Trajectories of school effectiveness improvement in the Chilean educational system

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Motivation

- A blind spot of studies about “effective schools”: how did they reach that condition?
- A blind spot of studies about school change and improvement: did school effectiveness increase?
- The forgotten question in both: inter-temporal sustainability of school effectiveness and improvement
- The big challenge in educational policy (nationally and internationally) is to start up and sustain school effectiveness improvement processes
- This study tackle this issue, combining quantitative and qualitative methods

Objectives

- Measure effectiveness at the school level in a comparable way; determine the magnitude of schools which move up in its effectiveness (elementary – 4th grade) and characterize those schools with longitudinal improvement trajectories (2002-2010)
- Describe and understand how some schools have been able to initiate and sustain improvement processes, in different contexts and at different levels of students’ performance

Methodology of the quantitative analysis

Construction of the Index of School Performance/Effectiveness (ISP)

- The Index is a composite measure that aggregates different school performance indicators, in order to allow longitudinal comparability (for each school and among schools)
- It considers results from 4th grades (there are comparable databases since 2002). It includes schools with >15 students taking tests (Kane & Staiger, 2002; Chay et al, 2005); only schools with systematic information for the period (not for new ones or those closed)
- It considers mobile average of two years vs. annual data (ameliorates short run noise)
- It includes schools' indicators about: Effectiveness (average SIMCE reading and math); Efficacy (pseudo value added at school level for reading and math, Treviño & Donoso, 2010); Internal efficiency (Retention rate and Promotion rate between 1st-4th grade); Absolut Equity (% of students above min Level of Performance in reading and math 4th grade); Relative Equity (inverse of coefficient of variation for reading and math)
- We checked internal consistency level among variables to construct an aggregated Index: Cronbach´s Alpha (values 0.92-0.94, relevance of the model, George & Mallery, 1995); estimated exploratory Factorial Analysis to determine which variables were in the ISP –KMO test for alternative models, with indices in range between 0.80-0.87 –good adjustment models (Visauta, 1998)
- Differentiated weight for each variable based on factorial analysis with 4000 schools

Methodology of the quantitative analysis

- To permit that IPS defines comparable trajectories across time, annual rough score of each variable (or mobile average) is standardized on base year (or mobile average): 2002 or 2002/2005) $(X_{ti}-X_{t0})/\sigma_{t0}$–such as a Laspeyres inedx- with a stable weight for each variable.

Table 1. Weighted Values of Each Standardized Variable for the Composition of the ISP

	Base Index 2002			Base Index 2002/2005		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
SIMCE Average Language	36.6%	31%		36.4%	32%	
SIMCE Average Mathematics	23.9%	26%		21.5%	24%	
Percentage of Students Non initial Language Level	7.1%	13%		9.6%	14%	
Percentage of Students Non initial Mathematics Level	6.0%	12%		6.3%	12%	
Approval Rate	0.9%	2%	5%	1.1%	2%	6%
Retention Rate	0.7%	1%	4%	0.7%	1%	6%
Mean/SD Language	5.1%	7%	25%	5.0%	6%	25%
Mean/SD Mathematics	5.9%	8%	24%	6.3%	9%	25%
Pseudo-Added Value Language	3.8%		21%	3.5%		21%
Pseudo-Added Value Mathematics	10.1%		20%	9.7%		17%

- Definition of clusters to analyze improvement trajectories: We tested an endogenous model (non hierarchical analysis by K-median) and an exogenous one through definition of groups based on the normalized distribution of 2002 (2002/2005); we selected the second one.

Table 4. Clusters based on normalized distribution of educational performance

Cluster Number	Range (in standard deviations)	Denomination
1	<=-1.00	Critical
2	>-1.00 to <=-0.50	Weak
3	>-0.50 to <=0.00	Basic (-)
4	>0.00 to <=0.50	Basic
5	>0.50 to <=1.00	Basic (+)
6	>1.00 to <=1.50	Intermediate
7	>1.50 to <=2.00	Intermediate (+)
8	>2.00 to <=2.50	Advanced
9	>2.50 to <=3.00	Advanced (+)
10	>3.00 to <=3.50	Excellence
11	>3.50	Excellence (+)

Matrix of changes in the ISP-4th grade by Mobile Average at School Level: Schools tend to improve gradually; few schools move up to higher levels of performance

Table 5. Mobility between Clusters (Mobile Average 2002/2005 vs. 2009/2010)

		Mobile average 2009/2010											
Mobile average 2002/2005		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**	**Cluster Name**
	1	151	115	85	24	7	2	0	0	0	0	**384**	Critical
	2	109	192	196	103	22	3	0	0	0	0	**625**	Weak
	3	36	118	212	181	87	21	2	1	0	0	**658**	Basic (-)
	4	6	45	139	199	145	38	3	0	0	0	**575**	Basic
	5	2	4	25	98	155	96	35	4	0	0	**419**	Basic (+)
	6	0	1	5	26	74	130	60	15	1	0	**312**	Intermediate
	7	0	0	1	1	10	51	61	11	2	0	**137**	Intermediate (+)
	8	0	0	0	0	1	2	15	9	2	0	**29**	Advanced
	9	0	0	0	0	0	0	0	0	0	0	**1**	Advanced (+)
	10	0	0	0	0	0	0	0	0	0	1	**1**	Excellence
	Total	**304**	**475**	**663**	**632**	**501**	**343**	**176**	**40**	**5**	**1**	**3,140**	

40,2%

24,5%

Main results by SES and administrative dependence (public, subsidized private, non-subsidized private)

School Changes by SES (4th grade; mobile averages)

- Distribution of schools among clusters is highly conditioned by SES, both based on starting point and improvement trajectories: There is not equal opportunity
- Few schools of low SES reaching clusters of higher performance: possible, but just anecdotic
- Most low SES schools belong to groups 1-2; almost none from Middle-High and High SES (schools from High SES start at group 4)
- In every SES school group a large percentage of schools was improving during the last decade (40.5% in SES A –low- ; 44.4% in SES B –middle low-; 39.3% in SES C –middle-; 35.7% in SES D –middle-high; and 30.4% in SES E –high-).
- Schools from SES E should and could continue improving their educational effectiveness (critical issue for Chilean system, based on PISA and TIMSS results)
- Deterioration in performance is observed among all SES groups, but it is more frequent in higher SES groups (13.8% in SES A; 23.4% in SES B; 25.1% in SES C; 36.5% in SES D; and 30.4% in SES E)
- School improvement trajectories showed some equity during last decade

School Changes by type of school (public, private)

- 39.4% improve at Municipal sector; 42.0% in Subsidized Private and 33.2% in non-subsidized Private. But at the same time, 25% of Municipal schools show deterioration, 23% among P. Subsidized and 31.1% among Private non-subsidized.
- Very symmetric distribution between Municipal and Private Subsidized schools, although they have very different initial levels of performance (cluster distribution)

Trajectories of School Effectiveness Improvement

- One of the main challenges of school improvement is its sustainability across the time.

Table 11. Conditions for Trajectory Categories of Educational Improvement at the School Level (Elementary Education)

	Number of subperiods with significant results			Restrictions
	Positive	Not Significant	Negative	
Systematic Improvement	5 4 3 2	0 1 2 3	0 0 0 0	None period shows a negative change but at least two on them are positive.
Sustained Improvement	4 3 2	0 1 2	1 1 1	Only first period negative
Basic Improvement	3 2 2 3	1 2 1 0	1 1 2 2	2^{nd}, 3^{rd} or 4^{th} period negative Only 1^{st} and 2^{nd} periods negative
Specific Improvement	1	4	0	None period shows a negative change but only one is positive
Random Improvement				If not belonging to the above categories

Trajectories of School Effectiveness Improvement

- Almost half of schools showing improvement processes had experienced at least one deterioration period
- Two thirds of schools with improvement showed persistent improvement trajectories (anticipating mid term sustainability)
- Sustainability condition was a little less frequent among municipal schools (63%) than among subsidized private (71%) and non subsidized private schools (69%)
- Considering trajectories by disciplines (reading and math), 41.4% reached sustainable trajectories in reading, but just 28.9% in math (math seems to be more complex and to have different challenges)
- Few schools reached trajectories of sustained and systemic improvement (in reading as well as in math): 10% of schools from the whole country

Case studies of schools with sustained processes of school effectiveness improvement

- Objective:
  - To describe and understand the contexts, characteristics and processes experienced by Chilean schools that showed sustained school improvement trajectories during the last decade

- Method:
  - General approach: multiple case study, using qualitative techniques
  - Sampling: purposeful sample of 12 schools with sustained school improvement (from the 420 schools with *systematic* or *sustained* trajectories for improved effectiveness > 166 schools with systematic or sustained improvement in both Language and Mathematics > 57 applying three additional criteria: low student selectivity, some consistency of 8^{th}-grade students' academic achievement, and a minimum of -0.5 S.D. in the ISP index, 2009/2010)
  - Sample: 12 schools, heterogeneous circumstances: public (7) and subsidized private schools (5) situated in Santiago Metropolitan Area and eight cities across the country, with different levels of students' absolute academic achievement and school enrolment
  - Data collection: two researchers by school conducted individual and collective semi-structured interviews with teachers, principals, school administrators, parents and students; classroom observations, non-structured observations of the schools' daily activities; official documents, school improvement plans, and school' curriculum materials

Case studies of schools with sustained processes of school effectiveness improvement

- Analytical framework (based on an extensive literature review):
  - Studied dimensions: (levels) context; school; classroom; (actors) students; teachers; families; (processes) school improvement processes developed during the last decade; complementary dimensions of school quality
  - Oriented protocols for the interviews, axial coding, cross-case analysis

- Data analysis:
  - Researchers analyzed the empirical material (with special emphasis on data triangulation), describing and interpreting institutional and classroom processes and strategies that -according to them- accounted for the observed improvements; researchers were also looking for inconsistent or unexpected results
  - Product: each pair of researchers produces a case study report for their corresponding schools, describing, analyzing and interpreting their main findings; a systematic cross-case analysis will be conducted (this presentation is the very first preliminary step)

- Two key challenges for studying long-term school improvement processes:
  - how to go beyond available measures of school quality (strongly based on test-scores)
  - how to “reconstruct” school’s history based mainly on contemporary actors’ reports

Preliminary findings about sustained processes of school effectiveness improvement

- *School improvement and educational policies*
  - Clear, relevant and generalized contribution
  - Strategic , highly selective use of the external improvement initiatives: "buffering" function

- *Relationship between schools and local communities*
  - Community recognition and social prestige strengthens school work in several ways
  - Some cases of “closure” and distancing of the schools in relation to the local community

- *Leadership for sustained school improvement*
  - Institutional and pedagogical leadership (exerted mainly by the principals) is a central component of improvement processes; both horizontal and hierarchical approaches
  - Cases of both extended leadership, and cumulative successions of leaderships

- *School culture: the role of collective identity*
  - Bases of collective identity are heterogeneous and sometimes contrasting among schools
  - Two critical challenges: how to socialize new teachers; how to persuade the students

Preliminary findings about sustained processes of school effectiveness improvement

- *The eclectic and contrasting approaches to teaching practices*
  - Pedagogical approach: take an eclectic perspective, try and fail
  - Coordination and monitoring of the teacher's work: contrasting approaches based on “internal professional accountability” versus “external control”
  - Strong focus on increasing SIMCE test-scores affects teaching practices

- *The complex and multidimensional nature of long term school improvement*
  - Several strategies for school improvement applied; “effective schools” as a model
  - School improvement processes were invariably multidimensional and frequently unbalanced
  - Schools experienced tensions and contradictions in their improvement processes
  - Processes undergone by the schools have not been similar nor have they followed a unique pattern; improvement processes have very different levels of institutionalization within schools