to differences in the distribution of outcomes among sub-populations, especially between high- and low-status groups.

**Equity** refers to fairness – a just treatment of people from different sub-populations, concerning availability and access to resources.

**With this distinction, one can refer to inequalities in student outcomes and inequities in processes and resources.**

# Inequities

refer to constructs at a level higher than the individual, such as:

## **the classroom**

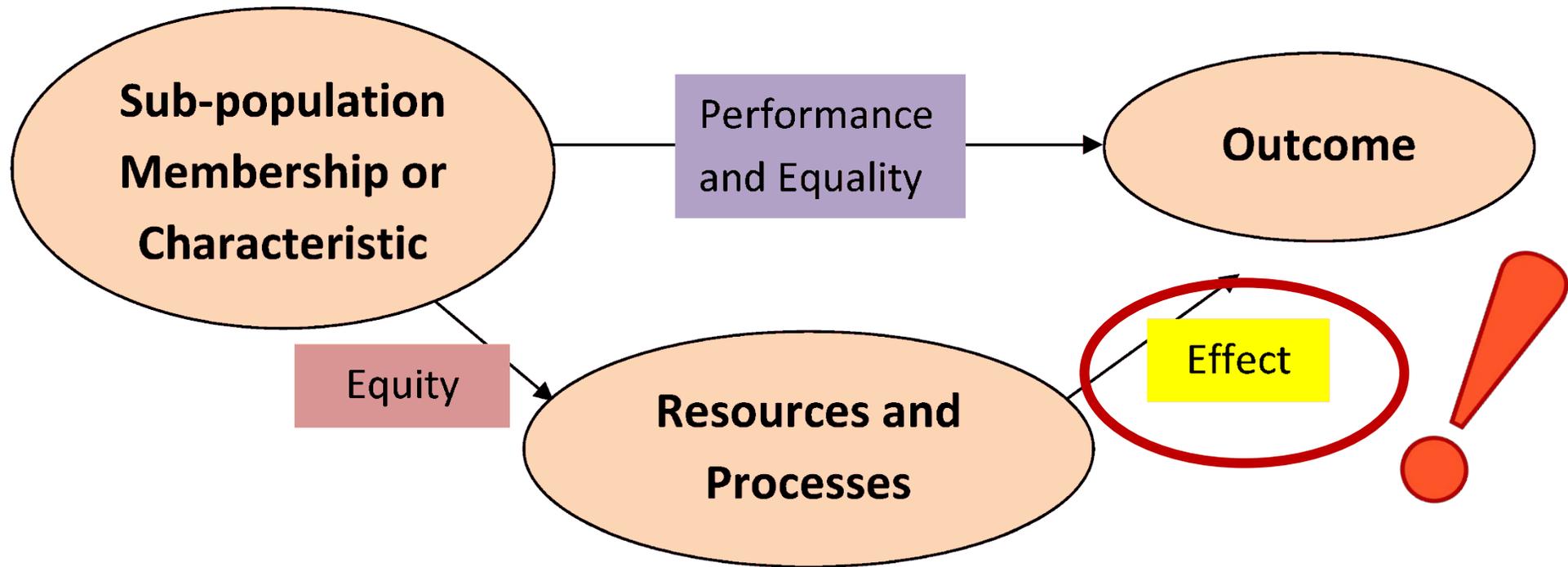
- quality of instruction
- effective learning time

## **the school**

- infrastructural resources
- didactic resources

## **or the neighborhood/district**

- safety
- average expenditure per student



We are only concerned with resources and processes that have strong “effects” on the outcome of interest.

# Four challenges to assess equity

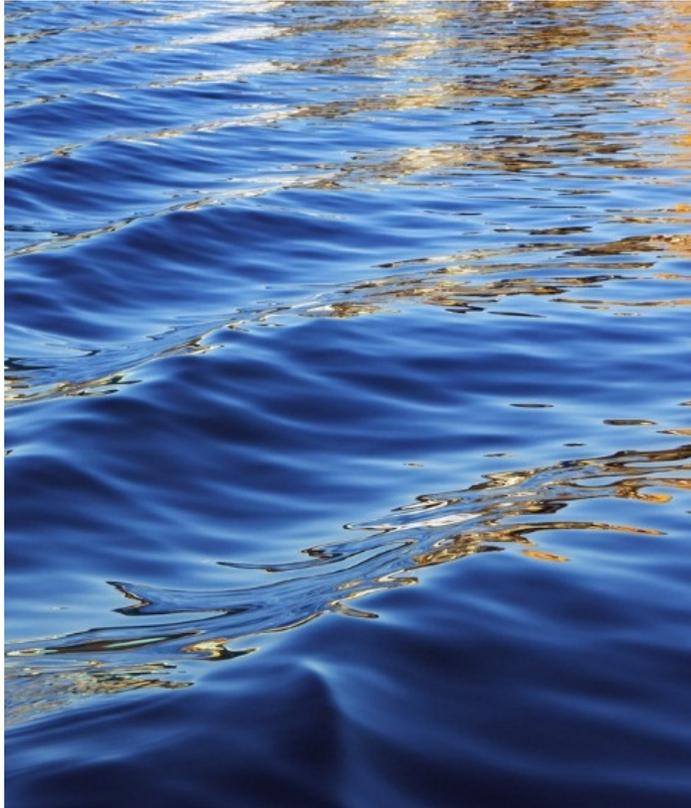
1. The “effect” associated with a measure of school resource or a process can differ, depending on the schooling outcome considered.
2. An “effect” can vary among jurisdictions. For example, the effects on learning associated with class size appears to differ among countries.
3. The effects of resource and process factors can differ among sub-populations. For example, being taught in a small class may be more beneficial for low SES students than for high SES students.
4. Measures of school resources and processes tend to be highly correlated at the school level and can interact in their effects on student outcomes.

This makes it very challenging to isolate the effects of particular factors.

What to focus on?



6 ideas to improve the  
assessment of quality,  
equality and equity



# 1. Focusing on Quality versus Inequality

Inequalities are typically measured as the difference between two sub-populations in the mean score on some outcome measure.

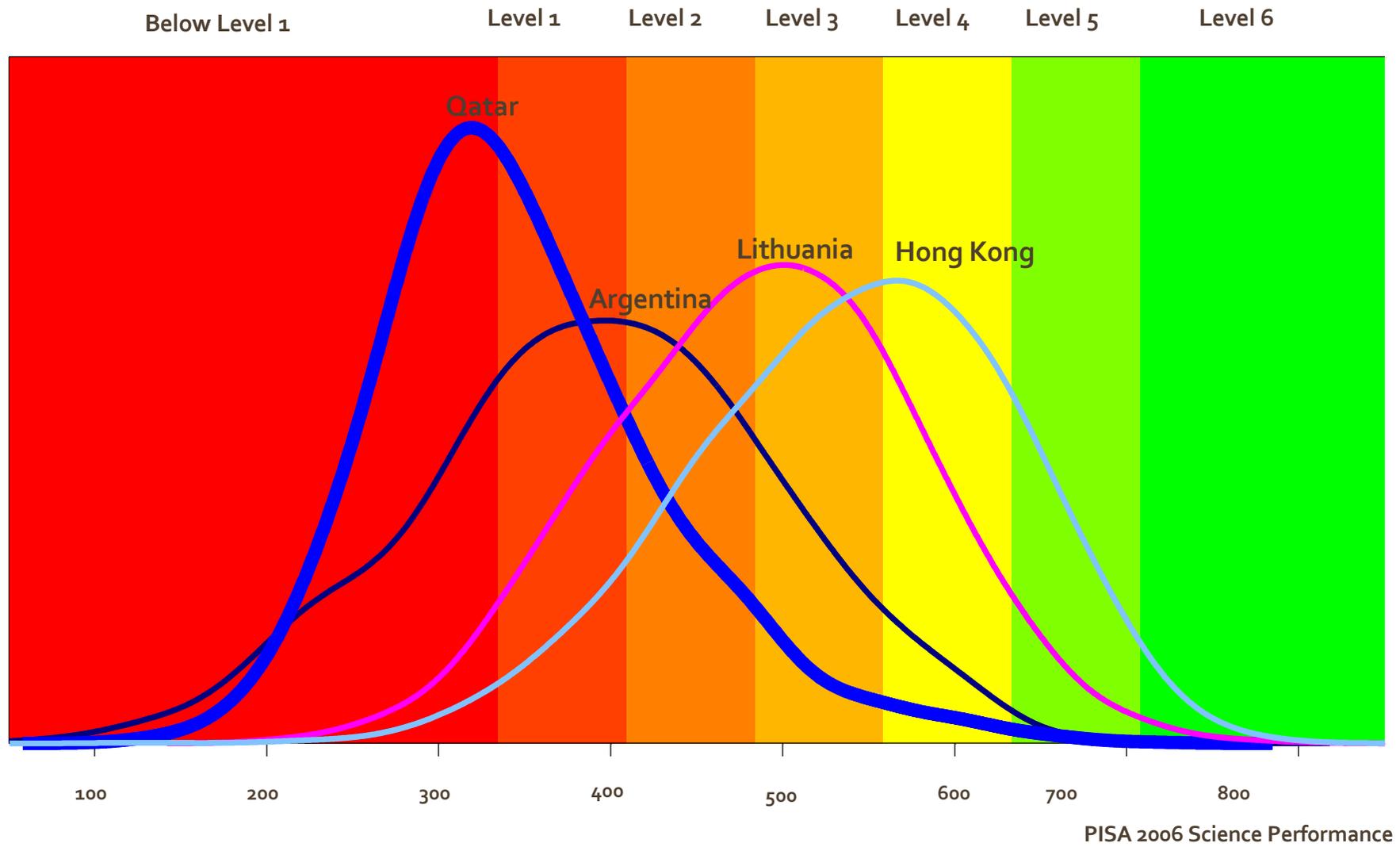
E.g. the difference in test scores between males and females, immigrants and non-immigrants, or students from low and high socioeconomic status (SES) backgrounds.

However, levels of inequalities are often compared among jurisdictions or groups without attention to the overall mean level of the outcome.

## 2. This means that skewness matters!

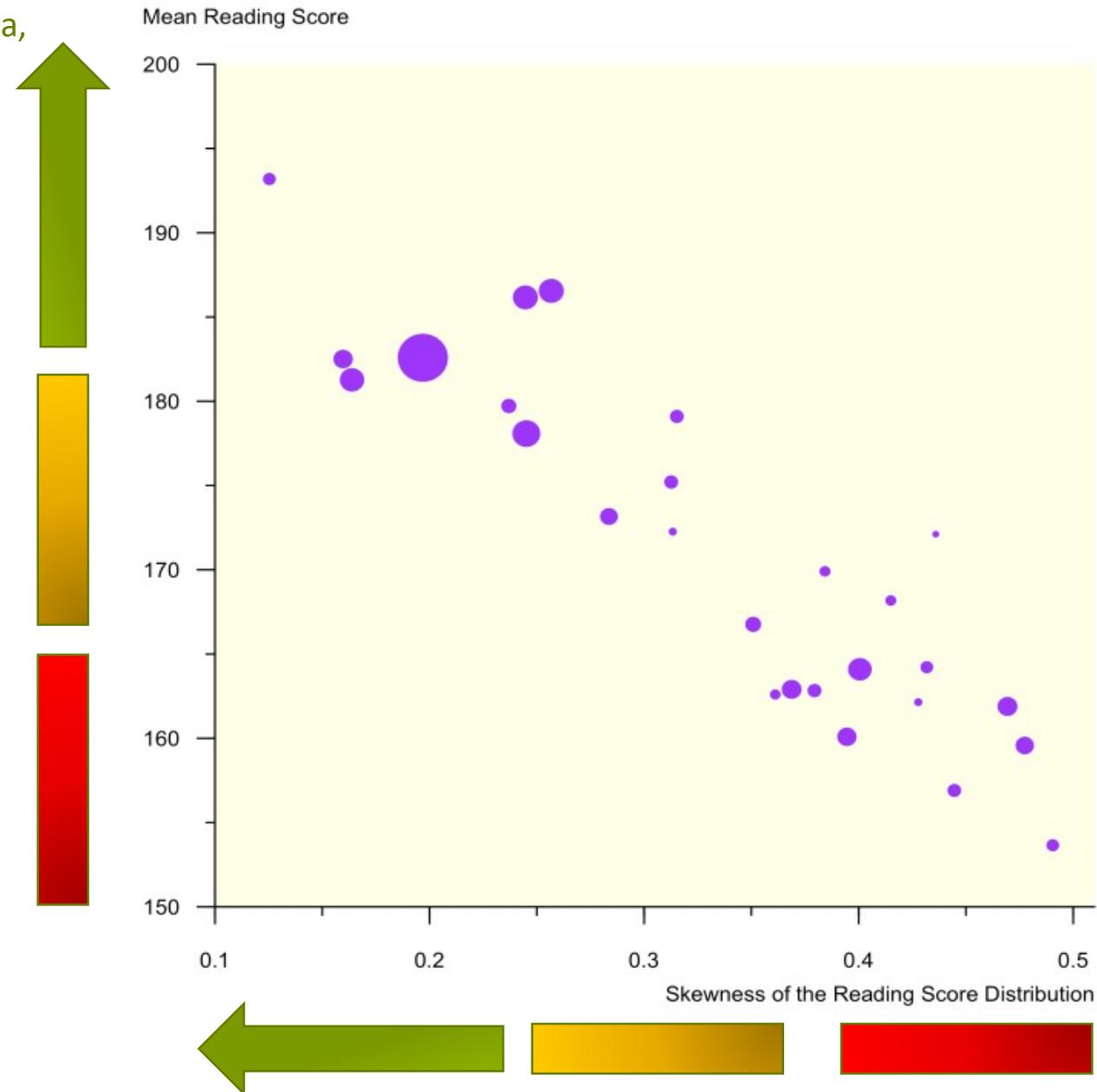
***Equality*** refers to similarities and differences not only on average, but also in the ***distribution*** of outcomes among sub-populations.

Proportion of Students

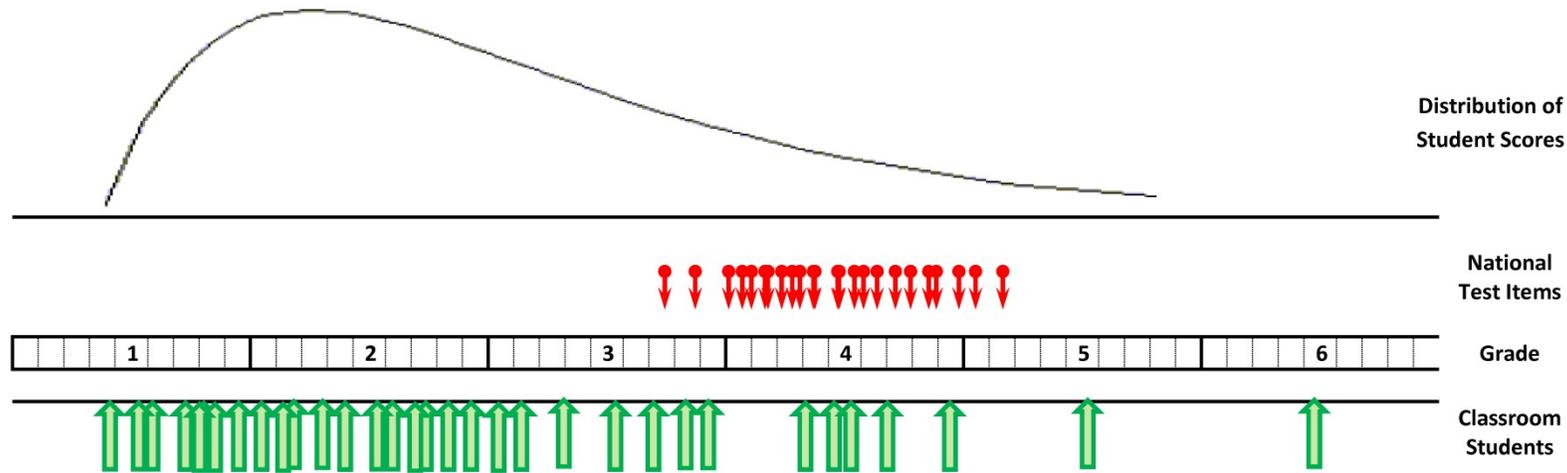


# Jurisdiction mean reading scores versus skewness of the distribution

Source: Prova Brazil 2007-grade 4 data, from 26 states.



### 3. Alignment between skill distribution and test items



Quite often the information from the test does not cover the range of skills in the population.

Each test scale is answer a small set of questions about an ability distribution.

Techniques based on Item Response Theory help us discern where the test “information” lies on the ability distribution.

In most cases we do not lose much information by setting a cut-point and dichotomizing the scores.



Source: Marotta, Tramonte, and Willms, 2016

## 4. Relative Risk versus Population Relevance

The “relative risk” is the ratio of risk of failing to achieve the desired outcome in a subpopulation compared to the risk of not achieving the outcome for those who are not members of that subpopulation.

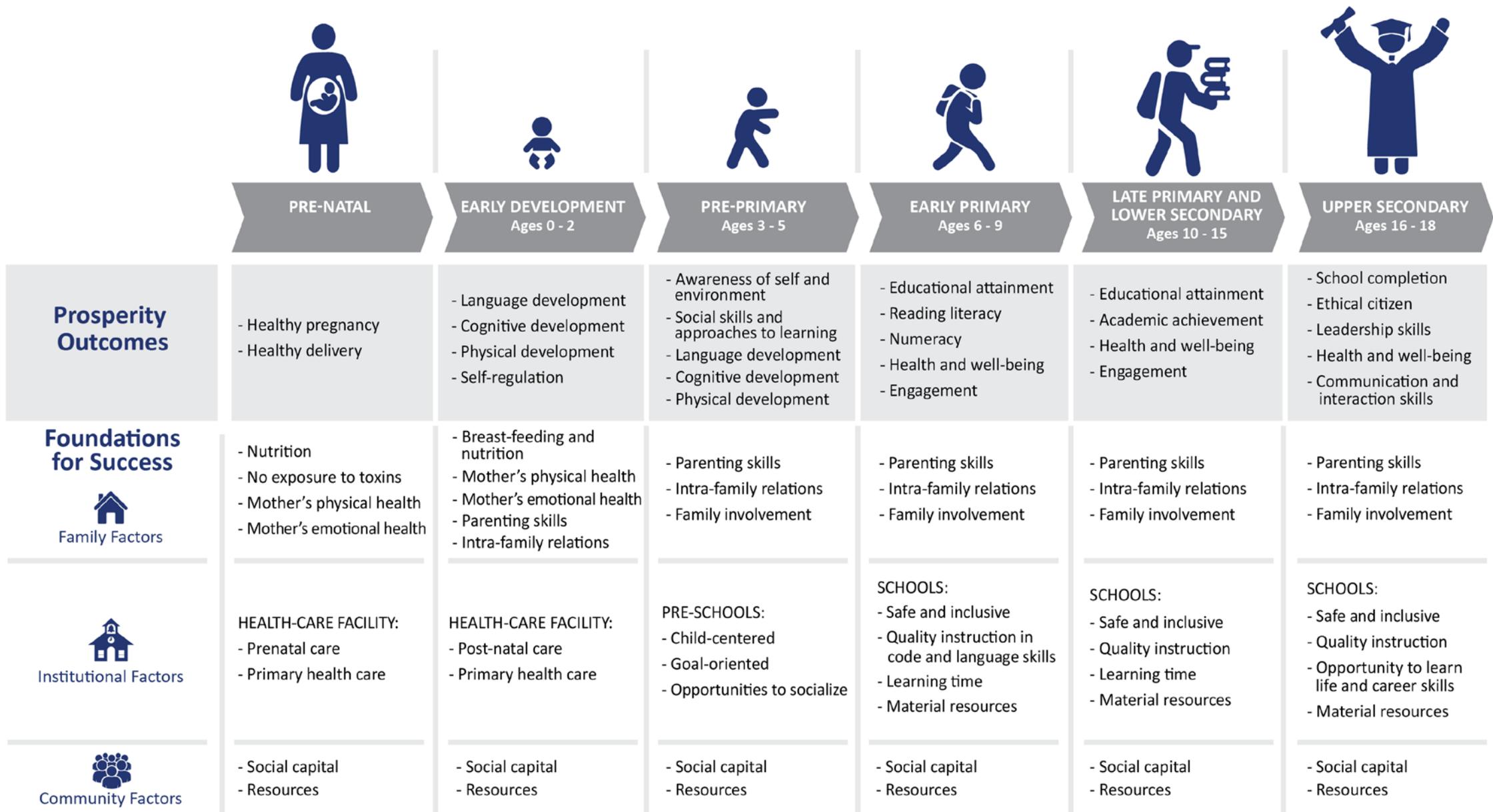
One also needs to consider the population relevance associated with increased vulnerability.

The “population attributable risk” measures the prevalence for the full population that would be achieved if the risk in the potentially vulnerable sub- population (e.g., immigrants) were reduced to the same prevalence as that of the non-vulnerable sub- population (e.g., non-immigrants).

## 5. Inequalities in Skills and Learning Potential are Established Early

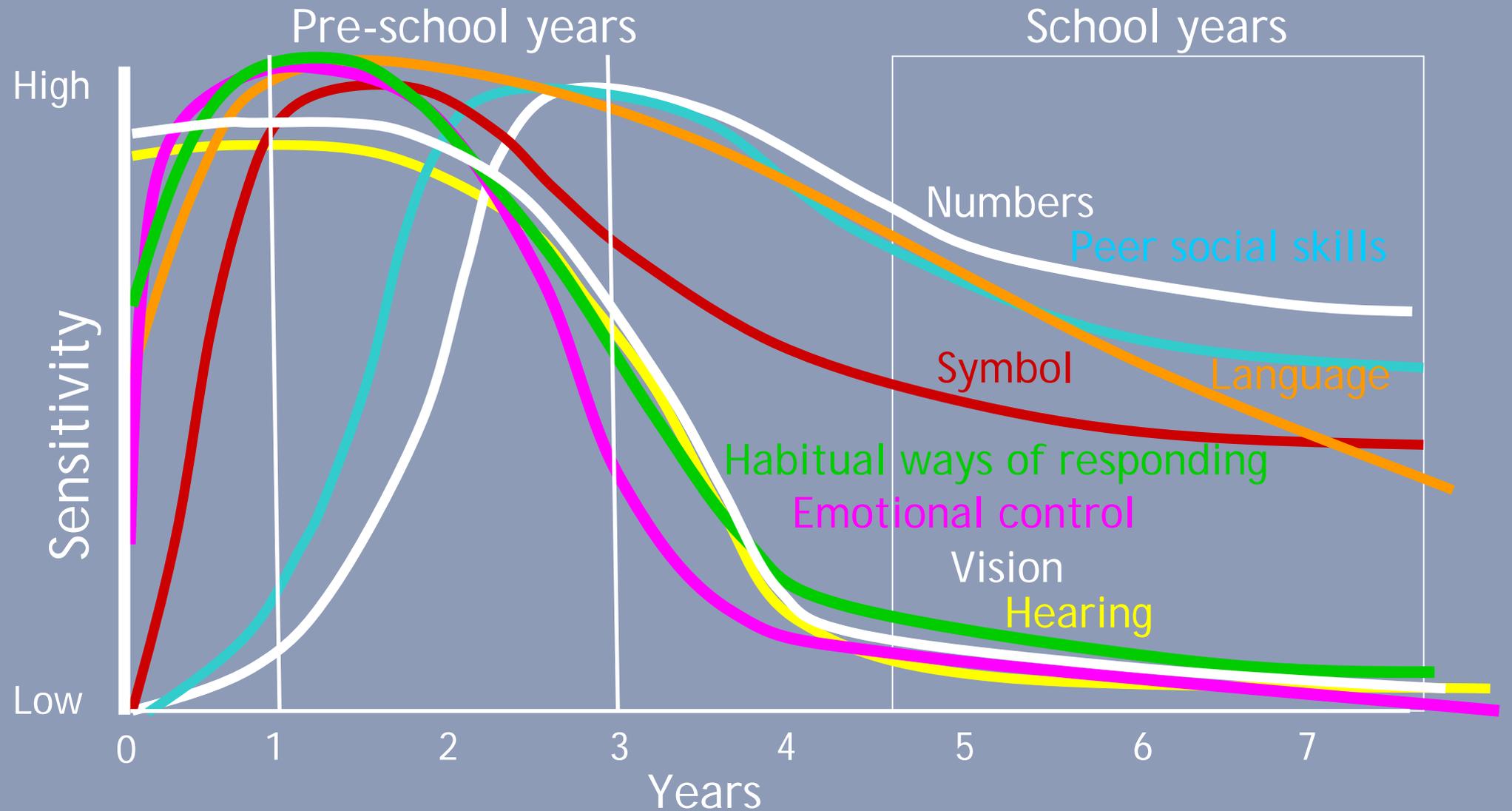
Many of the inequalities in learning outcomes observed in the national and international studies may be largely attributable to differences in children's skills when they enter school.

International test scores like PISA are the cumulative result of children's learning at home and at school since birth (or even earlier)

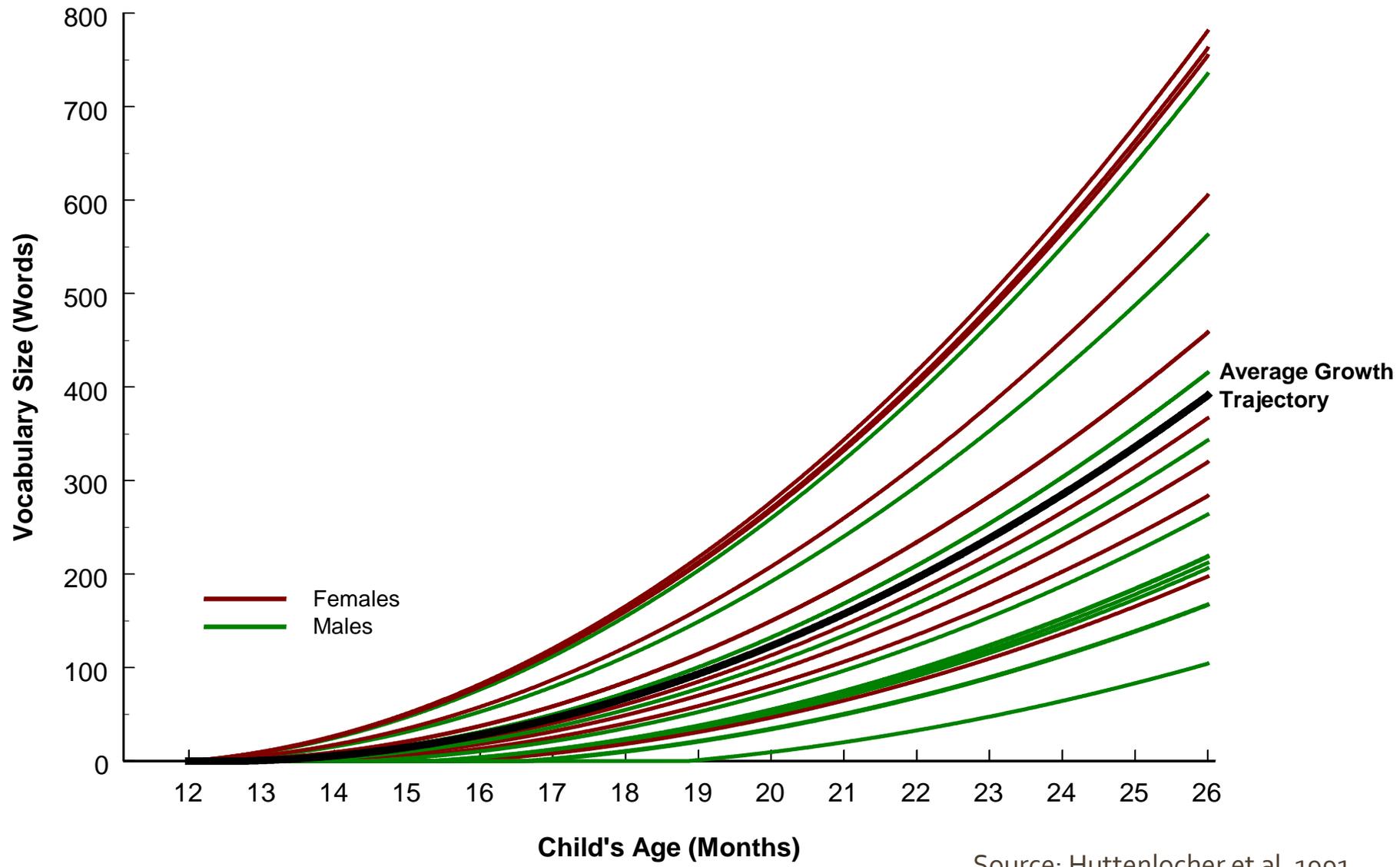


Source: TLB, 2015; Willms, 2018

# Sensitive Periods in Early Brain Development



Graph developed by Council for Early Child Development (ref: Nash, 1997; *Early Years Study*, 1999; Shonkoff, 2000.)



Source: Huttenlocher et al, 1991

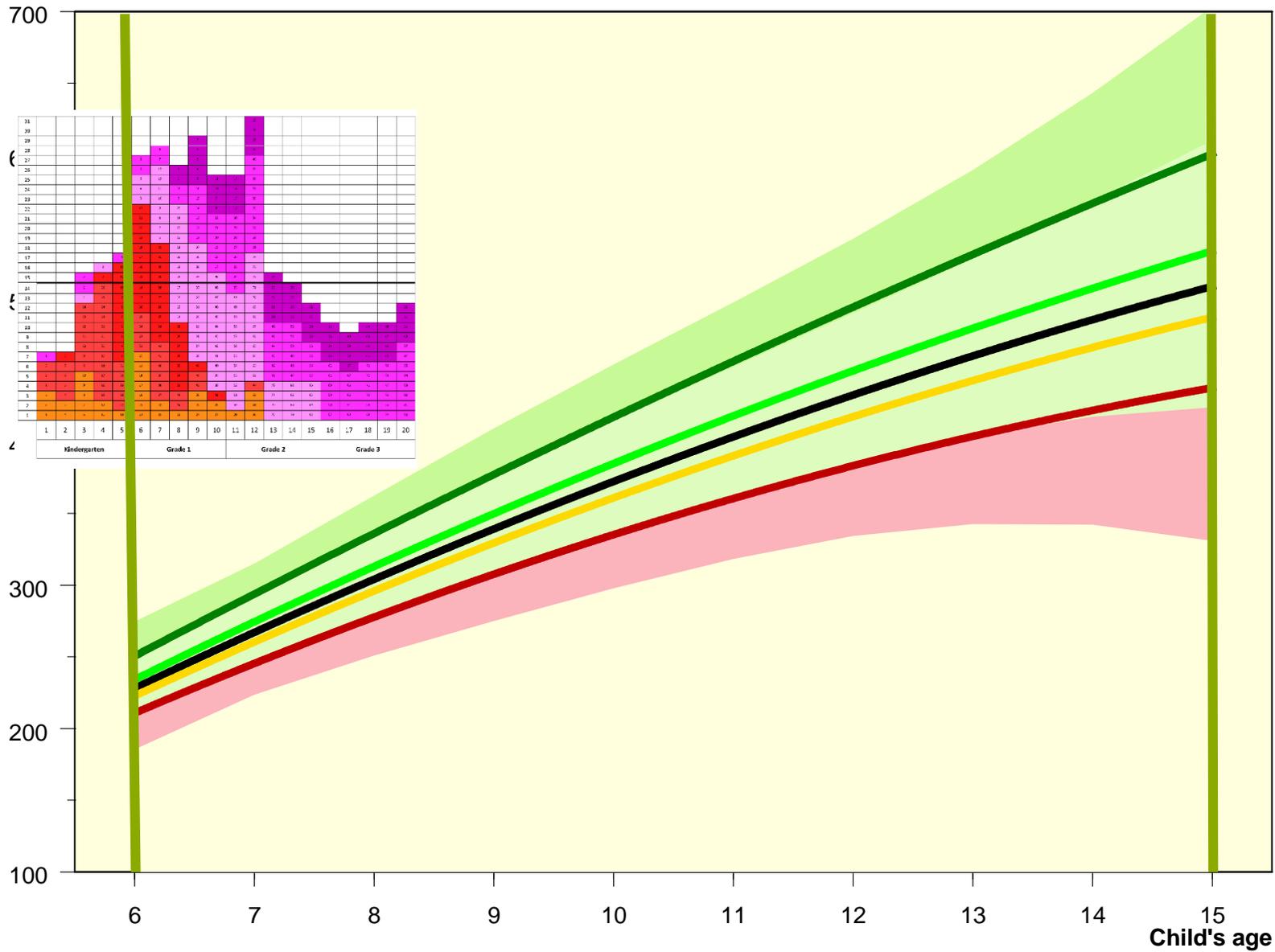
31												19										
30												18										
29								7				17										
28							8		6			16										
27						6	7		5			40										
26						5	13	2	4			39										
25						5	12	1	3	11	15	38										
24						4	11	10	16	10	14	37										
23						3	10	9	15	9	13	36										
22						22	9	25	14	8	12	35										
21						21	8	24	13	22	30	34										
20						20	7	23	12	21	29	33										
19						19	6	22	11	20	28	32										
18						18	32	21	37	19	27	31										
17					4	17	31	20	36	18	26	74										
16			2	12	16	30	19	35	17	25	73											
15			3	2	11	15	29	18	34	49	24	72	24									
14			2	26	10	14	28	17	33	48	23	71	23	28								
13			1	25	9	13	27	16	32	47	61	70	22	27								
12			14	24	8	36	26	15	31	46	60	69	21	26	32					52		
11			13	23	7	35	25	14	30	45	59	68	20	25	31					51		
10			12	22	6	34	24	39	29	44	58	67	46	52	30	36		44	48	50		
9			11	21	5	33	23	38	28	43	57	66	45	51	29	35	40	43	47	49		
8			10	20	4	32	42	37	27	42	56	65	44	50	56	34	39	42	46	87		
7	1	1	9	19	3	20	41	36	26	41	55	64	43	49	55	33	38	41	45	86		
6	3	7	8	18	31	19	40	35	40	40	54	63	42	48	54	62	37	73	79	85		
5	2	6	10	17	30	18	39	34	46	39	53	62	41	47	53	61	67	72	78	84		
4	1	5	9	16	29	17	38	33	45	38	52	47	78	82	86	60	66	71	77	83		
3	3	4	8	15	28	16	37	44	26	41	51	32	77	81	85	59	65	70	76	82		
2	2	5	7	12	27	15	22	43	25	28	50	31	76	80	84	58	64	69	75	81		
1	1	4	6	11	13	14	21	23	24	27	29	30	75	79	83	57	63	68	74	80		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
	Kindergarten				Grade 1				Grade 2				Grade 3									

# The Reading Mountain

<b>Code-Related Skills</b>	Concepts about print	22
	Phonological Awareness – Supra-Phonemic Awareness	25
	Phonological Awareness – Phonemic Awareness	19
	Letter Knowledge	23
	Fluency – Word Decoding and Spelling	86
	Fluency – Word Recognition and Spelling	78
	Fluency – Speed & Prosody	27

Source: Copyright of TLB- Confident Learners

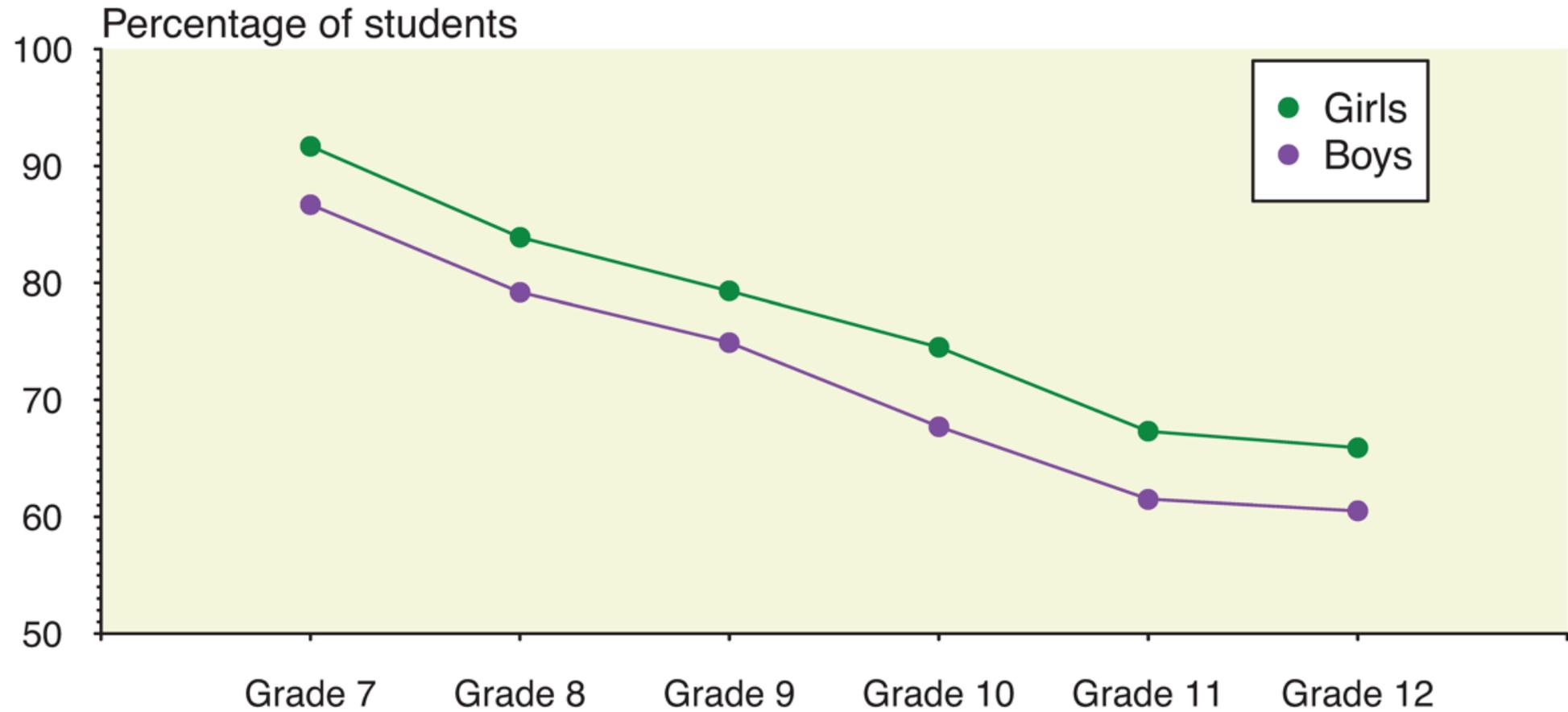
# Mathematics Scores



Canada PISA 2003

Growth trajectories for mathematics, by age 8 performance quintile

**Figure III-4. Values schooling outcomes, by sex and grade**



Source: TLB, 2016

Skill-based assets are the building blocks for future successful development.

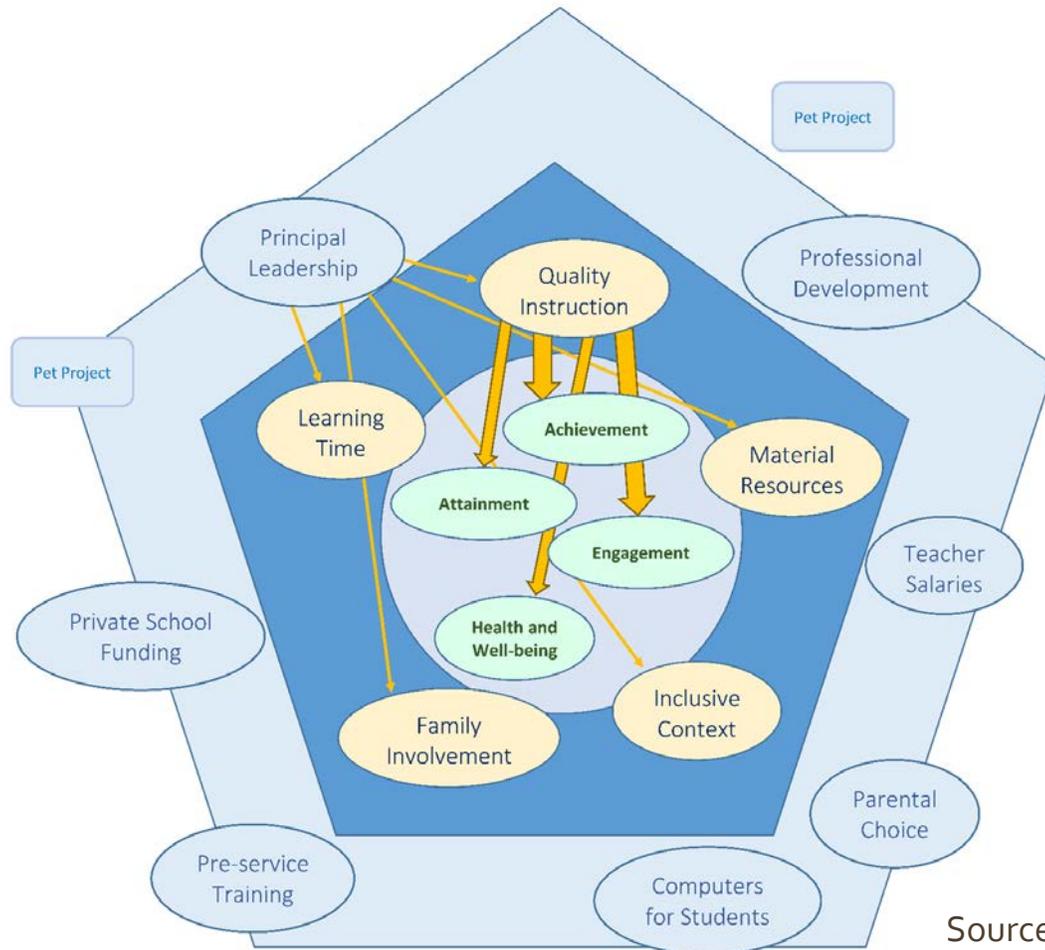
The focus of research and intervention should shift from demographic risk factors to the outcomes that are critical for successful child development.

# Entrenched Inequalities

Given that children's learning potential is to some extent established during the pre-school years, and is affected by family and community resources, many of the inequalities we observe in the school system are entrenched through long-standing economic, social, and political forces.

**In other words, societies establish certain *intolerable* equilibria for inequalities in social outcomes.**

# 6. Identify resources and school processes that really matter



Foundation of Success factors are:

**Potent** (strong effects on outcomes)

**Pervasive** (effect a range of outcomes)

**Proximal** (has a direct effect on the outcomes)

Source: TLB, 2015; Willms, 2018

# But these resources and processes are difficult to measure

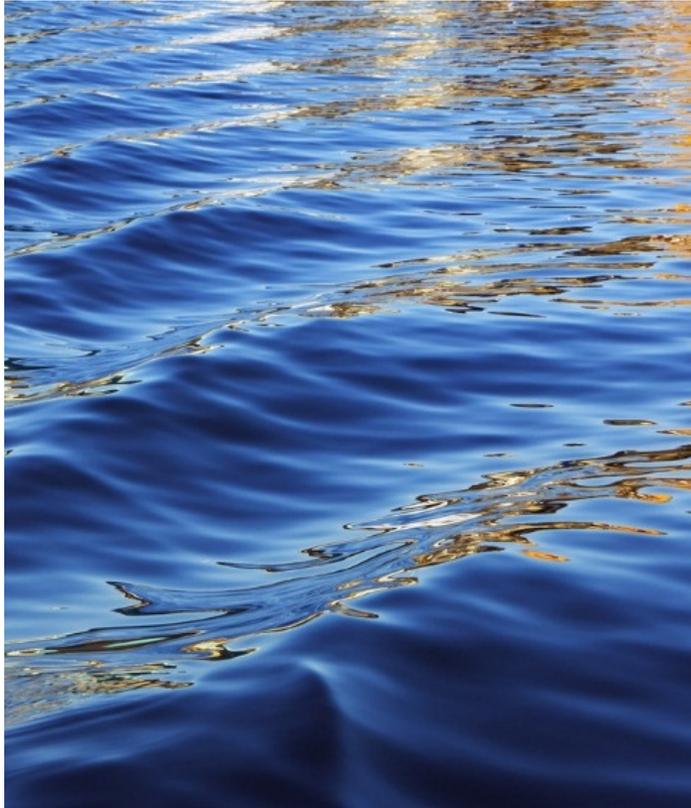
In cross-sectional studies, the school effect variables tend to highly correlated

We have relatively few experimental studies that provide strong causal inference

But we do have 30 years of research and meta analyses of meta analyses (Hattie, 2009) that pointed us to material resources, learning time, family involvement inclusive environments, and quality of instruction.

Quality of instruction is the core resource, but it is very difficult to define and measure in ILSA:

- Response rates from teachers and principals tend to be low
- Teachers and principals tend to give biased reports



# Indicators for design and decisions

# Trailing Indicators

State and National monitoring systems generally provide *trailing indicators*.

Trailing indicators are based on long tests administered annually or biennially.

Data are collected after a fixed period of learning.

Trailing indicators are meant to assess changes in system performance across schools and districts, and over time.

# Trailing indicators can be used to

- establish standards
- assess the extent of inequalities
- inform educational policy
- provide a framework for basic or theoretical research and
- enhance the credibility of the teaching profession

## Leading indicators

But the everyday life of teachers and school staff requires *leading indicators* that identify students who are falling off track, inform school policy and instructional decisions, and increase student motivation.

Leading indicators are based on short tests and surveys administered frequently.

Data are collected before learning occurs or as it is occurring.

## Leading indicators can be used to:

- provide a framework for intervention
- guide school policy and practice to improve school climate
- stimulate discussion about school reform
- identify issues relevant to particular students or groups of students
- identify students who need extra support
- involve parents in meaningful ways
- increase student and teacher engagement



PRE-NATAL



EARLY DEVELOPMENT  
Ages 0 - 2



PRE-PRIMARY  
Ages 3 - 5



EARLY PRIMARY  
Ages 6 - 9



LATE PRIMARY AND  
LOWER SECONDARY  
Ages 10 - 15



UPPER SECONDARY  
Ages 16 - 18

### Prosperity Outcomes

- Healthy pregnancy
- Healthy delivery

- Language development
- Cognitive development
- Physical development
- Self-regulation

- Awareness of self and environment
- Social skills and approaches to learning
- Language development
- Cognitive development
- Physical development

- Educational attainment
- Reading literacy
- Numeracy
- Health and well-being
- Engagement

- Educational attainment
- Academic achievement
- Health and well-being
- Engagement

- School completion
- Ethical citizen
- Leadership skills
- Health and well-being
- Communication and interaction skills

### Foundations for Success



Family Factors

- Nutrition
- No exposure to toxins
- Mother's physical health
- Mother's emotional health

- Breast-feeding and nutrition
- Mother's physical health
- Mother's emotional health
- Parenting skills
- Intra-family relations

- Parenting skills
- Intra-family relations
- Family involvement

- Parenting skills
- Intra-family relations
- Family involvement

- Parenting skills
- Intra-family relations
- Family involvement

- Parenting skills
- Intra-family relations
- Family involvement



Institutional Factors

- HEALTH-CARE FACILITY:
- Prenatal care
  - Primary health care

- HEALTH-CARE FACILITY:
- Post-natal care
  - Primary health care

- PRE-SCHOOLS:
- Child-centered
  - Goal-oriented
  - Opportunities to socialize

- SCHOOLS:
- Safe and inclusive
  - Quality instruction in code and language skills
  - Learning time
  - Material resources

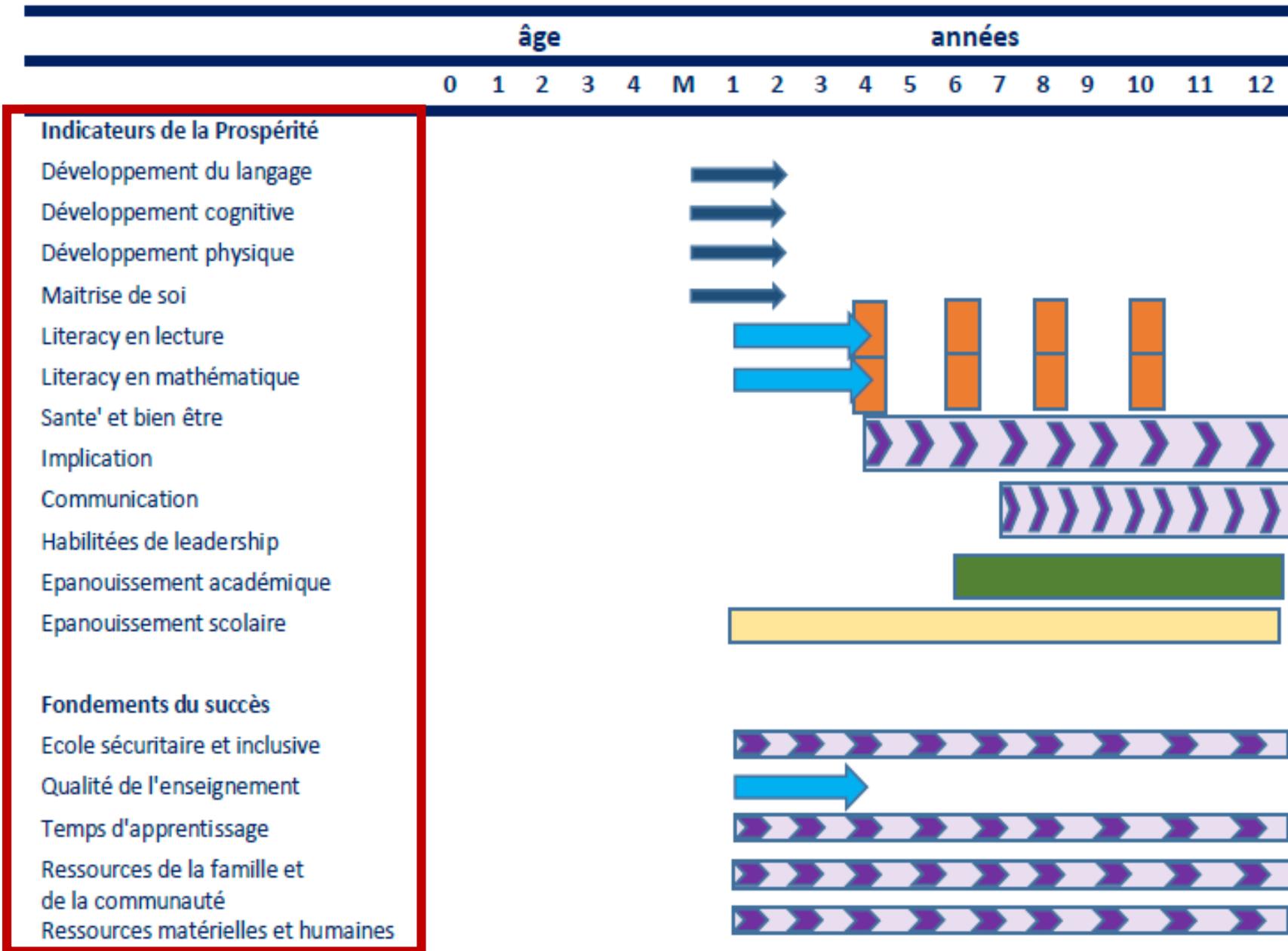
- SCHOOLS:
- Safe and inclusive
  - Quality instruction
  - Learning time
  - Material resources

- SCHOOLS:
- Safe and inclusive
  - Quality instruction
  - Opportunity to learn life and career skills
  - Material resources



Community Factors

- Social capital
- Resources



- **Blue arrows:** Census. ID to follow all children from kindergarten to grade 2
- **Light blue arrows :** Census-like administered PAQEEB pre-test, post-test, and sub-tests to evaluate weakest students and intervene immediately, until end of grade 3
- **Orange blocks:** sample cross-sectional, SNERS and PASEC are ILSAs
- **Rectangles with purple arrows :** school census but sample of students.
- **Other colors:** thematic survey.

Source: L. Tramonte, 2018

# Linear Path vs. Circular Use of ILSA

