Special Session FGV EESP CLEAR - SBE Policy
"Avaliação de Políticas para o Ensino Médio no Brasil"

Lucas Finamor
Sao Paulo School of Economics, FGV

► Challenging stage of education in many countries

High School

► Challenging stage of education in many countries

► One of the main challenges: school dropout

► In Brazil a large proportion of students do not graduate from HS

  ■ Among students enrolled in 8th grade in 2008–2012: only 62.4% enrolled in last year year of HS

HS graduation

► All students enrolled in 8th grade between 2008–2012 (School Census 2008–2017)

Sample	Graduate HS	Graduate HS or EJA
All	62.4%	70.7%
Girls	66.9%	74.1%
Boys	57.6%	67.0%
Public School	59.1%	68.1%
Private School	84.7%	87.8%
Black/Natives	56.1%	65.2%
White/Asian	70.4%	76.7%

- ▶ Dropout is huge, but it is not the only issue

- ▶ Low levels of proficiency

- ▶ Transitions into university and into labor market

Many policies were (have been) implemented

1. Full-time schools

2. Improvements in school management (Programa Jovem de Futuro, Programa do TCM-RJ)

3. High School Reform (2017)

4. Vocational Educational tracks (Novotec)

5. Scholarships (Programa Renda Melhor Jovem, Pé de Meia)

Presenters

► Tássia Cruz (EBAPE FGV)

► Victoria Jaeger (Instituto Unibanco)

► Caio Castro (FGV-EESP CLEAR)

Tássia Cruz
(EBAPE FGV)

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Escolas de Tempo Integral

Tassia Cruz[1]

[1]FGV EBAPE

12 de dezembro de 2024
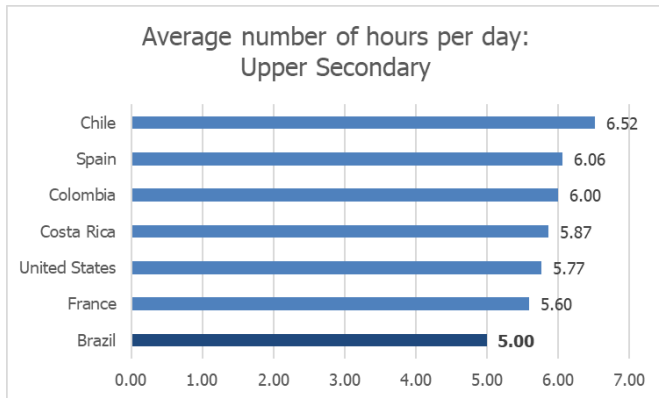
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- O Brasil tem uma das menores médias de tempo de aula por dia no mundo.

Source: Education at a Glance 2023. Indicator D1: How much time do students spend in the classroom?

- Há uma enorme desigualdade na oferta de escolas em tempo integral, com o Nordeste brasileiro sendo pioneiro, e o Norte tendo as piores médias.

Média de Horas-Aula Diária no Ensino Médio: Escolas Estaduais

Escala		
4	5	
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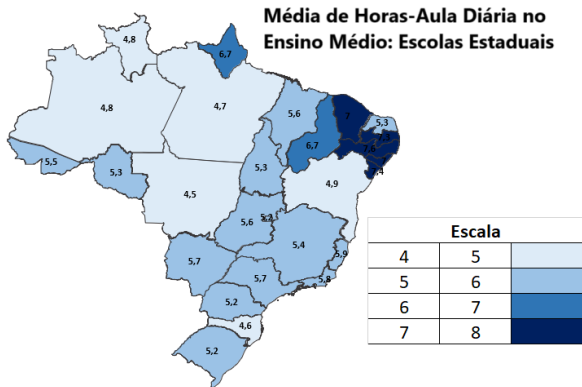
Fonte: Fonte: Censo da Educação Básica 2023/INEP.

Revisão de Literatura

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Resultados

- O desempenho aumenta com o tempo de instrução. Contudo (em geral) efeitos são pequenos em aprendizado (Lavy, 2015).

- Retornos maiores para grupos menos privilegiados (Rosa et al., 2022; Bellei, 2009; Cerdan-Infantes e Vermeersch, 2007).

- Retornos decrescentes para tempo de instrução adicional (Rivkin e Schiman, 2015).

- Efeitos positivos em outros fatores: abandono escolar, repetência, habilidades socioemocionais, práticas pedagógicas ativas (Boas e Abbiati, 2020; Martinic, 2015; García et al., 2013).

Revisão de Literatura

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Resultados

- Estudantes de baixo NSE têm menor probabilidade de se matricular em escolas de tempo integral (Elacqua et al. 2022).

- **Importância do contexto escolar**: Efeitos positivos dependem do ambiente da sala de aula (Rivkin e Schiman, 2015).

Que características organizacionais – como formação de professores, dedicação exclusiva e currículos diversificados – importam para os resultados?

"Full-Time Teachers, Students, and Curriculum: The Single-Shift Model in Rio de Janeiro."

1. As escolas que adotaram o Turno Único tiveram melhores resultados educacionais comparadas às escolas em tempo parcial?

2. Quais são as diferenças nos resultados entre as escolas 'certificadas' (Ginásio Carioca) e as 'não certificadas' no modelo Turno Único?

3. Quais fatores do modelo de Ginásio Carioca estão por trás dos resultados encontrados?

Tempo Integral no Município do Rio

1. **Ginásio Carioca:**
   - Ensino fundamental II ($7^{\underline{o}}$ ao $9^{\underline{o}}$ ano): Horário integral.
   - Currículo estruturado e diversificado: projeto de vida, estudo dirigido, inglês e disciplinas eletivas.
   - 100% dos professores com carga horária de 40 horas em uma única escola.
   - **Piloto: Ginásio Experimental Carioca**

2. **Primário Carioca:**
   - Ensino fundamental I ($1^{\underline{o}}$ ao $6^{\underline{o}}$ ano): Horário integral.
   - Professores preferencialmente com 40 horas, mas não obrigatório.

3. **Turno Único (Não Certificado):**
   - Escolas com horário integral (7 horas/dia), mas sem as características estruturais dos modelos certificados.

4. **Tempo Parcial:**
   - Horário reduzido (4 a 5 horas/dia).

- Impacto dos Ginásios Cariocas e das escolas de Turno Único não certificadas no resultado educacional:

$\text{Outcome}_{ti} = \beta_0 + \beta_1 \text{School}_i + \beta_2 \text{Year}_t$
$+ \beta_3 \text{Ginásio Carioca} \times \text{Post}_{it} + \beta_4 \text{Single-Shift} \times \text{Post}_{it}$
$+ \beta_5 \text{Schools of Tomorrow}_{ti} + \beta_6 \text{More Education}_{ti}$
$+ \beta_7 \text{Mean \# of items in the house}_{ti}$
$+ \beta_8 \text{\%Mothers w/ higher ed}_{ti}$
$+ \beta_9 \text{Age-grade distortion}_{ti} + \beta_{10} \text{Participation rate}_{ti} + \epsilon$
(1)

- Impacto do Turno Único (incluindo certificadas e não certificadas), comparando o modelo piloto e sua expansão:

$\text{Outcome}_{ti} = \beta_0 + \beta_1 \text{School}_i + \beta_2 \text{Year}_t$
$+ \beta_3 \text{Single-Shift in 2011} \times \text{Post 2011}_{it}$
$+ \beta_4 \text{Single-Shift in 2012/3} \times \text{Post 2012/3}_{it}$
$+ \beta_5 \text{Schools of Tomorrow}_{ti} + \beta_6 \text{More Education}_{ti}$
$+ \beta_7 \text{Mean \# of items in the house}_{ti}$
$+ \beta_8 \% \text{Mothers w/ higher ed}_{ti}$
$+ \beta_9 \text{Age-grade distortion}_{ti} + \beta_{10} \text{Participation rate}_{ti} + \epsilon$
(2)

Diff-in-Diff

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IDEB Middle Schools & Single-Shift
Diff in Diff

Control group (288 schools)
Became Single-Shift in 2011 (16 schools)
Became Single-Shift in 2012 or 2013 (17 schools)
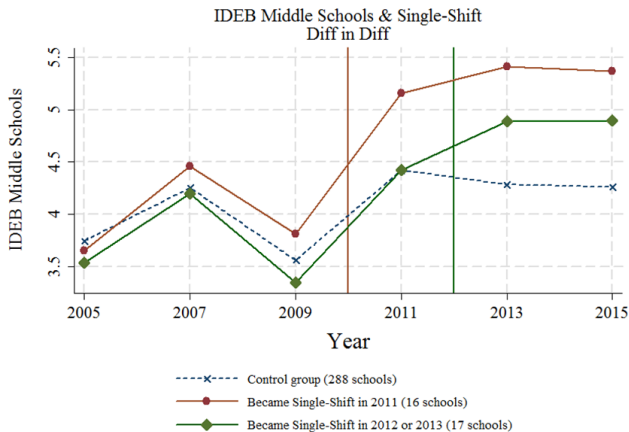
Notes: The Single-Shift program started in 2011. In 2011, there were 18 Single-Shift middle schools, 8 Single-Shift non-CMS and 10 CMS. Of these, 16 had complete information. In 2012-2013, 20 new schools became Single-Shift: 6 non-CMS and 14 CMS. Of these, 3 left the Single-Shift program. Source: INEP & MSE. Control group in this Figure refers to schools that did not become Single-Shift until 2015 or that left the Single-Shift program.

Resultados

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Ginasio Carioca & IDEB Middle Schools

	(1) IDEB Mid (SD)	(2) IDEB Mid (SD)	(3) IDEB Mid (SD)	(4) IDEB Mid (SD)
Carioca Middle School * Post	1.454	0.806	0.410	0.958
	[0.125]***	[0.110]***	[0.130]***	[0.149]***
Single-Shift * Post	0.153	0.011	-0.300	-0.318
	[0.157]	[0.133]	[0.109]***	[0.244]
School of Tomorrow	0.138	0.026	-0.505	0.092
	[0.088]	[0.090]	[0.109]***	[0.126]
More Education	0.101	0.09	0.262	0.1
	[0.053]*	[0.053]*	[0.090]***	[0.074]
Observations	1956	1635	164	820
Number of schools	326	327	41	164
R-squared	0.46	0.49	0.79	0.43
Student characteristics by school	No	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Restricted Sample	No	No	Yes	Yes

Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
Notes: IDEB Middle Schools 2005, 2007, 2009, 2011, 2013 and 2015. Columns (2) to (4) refer to the years 2007
through 2015. Column (3) refers to only schools that eventually became Single-Shift until 2015, from 2007 through
2013. Column (4) refers to only schools with low-age-grade distortion in 2010 (before the program). Clustered
standard error at the school level.

Principais resultados

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- Os alunos matriculados no Ginásio Carioca tiveram melhorias significativas nos resultados de aprendizado e taxas de aprovação.

- Não há diferenças significativas nos resultados entre o piloto e a expansão do programa.

- Não há melhorias significativas nos resultados dos alunos matriculados nos Primários Cariocas.

- A principal característica que diferencia o modelo de Ginásio Carioca dos demais modelos – Primário Carioca, Turno Único (não certificado), e modelo parcial – é a exigência de que todos os professores da escola trabalhem 40 horas semanais em uma única escola.

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- Assim como encontrado na literatura, achados reforçam a importância de considerar o contexto educacional para os efeitos do tempo integral.

- Importância de reformular estruturas organizacionais, em vez de simplesmente aumentar o tempo de aula.

- **Dedicação exclusiva dos professores** como fator-chave para efeito.

Victoria Jaeger
(Instituto Unibanco)

Evaluating the impact of a professional development program for principals on school management practices: Evidence from Brazil

Ricardo Madeira (Instituto Unibanco USP)
with B. Borges (EESP), G. Leite (EESP) and L. Meloni (USP)

motivation

- Brazilian context: increase in public education expenditure through the last decade *vs* Low performance at international student assessment rankings

- From a national point of view, the disparities in learning within the country cannot be explained by differences in per-student spending (de Barros, de Carvalho, Franco, Garcia, Henriques, and Machado, 2019)

- This pattern highlights the importance of governance and management to explain the persistence of low school effectiveness in developing countries (Glewwe and Muralidharan, 2016)

motivation

- The relationship between school governance, management practices and student achievement is well-documented in developed countries (Dobbie and Fryer (2013), Fryer (2014) and Fryer (2017)),

- However, the understanding of which management practices are important and in which contexts they are more or less likely to be effective is still limited.

- Measuring management practices is challenging: even though there are recognized instruments in the literature (Bloom et al. 2015), the set of measures that managers can take varies significantly depending on the institutional setting.

- This paper contributes to deepening the understanding of governance and management practices within schools in developing countries

- More specifically, we investigate the impact of a randomized school management program with documented positive effects on student outcomes on school management practices in Brazil.

- Considering the context of Brazilian public schools, we employ a survey instrument specifically developed to capture variation between schools in this setting.

main findings

- Our results show that the program increased the overall management practices index by 0.25 standard deviations

- Particularly, the program affects how principals use pre-established targets, use student learning assessments and identify school leaders and attribute responsibilities.

- Considering the correlation between school performance and the management practices index, the program's impact on management practices would be responsible for at least 50% of the effect of the program on students' achievement.

outline

Institutional background

Experimental design

Results

Discussion

Institutional background

context: underachievement and limited principal's autonomy

- The inefficiency in educational investment raises concerns about how resources are being used at the school level and gave rise to policies aiming to improve school management quality at municipal and state levels.

- In a context of scarce resources and limited autonomy, improvements in the management practices of principals are difficult to assess.

- Our study takes advantage of a program specifically designed to improve management quality and develops a survey management instrument that considers both the possibilities and limits regarding school principals' actions in Brazilian public schools.

the program

- The *Jovem de Futuro* (JdF) program started as a pilot in 2007. After over a decade, it has been implemented in 12 Brazilian states and attended more than 4,700 schools

- The primary objective of the program is to increase students learning and graduation rates by improving the management implementing actions in five major areas: Governance, Management training, Technical support, Mobilization and Knowledge Management

- Importantly, the program does not offer additional funds to schools - the program does not claim to change schools' performance by relaxing their budget constraints.

survey instrument

- Bloom et al (2015) developed the international World Management Survey school management index that comprises 20 management practices, evaluated in a 1 to 5 scoring grid

- The WMS tool is not designed to capture variation in institutions such as the public sector of developing countries.

- We take the WMS instrument as a reference and construct an instrument that adapts the management practices to the context of Brazilian public schools.

survey instrument

- Several rounds of adaptation of a questionnaire/instrument developed by the WMS:

    - Translation

    - Contextualization: management depends on the tools enabled by the institutional context (Ex: hiring and firing teachers)

    - Interaction with the technical teams of the Department of Education of the State of Espirito Santo

survey instrument

- Our management survey instrument comprises thirteen major managerial practices, graded in a five-categories rubric system.

- The topics addressed refer mainly to organization, planning, and execution of school activities, innovation and support of the instructional process, definition and evaluation of school leaders, use of available tools and information to assess student learning, and school identity.

survey instrument

Groups	Practices	Description
Pedagogical Practices	Pedagogical project	Evaluates school elaboration of the pedagogical project and how (and if) it is used to guide decisions.
	Teaching planning process	Evaluates the quality of the pedagogical planning process.
	Teaching and learning customization	Evaluates how principals identify pedagogical strategies to work with different levels of students' learning.
	Data use for student flow analysis	Evaluates how principals deal with absence, repetition, and dropout.
	New teaching practices adoption	Evaluates if principals encourage the improvement of teaching practices and the search for innovative learning strategies.
	Workflow improvement	Evaluates the process of problem-solving adopted by principals.
	School leaders definitions and tasks	Evaluates how principals identify school leaders and assign responsibilities to the management team and teachers.
Human Resources & School Identity	Workers evaluation	Identifies and qualifies how principals evaluate the performance of school professionals.
	Performance management and retention	Analyzes how (and if) principals deal with both great and poor staff performances.
	School image/identity	Assesses whether there is a concern of the manager in creating an identity for the school.
Evaluation Processes	External learning assessment	Evaluates how principals use national and state-level external evaluations to analyze students' learning conditions.
	Internal learning indicators	Evaluates how the school internally evaluates student performance.
	School targets	Evaluates whether there is a management focused on goals for student learning.

data collection

- We collected the primary data through phone interviews with principals between September and November of 2017

- The interviews were based on a predefined script of open questions and conducted as a guided and anonymous conversation.

- Interviews were recorded, and responses were graded twice by different graders to reduce measurement error.

survey instrument validity

- We have taken several precautions to validate the survey instrument and the interview method.
  - We applied the survey instrument as a pilot to test if we captured enough variation within the States
  - We conducted robustness checks regarding the agreement of grades.
  - We trained all interviewers based on real situations and did not mention the program during the training.
  - We report correlations between our instrument and i) average school performance; ii) a self-reported school's environment instrument (that asked teachers and principals aspects related to management quality)

Experimental design

Table 1: Experiment and Sample Composition

	Experiment Design			Sample composition	
	Strata	Details	Schools	Strata	Schools
Pará	42	39 (1T, 1C)	78	42	80
		3 (2T, 1C)	9		
Espírito Santo	70	11 (3T, 1C)	44	70	217
		59 (2T, 1C)	177		
Total			308		297

descriptive statistics

<div align="center">

Table 2: Descriptive Statistics

</div>

	Total sample		Treatment		Control	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Management Practices						
Average Index	4.13	0.497	4.19	0.476	4.03	0.520
Pedagogical Practices						
Pedagogical Project	4.14	0.966	4.16	0.974	4.10	0.956
Teaching planning process	4.21	0.655	4.22	0.651	4.19	0.665
Teaching and learning customization	4.35	0.784	4.42	0.685	4.23	0.932
Data use for student flow analysis	4.66	0.453	4.68	0.419	4.63	0.511
New teaching practices adoption	4.14	0.814	4.18	0.818	4.06	0.804
Workflow improvement	4.46	0.658	4.46	0.691	4.46	0.594
School leaders definitions and tasks	4.18	0.597	4.24	0.593	4.06	0.590
Human Resources & School Identity						
Workers evaluation	2.70	1.604	2.83	1.606	2.45	1.579
Performance management and retention	3.72	0.554	3.76	0.564	3.64	0.529
School image/identity	4.31	0.539	4.33	0.529	4.27	0.557
Evaluation Processes						
External learning assessment	4.48	0.893	4.59	0.801	4.30	1.020
Internal learning indicators	4.51	0.747	4.60	0.716	4.35	0.779
School targets	3.88	1.133	4.02	1.042	3.63	1.252
Observations	297		193		104	

empirical model

The assignment mechanism allows the program's impact to be causally measured through a simple mean difference between treated and control schools.

Formally, we estimate the impact by the following equation:

$$Y_{is} = \beta_0 + \beta_1 PJF_{is} + \gamma_s + \epsilon_{is}$$

- Y_{is} is a measure of school management quality of school i in the stratum s;
- PJF_{is} is a binary variable equal to one if school i in the stratum s received the program and zero otherwise;
- γ_s is the stratum fixed effect.

experiment validity

Table 3: Balance Test of Predetermined school characteristics

	(1) Full sample	(2) Treatment	(3) Control	(4) Difference
Management Complexity Index	4.882	4.917	4.817	0.098
	(1.038)	(1.062)	(0.993)	(0.128)
Elementary school	0.734	0.736	0.731	0.001
	(0.443)	(0.442)	(0.446)	(0.059)
High school	0.997	1.000	0.990	0.008
	(0.058)	(0.000)	(0.098)	(0.009)
Professional school	0.007	0.005	0.010	-0.003
	(0.082)	(0.072)	(0.098)	(0.014)
Number of students (per 1,000)	0.873	0.865	0.888	0.003
	(0.394)	(0.369)	(0.437)	(0.052)
Computer lab	0.926	0.933	0.913	0.007
	(0.262)	(0.251)	(0.283)	(0.035)
Science lab	0.650	0.668	0.615	0.035
	(0.478)	(0.472)	(0.489)	(0.066)
Sports court	0.838	0.824	0.865	-0.046
	(0.369)	(0.382)	(0.343)	(0.052)
Internet	0.990	0.984	1.000	-0.017
	(0.100)	(0.124)	(0.000)	(0.011)
Rural	0.027	0.031	0.019	0.008
	(0.162)	(0.174)	(0.138)	(0.021)
Backup activities	0.010	0.010	0.010	0.005
	(0.100)	(0.102)	(0.098)	(0.013)
Share of non-white teachers	0.479	0.477	0.485	0.025
	(0.194)	(0.187)	(0.206)	(0.020)
Share of female teachers	0.607	0.611	0.600	-0.009
	(0.134)	(0.134)	(0.135)	(0.015)
Observations	297	193	104	297
F-test of joint significance (F-stat)				1.307
F-test, number of observations				297

attrition

Variable	(1) In the sample	(2) Out of the sample	(3) Difference
Management Complexity Index	4.882	5.182	0.300
	(1.038)	(0.751)	(0.316)
Elementary school	0.734	0.636	-0.098
	(0.443)	(0.505)	(0.137)
High school	0.997	1.000	0.003
	(0.058)	(0.000)	(0.018)
Professional school	0.007	0.000	-0.007
	(0.082)	(0.000)	(0.025)
Number of students	873.047	1,107.727	234.680*
	(393.739)	(450.837)	(121.508)
Computer lab	0.926	0.727	-0.199**
	(0.262)	(0.467)	(0.083)
Science lab	0.650	0.545	-0.104
	(0.478)	(0.522)	(0.147)
Sports court	0.838	0.909	0.071
	(0.369)	(0.302)	(0.113)
Internet	0.990	0.909	-0.081**
	(0.100)	(0.302)	(0.035)
Rural	0.027	0.000	-0.027
	(0.162)	(0.000)	(0.049)
Backup activities	0.010	0.000	-0.010
	(0.100)	(0.000)	(0.030)
Share of non-white teachers	0.479	0.623	0.143**
	(0.194)	(0.078)	(0.059)
Share of female teachers	0.607	0.563	-0.044
	(0.134)	(0.117)	(0.041)
Observations	297	11	308
F-test of joint significance (F-stat)			0.654
F-test, number of observations			308

Results

impact on management practices

Variable	(1) Control group average	(2) Program effect
Average Index	4.028	0.130**
	(0.520)	(0.063)
Pedagogical Practices	4.245	0.066
	(0.487)	(0.058)
Pedagogical Project	4.096	0.076
	(0.956)	(0.121)
Teaching planning process	4.188	-0.027
	(0.665)	(0.075)
Teaching and learning customization	4.226	0.150
	(0.932)	(0.097)
Data use for student flow analysis	4.625	0.041
	(0.511)	(0.059)
New teaching practices adoption	4.058	0.081
	(0.804)	(0.093)
Workflow improvement	4.462	-0.010
	(0.594)	(0.083)
School leaders definitions and tasks	4.063	0.150**
	(0.590)	(0.070)
Human Resources & School Identity	3.457	0.137
	(0.701)	(0.086)
Workers evaluation	2.452	0.259
	(1.579)	(0.185)
Performance management and retention	3.644	0.098
	(0.529)	(0.073)
School image/identity	4.274	0.054
	(0.557)	(0.069)
Evaluation Processes	4.091	0.274***
	(0.803)	(0.096)
External learning assessment	4.298	0.247**
	(1.020)	(0.113)
Internal learning indicators	4.346	0.217**
	(0.779)	(0.094)
School targets	3.630	0.359**
	(1.252)	(0.152)
Observations	104	297

Discussion

interpretation

- Comparing our effects to the existing is not trivial, since related studies mainly investigate the impacts of management programs on students' performance or correlate variations in management practices indexes with school characteristics (exception is Muralidharan and Singh, 2020 and Romero et. al, 2022)

- Unlike the related papers, since we evaluate a program with documented impacts on student performance, we focus on providing evidence of impact on management practices as a potential mechanism

considering control group average scores...

- Our average results could be interpreted as...

    - *School leaders definitions and tasks*: part of the treated principals add a practice of developing/revising attributions with school employees'

    - *External learning assessment*: part of the treated schools add a reflexive process about those results involving all school community (parents, students, teachers, and staff members) to elaborate a school plan

- Our average results could be interpreted as...

    - *Internal learning indicators*: part of the treated schools add the practice of comparing internal and external evaluations to elaborate the schools' action plan

    - *School targets*: part of the treated schools add practices related to the diversity of targets, monitoring those targets, and involving the school community in discussions about them.

management as a potential mechanism

- On average, $+1$ point in our measure of management practices is associated with an average increase in both Language/Math std scores of 19.9 and 23.7 points, respectively.

- Assuming the correlation between our instrument and scores for the control group captures the effect in the absence of the program, the effect on student proficiency through an increase in management practices would be equivalent to 2.6-3.1 points in the state evaluation exams, corresponding to 1/2 of the total impact of the program.

Caio Castro
(FGV-EESP CLEAR)

Effects of Technical Education and Professional Qualification: Experimental Evidence from Novotec Integrado

This paper in a nutshell..

- **RQ:** What are the consequences of expanding the choice options to include technical and vocational courses for high school students?
  - ▶ Is there a higher retention of students in school? Is there an impact on their frequency?
  - ▶ Is there an improvement in student performance? Is there an effect on the probability of passing to the next academic year?

- Evaluate the effects of a technical and training course aimed at high school students

- **Key design feature**: large scale state program where people are studying in the area of their choice

- We track this impact evaluation through the following outcome path
  - ▶ Attendance
  - ▶ Frequencies
  - ▶ Grades
  - ▶ Approval for next academic year

- The context of our study is the *Novo Ensino Médio (NEM)*: increase in the minimum workload, common curriculum base and implementation of training itineraries

Contribution

- Discussion between substitution and complementarity between TVET and regular schooling

- Explore a framework in which we can investigate the existence of different impact between genders in educational outcomes

- First evidence of the *Novo Ensino Medio* impact

- Evaluate the effects of a technical and training course aimed high school students

Novotec Integrado

- *Novotec Integrado*: a program of Secretariat of Economic Development of the State of São Paulo (SDE), which aims to expand the offer of technical and vocational education in the state

- Students are included in the integrated technical education model, studying in the area of their choice

- Technical course integrated to High School classes and subjects, all in the same period of study hours (morning or afternoon), during the 3 years of this school stage

- At the end, the student leaves with a technical diploma and a certificate of completion of high school

- Technical courses in 10 areas, including administration, marketing, legal services, and systems development

Novotec Integrado - 2021

- In 2021 the student selection process was carried out by lotteries
- Students from the São Paulo state education system register in an online portal of the Secretariat of Education
- Registration in October, 2020
- Randomization in November, 2020
- Enrollments from February to April of 2021

Experimental Design

- Students apply online, indicating school and course of their choice

- Define class as a combination course and school

- Half the seats in each class are reserved for each gender;

- For each class, applicants are organized in 2 groups according to their gender

- Lottery occurs when there is excess demand in a given stratum.

Experimental Design

- Applicants in each group are randomly ordered

- Order respects (if exists) priority criteria

- The first S_k then receive an enrollment offer, where S_k is the number of seats available for waitlist k

- If a among the first S_k fail to enroll, then offers go down the waitlist until position $S_k + a$. This is repeated until all seats are taken;

Methodology

- ITT and LATE estimators

- Ever Offer (EO) estimators: offers continue until all seats are filled. This implies that the last applicant getting an offer must by construction be a taker (De Chaisemartin and Behaghel (2020))

- This means that expected proportion of takers is strictly greater among applicants getting an offer than among applicants never getting one

- Waitlist fixed effects are included in the estimation. They induce an endogenous reweighting of waitlists that usually further increases this imbalance between the two groups

Doubly Reweighted Ever-Offer - DREO

- Intuitively: dropping the last applicant getting an offer in each waitlist is sufficient to restore the comparability between applicants getting and not getting an offer

- Propose a estimator which is built through the comparisons of applicants that get and do not get an offer in each waitlist, downweighting applicants that accept their offer by an amount equivalent to dropping one of them. (DREO)

- DREO estimators of the ITT and LATE are consistent and asymptotically normal when the number of waiting-list lotteries goes to infinity.

◂ DREO

The Experiment

- 48,454 students registered in the Secretariat of Education's online portal expressing interest in TVET courses

- Lottery occurs when there is excess demand in a given stratum (school, course, and gender)
  - ▶ 9,968 students that received the initial offer enrolled, while 2,510 students from the wait-list enrolled
  - ▶ 800 strata with wait-list
  - ▶ Our partnership with SEDUC provide unique administrative data
    1. Socioeconomic characteristics of the student (date of birth, race, gender and family income level)
    2. Bimonthly records that identify in which municipality, school and class type (Novotec or otherwise) they are enrolled
    3. Information including information on which course they are attending if they are in the vocational track, in addition to their current grade.
    4. Preliminary data: incomplete administrative information from 2021 and 2022 (only first semester)

Summary of Results

- Increase in attendance
  - Persistent in all periods, with the biggest effects in the last two periods
  - Positive effect in both Novotec and core curriculum courses

- Frequency
  - ↓ in level of frequency
  - ↑ in volatility
  - All effects are present in core curriculum courses

- Mixed signal and non significant effects on grades

- ↑ in approval

- Main heterogeneity: gender
- No clear heterogeneity across courses

Discussion of results

- Students: (i) increase attendance (ii) decrease frequency in core curriculum; (iii) increase volatility; (iv) increase approval rates

- Add to a growing literature of TVET effects (but focus is mainly on labor outcomes)

- **Our contribution**: novel evidence + policy discussion
  - ▶ **Results**: show evidence of the role of TVET on educational outcomes
  - ▶ **Policy Discussion**: possible setbacks of *NEM*

- **Next steps**:
  - ▶ Full dataset (2021-2023)
  - ▶ New cohort
  - ▶ Standardized performance tests
  - ▶ Survey: labor outcomes; academic decisions

Experimental Design - Example

Generate a random number for each student

Sophia	0.156
Miguel	0.340
Davi	0.447
Alice	0.298
Arthur	0.330
Julia	0.439
Pedro	0.342
Isabella	0.013
Gabriel	0.930
Manuela	0.486
Laura	0.480
Bernardo	0.619

Lucas	0.575
Matheus	0.875
Luiza	0.127
Rafael	0.200
Heitor	0.565
Valentina	0.693
Giovanna	0.143
Eduarda	0.167

Helena	0.583
Enzo	0.906
Guilherme	0.443
Beatriz	0.867
Nicolas	0.091
Lara	0.390

Experimental Design - Example

Sort the applicants following the random number, respecting: (i) gender; (ii) distance

Valentina	0.693
Manuela	0.486
Laura	0.48
Julia	0.439
Alice	0.298
Eduarda	0.167
Sophia	0.156
Giovanna	0.143
Luiza	0.127
Isabella	0.013

Gabriel	0.93
Matheus	0.875
Bernardo	0.619
Lucas	0.575
Heitor	0.565
Davi	0.447
Pedro	0.342
Miguel	0.34
Arthur	0.33
Rafael	0.2

Beatriz	0.867
Helena	0.583
Lara	0.39

Enzo	0.906
Guilherme	0.443
Nicolas	0.091

Experimental Design - Example

Assuming that this class has 6 vacancies (3 for each gender)

Valentina	0.693	Gabriel	0.93
Manuela	0.486	Matheus	0.875
Laura	0.48	Bernardo	0.619
Julia	0.439	Lucas	0.575
Alice	0.298	Heitor	0.565
Eduarda	0.167	Davi	0.447
Sophia	0.156	Pedro	0.342
Giovanna	0.143	Miguel	0.34
Luiza	0.127	Arthur	0.33
Isabella	0.013	Rafael	0.2
Beatriz	0.867	Enzo	0.906
Helena	0.583	Guilherme	0.443
Lara	0.39	Nicolas	0.091

- Valentina, Manuela and Laura receive the enrollment offer
- Gabriel, Matheus and Bernardo receive the enrollment offer

Methodology

- ITT:
$$Y_{ik} = \alpha + \tau_{ITT} Z_{ik} + \beta X_{ik} + \gamma_k + \varepsilon_{ik} \tag{1}$$

- LATE:
$$T_{ik} = \alpha + \tau_{FS} Z_{ik} + \beta X_{ik} + \gamma_k + \varepsilon_{ik} \tag{2}$$

$$Y_{ik} = \theta + \tau_{LATE} \hat{T}_{ik} + \rho X_{ik} + \lambda_k + \nu_{ik} \tag{3}$$

- T_{ik} indicates if the applicant i in waitlist k receives the treatment, i.e, enrolls in the class

- Applicant i in waitlist k

- Dummy indicating whether applicant has received an offer

- γ_k waitlist fixed effect

DREO

- DREO estimator for the LATE:

$$\widehat{\Delta} = \frac{\frac{1}{K} \sum_{k=1}^{K} \frac{N_k}{\bar{N}} \left(\frac{1}{L_k - 1} \sum_{i:Z_{ik}=1} w_{ik} Y_{ik} - \frac{1}{N_k - L_k} \sum_{i:Z_{ik}=0} Y_{ik} \right)}{\frac{1}{K} \sum_{k=1}^{K} \frac{N_k}{\bar{N}} \frac{1}{L_k - 1} \sum_{i:Z_{ik}=1} w_{ik} D_{ik}} \quad (4)$$

- $w_{ik} = 1 - \frac{1}{S_k}$ for applicants that get and accept an offer. Everyone else has this weight equal to 1

- L_k denote the number of applicants getting an offer in waitlist k

- D_{ik} denote the observed treatment

- Z_{ik} denote whether applicant i gets an offer

- $\bar{N} = \frac{N}{K}$, N total applicants , N_k applicants in waitlist k, K waitlists.

Thank you