

# Can Management Improve Learning? Evidence from a Randomised Field Experiment

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## My Paper Addresses the Following Questions

- ▶ Can a real-world policy improve school management regarding the "best" management practices at a low cost?
- ▶ Can these specific management practices improve pupils' learning or the school's learning productivity (by keeping systems and personnel unchanged and without financial incentives)?

# Lit Gap about the Effects of Management on Learning

- ▶ Conflicting pieces of evidence: Barros et al. (2019, 2021), Beg, Fitzpatrick, and Lucas (2023), Fryer (2017), and Tavares (2015) X Hoyos, Ganimian, and Holland (2019), Muralidharan and Singh (2020), and Romero et al. (2022)
  - ▶ We will try to solve the divergence.
- ▶ The literature is unclear about which management practices can affect pupils' learning.
  - ▶ We will test a group of 23 'best' management practices.
- ▶ Very few educational interventions have been shown to improve pupils' learning at a low cost.
  - ▶ We will present a powerful, low-cost intervention.

# Research design

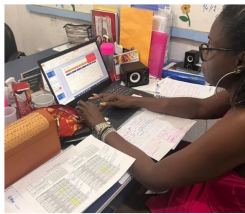
## A randomised field experiment in Rio de Janeiro

- ▶ Sample: 80 grades 1-9 public schools (31,760 pupils)
- ▶ Fixed sample of pupils from January 2022 (pupils enrolled in a sample school after January 2022 were not considered).
- ▶ 1/2 randomly assigned to treatment (pair matching).
- ▶ Duration: two years (from 01/2022 to 12/2023)
- ▶ Treatment: the 23 'best' management practices discussed in Bloom et al. (2015)
- ▶ First study to test this set of practices through an experiment.

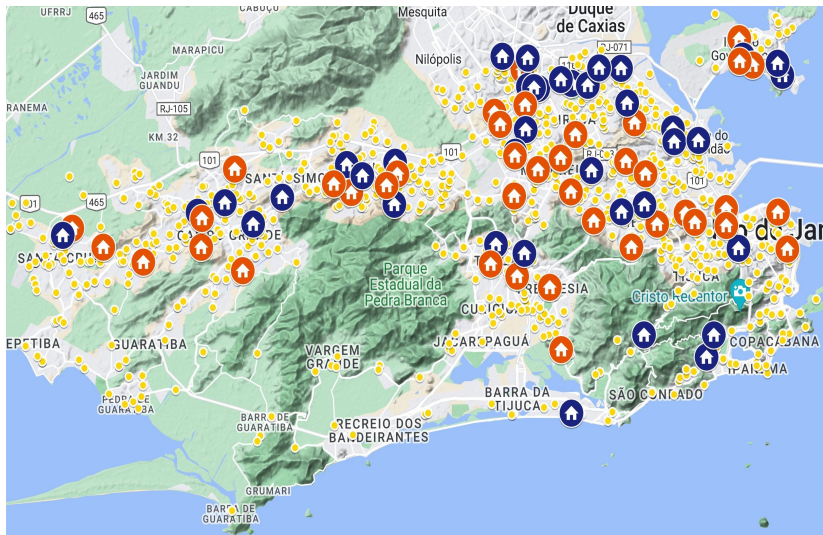
## The Intervention

- ▶ Partnership between the Court of Accounts (TCMRio) and the Secretariat of Education (SMERJ), both from the Municipality of Rio de Janeiro.
- ▶ The organisations kindly provided six civil servants to be trained by us to implement the intervention.
- ▶ Homemade intervention. No consulting firm.
- ▶ The programme was implemented through one-to-one coaching sessions and on-the-job training with school managers (no contact with teachers or pupils).
- ▶ Cost: USD (PPP GDP) 15.22 per year per pupil.

# Science and Management for Education Programme



# The Selection of Schools for the Management Experiment



# Data

## Administrative data - Pupils' and schools' characteristics.

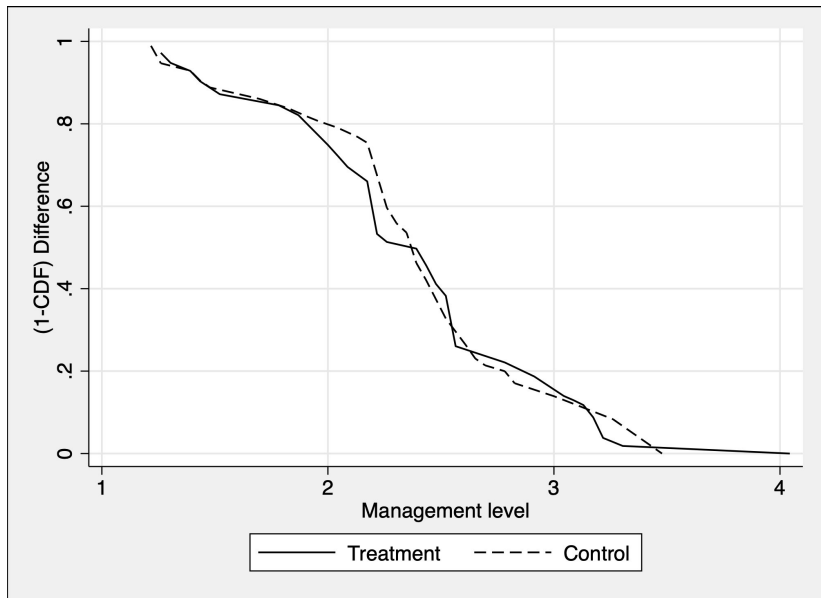
- ▶ Pupils' Mathematics and Portuguese tests applied to all grades 1-9 pupils in December 2023. [◀ More details](#)

## Data Generated by the Researcher

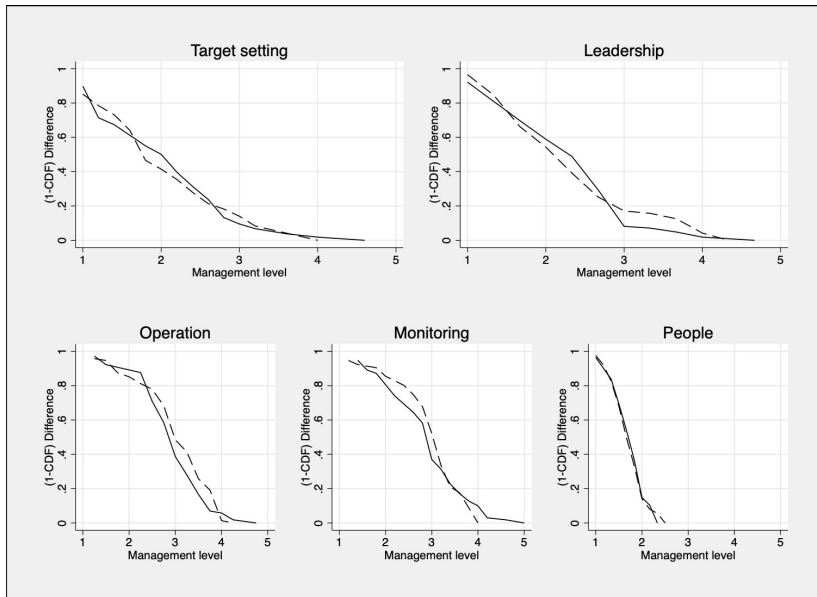
- ▶ Two management surveys before (10/2021) and after (12/2023) the intervention. WMS methodology (Bloom and Van Reenen 2007, 2010; Bloom et al. 2014; Bloom et al. 2015).
- ▶ Each school was assessed by two raters regarding each of the 23 'best' management practices. [▶ Agreement Table](#)
- ▶ Each practice received a score from one, worst management, to five, best management.
- ▶ The school's overall management score is calculated as the simple average of the scores of the 23 practices.



# School Management in 2021



# School Management by Group of Practices in 2021



# School Management Diagnosis

- ▶ **Lack of information:** School managers do not have information about the best management practices to improve learning.
  - ▶ **Managers are not trained** to implement these 'best' management practices.
- ▶ **Lack of incentive:** Schools are focused on bureaucracy and ironing out last-minute problems. Many demands from civil society, media, and 'watchdogs' regarding food, school building repairs, security, budget, air conditioning, electricity, water, etc.
  - ▶ **Little or no incentive** directly aimed at management to improve learning.

# Econometric Model - ATE

Programme impact (ATE) on pupils' reading and maths scores:

$$Y_{isp} = \alpha + \beta_{ITT} Z_{isp} + \epsilon_{isp} \quad (1)$$

Pupil level analysis. Clustered (school pairs) robust standard errors (Chaisemartin and Ramirez-Cuellar 2024).

Programme impact (ATE) on the management of the schools:

$$M_S \sqrt{n_S} = \iota \sqrt{n_S} + \lambda_{ITT} Z_S \sqrt{n_S} + \varepsilon_S \sqrt{n_S} \quad (2)$$

School level analysis. Weighted least squares. 'Robust standard errors'.

# Econometric Model - Treatment Intensity Analysis

## Exclusion Restriction

The random instrument can only affect pupils' learning through the school's management. Managers do not teach.

The effect of management on pupils' reading and maths scores (2SLS):

$$Y_{isp} = \alpha + \beta_{IV} \hat{M}_{isp} + \epsilon_{isp} \quad (3)$$

Where  $\hat{M}_{isp}$  is the fitted  $M_{isp}$  from the following first-stage equation.

$$M_{isp} = \omega + vZ_{isp} + \xi_{isp}$$

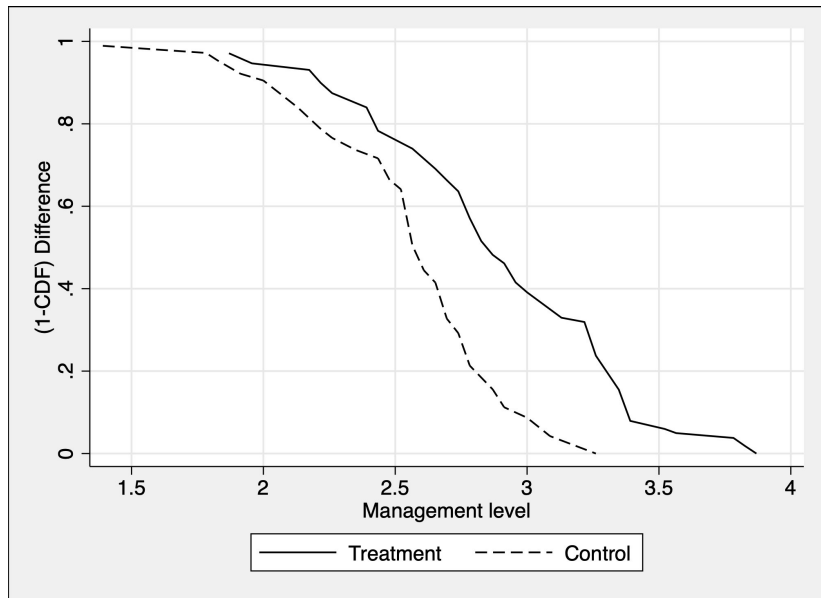
Pupil level analysis. Clustered (school pairs) robust standard errors (Chaisemartin and Ramirez-Cuellar 2024).

# Programme Impact (ATE) and Management Impact (IV)

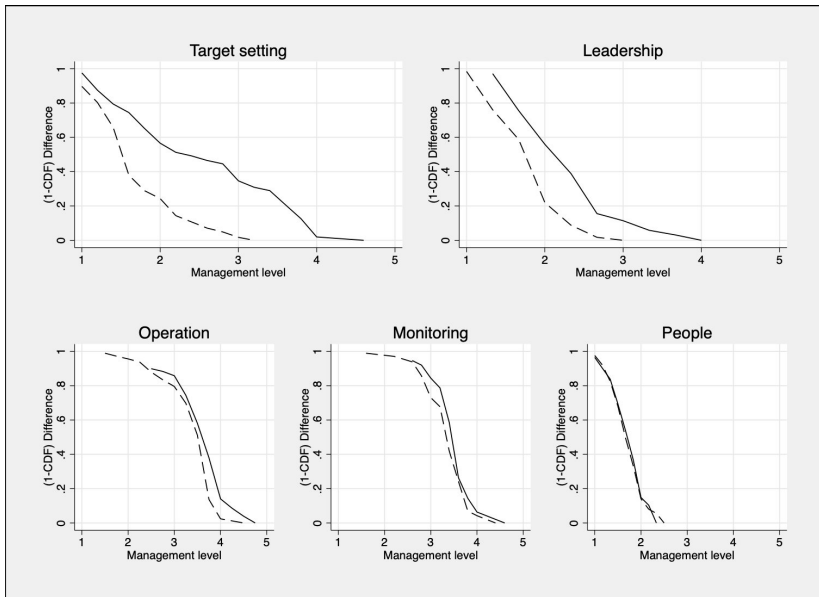
Table IX: The Treatment Causal Effects

	No covariates		With covariates	
	(1) ATE OLS	(2) Mgmt ([1,5]) IV	(3) ATE RA	(4) Mgmt ([1,5]) IV/RA
Reading (SD)	0.226*** (0.059)	0.680*** (0.245)	0.187*** (0.045)	0.564*** (0.182)
Maths (SD)	0.237*** (0.059)	0.714*** (0.265)	0.208*** (0.049)	0.627*** (0.212)
Mgmt (SD)	0.916*** (0.268)	–	0.928*** (0.260)	–

# Programme Impact on School Management

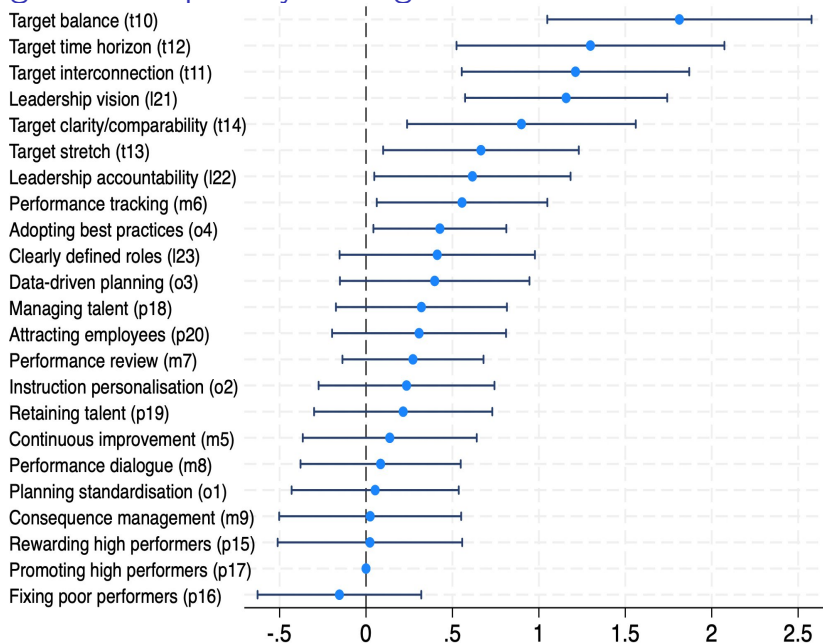


# Programme Impact on the Groups of Management Practices





# Programme Impact by Management Practice



## Impact in Terms of Years of Learning

One year of learning in a control school is equivalent to approximately 0.31 SD.

Treatment school pupils learnt in 2 years the equivalent to what is taught on average in 2.75 years at a control school.

Treatment schools were 37.5 % more productive.

Pupils from high implementation schools learnt in 2 years, the equivalent to what is taught on average in more than 4 years in a control school.

High implementation schools were 110 % more productive.

## Robustness Checks and Heterogeneity Analysis

- ▶ An exclusion restriction 'falsification test': the subgroup of schools that did not change management due to treatment also did not change learning.
- ▶ From IRT to CTT scores: results remain almost the same.  
[▶ Table](#)
- ▶ Units of analysis: from pupils to schools. Results remain the same.
- ▶ Multiple hypothesis testing: sharpened False Discovery Rate (FDR) q-values. All p-values remain within 1%.

No significant impact difference across subgroups of pupils.

Male and female; black, brown or white; poor families; different grades; performance quartiles in 2021. However, one more SD in 2021 management is linked to 0.174 SD more programme impact.

## Conflicting Evidence - Null results

Not all management practices impact pupils' learning.

Our group of management practices has shown a causal effect on learning.

Training alone may not change school management.

It is important to be close (within the school) to guide, help and control.

Small management changes may not be enough.

Learning detectable changes happen with large management changes.

Our programme had to change school management by 0.916 SD to change learning by about 0.23 SD.

## Why Did the Programme Work?

- ▶ **Lack of information:** the programme delivered information (simplified and adapted) on the best management practices. The programme 'made it easy' for managers to access the relevant information.
- ▶ **Lack of incentive:** The intervention focused on influencing managers to change their behaviour. Strong persuasion work - horizontal relationship!
  - ▶ The programme 'made it easy' for school managers to improve the management of their schools through one-to-one coaching, on-the-job training and simple tools.
  - ▶ The intervention changed the school manager's focus from bureaucracy to performance management.

## Brazil's Main News TV Programme - Fantástico

- ▶ Original documentary produced by Fantástico (TV Globo).
- ▶ Original documentary length: 13 minutes
- ▶ Edited version for the conference: 4 minutes.
- ▶ English subtitles added by the researcher.

▶ Documentary about the Science and Management for Education Programme

THANK YOU!

THE END

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# Pupils' Mathematics and Reading Scores

- ▶ Reading and mathematics tests were applied in December 2023 to all grades 1-9 pupils in a Rio de Janeiro school.
- ▶ Tests developed by an external organisation.
- ▶ Two types of scores: based on Classical Test Theory (CTT) and Item Response Theory (IRT).

▶ Outcome Box Plot

- ▶ Attrition rate:
  - ▶ 11% of missing (no significant differences between control and treatment).
  - ▶ Replacing December 2023 missing scores with previous scores from September, June or April 2023 tests - 1% of missing.

▶ Missing Table

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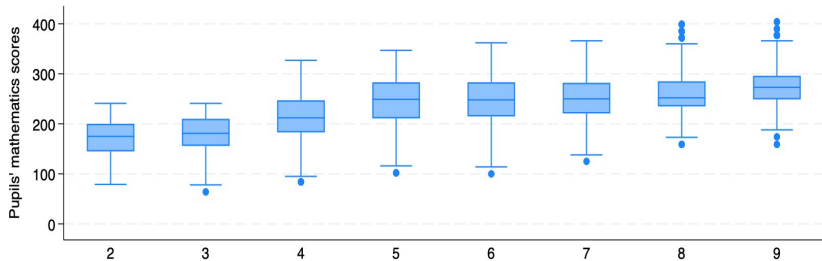
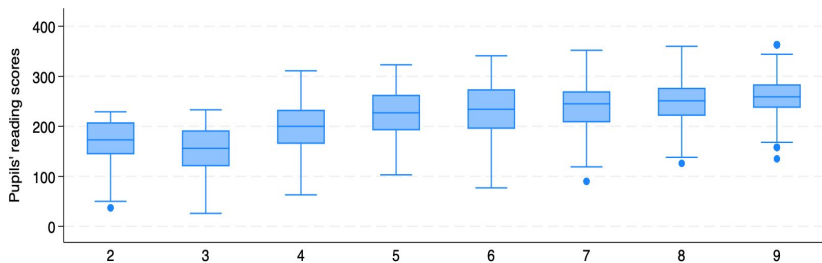
## Agreement Coefficients for the 2021 and 2023 Surveys

	2021	2023
Percent Agreement	0.922	0.941
<b>Brennan and Prediger</b>	<b>0.720</b>	<b>0.788</b>
Cohen/Conger's Kappa	0.608	0.709
Scott/Fleiss' Pi	0.608	0.709
<b>Gwet's AC2</b>	<b>0.760</b>	<b>0.811</b>
Krippendorff's Alpha	0.608	0.709

### Benchmark scale

<0.000	Poor
0.000 - 0.200	Slight
0.200 - 0.400	Fair
0.400 - 0.600	Moderate
0.600 - 0.800	Substantial
0.800 - 1.000	Almost Perfect

# Outcome Box Plot



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# Missing Outcome Data

Table IV: Pupils' Educational Performance Missing Data in 2022 and 2023

Pupils performance	Before adjustment		After adjustment	
	Missing	Percent	Missing	Percent
Reading - 04/22	2,650	8.34 %	2,650	8.34 %
Mathematics - 04/22	2,689	8.47 %	2,689	8.47 %
Reading - 06/22	2,950	9.29 %	844	2.66 %
Mathematics - 06/22	3,111	9.80 %	881	2.77 %
Reading - 04/22	3,008	9.47 %	511	1.61 %
Mathematics - 09/22	3,060	9.63 %	519	1.63 %
Reading - 09/22	3,001	9.45 %	399	1.26 %
Mathematics - 12/22	3,049	9.60 %	398	1.25 %
Reading - 04/23	5,289	16.65 %	368	1.16 %
Mathematics - 04/23	5,311	16.72 %	375	1.18 %
Reading - 06/23	3,849	12.12 %	351	1.11 %
Mathematics - 06/23	3,973	12.51 %	362	1.14 %
Reading - 09/23	4,006	12.61 %	350	1.10 %
Mathematics -09/23	4,067	12.81 %	356	1.12 %
Reading - 12/23	3,878	12.21 %	348	1.10 %
Mathematics - 12/23	3,985	12.55 %	355	1.12 %

# Alternative Pupils' Scores (CTT)

Table XI: The Treatment Causal Effects - Alternative Pupils' Scores (CTT)

	No covariates		With covariates	
	(1)	(2)	(3)	(4)
	ATE OLS	Mgmt ([1,5]) IV	ATE RA	Mgmt ([1,5]) IV/RA
Reading (SD)	0.209*** (0.055)	0.630*** (0.252)	0.174*** (0.042)	0.522*** (0.192)
Mathematics (SD)	0.220*** (0.053)	0.662*** (0.247)	0.194*** (0.044)	0.583*** (0.201)

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