Advancing Diversity in School Leadership: Evidence from Colombia*

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Abstract

In Colombia, women represent 65% of the teacher workforce but only 34% of school principals, reflecting a significant gender gap in leadership. This study examines two centralized principal selection processes implemented by Colombia's National Civil Service Commission: the 2016 nationwide process and the 2018 process targeting disadvantaged PDET regions (Development Programs with a Territorial Focus). Both processes evaluated candidates through standardized tests, minimum requirements, and assessments of education and experience, determining eligibility for leadership vacancies. Our descriptive analysis shows how selection criteria influence gender representation. In 2016, standardized testing dominated, resulting in 45% of applicants being women but only 20% qualifying, with an overall eligible-to-vacancy ratio of just 0.7%. In contrast, the 2018 PDET process prioritized context-specific competencies and practical experience, yielding 35% female eligibility despite women comprising only 38% of applicants (likely due to challenging conditions in PDET regions). Moreover, eligible candidates of both genders outnumbered vacancies by 4.5 times. These findings underscore the critical role of selection design in shaping gender representation in school leadership. However, structural barriers, such as inadequate childcare and rigid work schedules, persist as obstacles to women's participation.

Keywords: *gender gap, educational leadership, school management, recruitment process, diversity in leadership, Latin America, Colombia*

1 Introduction

The gender gap in leadership roles remains a global challenge across sectors. In Latin America and the Caribbean (LAC), women hold only 29% of congressional seats, 25% of ministerial positions, 20% of corporate board seats, and 30% of positions on governing boards of multilateral organizations (Gonzalez and

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Ibanez, March 8, 2024). While these disparities are well-documented, less attention has been paid to the gender gap in school leadership (Bergmann et al., 2022; Wang and Gao, 2022). Globally, women comprise 68.3% of the teaching workforce in OECD countries but hold only 47.3% of school leadership positions (OECD, 2019). This disparity is even more pronounced in LAC, where in 2013, eight out of 15 countries reported at least a 20 percentage point gap between female teachers and principals (Adelman and Lemos, 2021). While countries such as Argentina, Brazil, and Peru have made strides in narrowing this gap, it remains a significant issue in others, including Colombia. In Colombia, where women constitute 65% of the teacher workforce, only 34% of school principals are female (Elacqua et al., 2024), underscoring the pressing need for targeted efforts to address gender inequality in educational leadership.

School principals play a pivotal role in shaping student outcomes, second only to teachers in terms of their impact (UNESCO, 2018; Grissom, Egalite, Lindsay et al., 2021; Branch et al., 2012; Coelli and Green, 2012; Muñoz and Prem, 2024; Hallinger and Heck, 1996; Heck et al., 1990; Marks and Printy, 2003; Pounder et al., 1995; Waters et al., 2003; Zheng et al., 2017).[1] Principals' responsibilities span curriculum implementation, teacher development, student disciplinary policies, financial management, and fostering a positive culture. By setting high expectations and guiding teachers, staff, students, and families, principals create environments conducive to effective learning (Darling-Hammond et al., 2022; Leithwood et al., 2004; Ten Bruggencate et al., 2012; Lemos et al., 2021; Bloom et al., 2015).

Female leadership provides broader institutional and societal benefits. In schools, greater gender balance fosters inclusive practices in teacher recruitment, retention, and diversity promotion (Husain et al., 2018; Grissom et al., 2012; Bartanen and Grissom, 2021; Branch et al., 2012; Campos-García and Zúñiga-Vicente, 2019). Female leaders often adopt participative leadership styles, encouraging collaboration and inclusion (Eagly and Karau, 2002; Shaked et al., 2018; Conto et al., 2023), and they serve as role models, positively influencing the aspirations and achievements of female students (Beaman et al., 2012; Bettinger and Long, 2005; Carrell et al., 2010; Dee, 2005; Lim and Meer, 2017; Paredes, 2014). However, challenges such as inadequate childcare, inflexible work policies, and gender biases recruitment practices continue to limit women's access to leadership positions (Grissom, Timmer, Nelson and Blissett, 2021; Bailes and Guthery, 2020; Angelov et al., 2016; Bertrand et al., 2010; Bertrand, 2018; Biasi and Sarsons, 2022; Blau and Kahn, 2017; Buser et al., 2014; Carrell et al., 2010; Howe-Walsh and Turnbull, 2016; Wang and Gao, 2022).

Recruitment processes play a critical role in shaping school leadership outcomes. Centralized systems, like Colombia's, promote equity by using competency-based selection tools to enhance transparency and mitigate discrimination (Bertrand and Mullainathan, 2004; Neumark et al., 1996; Muñoz and Prem, 2024; Oreopoulos, 2011; Riach and Rich, 2002). However, such systems are rare in education globally. In many regions, including LAC, principals are typically selected at the local level, where subjective criteria, such as experience and political connections, often outweigh merit (Ramachandram et al., 2017; Elacqua et al., 2021; Aravena, 2020). Colombia's centralized, competency-based recruitment approach stands out for its transparency and fairness, yet it can unintentionally reinforce disparities when standardized tests are heavily weighted, as women may experience test anxiety or face structural disadvantages in test prepara-

[1] Note that empirical evidence on principals' impact on student performance yields mixed results, with some studies finding no significant effects (Bartanen et al., 2024; Ten Bruggencate et al., 2012).

tion (Arias et al., 2023; Azmat et al., 2016; Cai et al., 2019; Jurajda and Münich, 2011).

This paper examines how institutional design impacts gender representation in educational leadership for coordinators, rural directors, and school principals in Colombia.[2] It compares two centralized selection processes: the 2016 nationwide process, which heavily weighted standardized testing, and the 2018 process, designed specifically for regions affected by armed conflict, poverty, and limited government presence—known as Development Programs with a Territorial Focus (*Programas de Desarrollo con Enfoque Territorial* - PDET). To better address the unique challenges in PDET regions, the 2018 process emphasized practical competencies and contextual experience, while reducing the weight of the high-stakes standardized exam used in 2016. Although a direct causal comparison between the two processes is not feasible, descriptive data suggests that the 2018 process narrowed the gender gap in eligibility and reduced the influence of socioeconomic factors.

Our findings reveal that the design of the 2016 selection process created significant barriers for women pursuing school leadership roles. The selection instruments exacerbated disparities: only 0.3% of female applicants were deemed eligible for leadership roles, compared to 1% of male applicants and an overall eligibility rate of 0.7% across all candidates. Women scored lower on the basic test, particularly in the numeric and functional components, reducing their likelihood of advancing beyond the eliminatory phase. Regression analysis further confirms these patterns, showing that only 16% of leadership vacancies were ultimately filled by women.

The 2018 selection process achieved notable progress despite challenging conditions in PDET regions. Female participation dropped to 38%, down from 45% in 2016, likely due to due to the remote and resource-scarce nature of PDET areas. Nevertheless, 19% of female applicants qualified for leadership roles, compared to 21% of male applicants and an overall eligibility rate of 20%. Moreover, the total number of eligible candidates in 2018 far exceeded available vacancies by 4.5 times, with 1,787 eligible candidates competing for 405 positions–a stark improvement over 2016, which yielded only 133 eligible candidates for 1,098 vacancies.

Further analysis of the 2016 selection process reveals persistent gender disparities even among eligible candidates. Women who qualified for leadership positions tended to select roles other than principal (e.g., coordinator), likely due to the greater work flexibility these positions offered. Conversely, principal positions were predominantly occupied by men. Additionally, women who attained school leadership roles were more frequently assigned to urban schools in less impoverished areas with lower risks of victimization—a pattern consistently observed across all candidates.

The remainder of this paper is organized as follows. Section 2 describes Colombia's school manager selection system and the features of the 2016 and 2018 PDET processes. Section 3 presents the data and empirical approach. Section 4 discusses the results, and Section 5 concludes with policy implications.

[2] In Colombia, rural directors are principals of a single, typically small school in a remote area, while school principals lead either a single large school or a network of schools, often spanning rural and urban sites. A 2001 reform merged some schools into networks, while others, particularly rural schools, remained independent. Research indicates that multi-site schools achieve similar test scores but have lower dropout rates compared to independent schools (Elacqua and Santos, 2020).

2 The Colombian School Manager Selection System

Between 1979 and 2002, both the selection and promotion of school staff in Colombia occurred through direct appointment by local governors and mayors. This changed significantly in 2002 when the National Civil Service Commission (*Comisión Nacional de Servicio Civil* - CNSC) implemented a centralized public competition system for filling school manager and teacher positions. This shift was meant to promote transparency, meritocracy, and equal opportunity, breaking away from regionally influenced practices. The new system was a reaction to a long-standing issue, where selection processes favored personal and political interests over merit—a common problem when decisions rely on committees, juries, or local authorities (Aravena, 2020; Donoso-Díaz et al., 2019; Soto Arango, 2013).

To manage the selection process, the CNSC established the Equal Merit and Opportunity Support System (*Sistema de Apoyo para la Igualdad de Mérito y la Oportunidad* - SIMO). This platform streamlines the application process by making information publicly accessible to candidates and providing transparency on available positions through the Public Offering of Career Jobs (*Oferta Pública de Empleos de Carrera* - OPEC). Additionally, the CNSC established call agreements with each certified territorial entity, requiring detailed information on vacancies. These legally binding and publicly available agreements outline the selection process and specified positions available for rural directors, coordinators, and principals. If positions remained unfilled after the competition, local authorities can make temporary appointments.

This centralized approach differs substantially from those used in other Latin American countries. While Colombia uses transparent evaluations and clear merit-based criteria to ensure an equitable selection process for all candidates, other countries in the region employ different models, ranging from democratic to politicized, each with varying degrees of centralization and discretion. Aravena (2020) provides an analysis of the approaches adopted in Brazil, Chile, Peru, and Colombia. Brazil follows a democratic model, where municipalities independently manage the selection process without a centralized system.[3] Peru uses a mixed model that combines objective, national-level evaluations with discretionary committee decisions in the final stages. Chile's model is centralized and objective but includes a discretionary element, allowing each municipality's mayor to choose from the top three candidates, adding a political component to the selection. Colombia, in contrast, employs a fully centralized, merit-based process that bases candidate placement solely on weighted test scores and applicant preferences, ensuring a transparent and non-political appointment.

Within this centralized framework, Colombia's selection process involves multiple assessment stages to evaluate candidates(Weinstein et al., 2019; Aravena, 2020).[4] However, its process stands out for providing a structured framework for evaluating and monitoring candidates throughout two main phases. In the first phase, under CNSC oversight, candidates complete multiple assessments of their capabilities. In the second phase, candidates' performance during a probationary period is evaluated, and determines

[3]Each municipality establishes its own selection criteria, often involving input from local school councils, parents, teachers, and community representatives. The selection process typically includes a combination of candidate evaluations, such as interviews, written assessments, and occasionally public votes or endorsements.

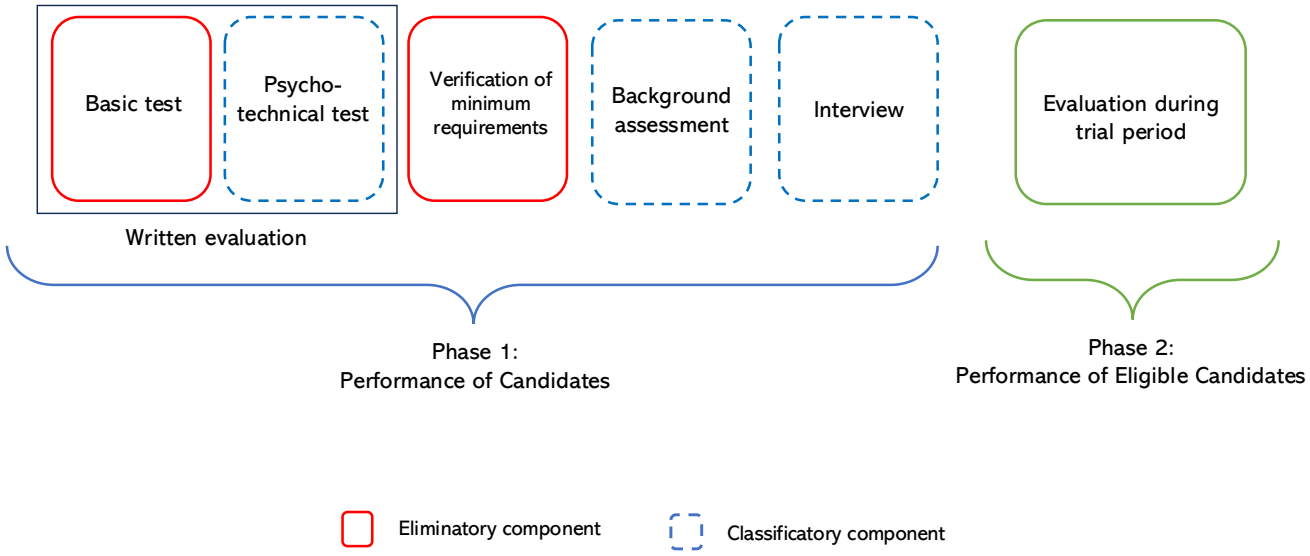
[4]See Table A1 for a comparative overview of selection processes in Latin American countries.

whether they are offered a permanent position.

Specifically, the first phase is made up of four assessment stages (Figure 1), the first of which is a basic competency test measuring knowledge and skills relevant to the leadership position, together with a psycho-technical test evaluating behavioral competencies. In the second stage, candidate's qualifications are verified, particularly relative to minimum educational and professional requirements. In the third stage, predefined scoring metrics of scholastic achievement and work experience are used to review candidates' backgrounds. In the final stage, candidates are interviewed using a group case-solving activity to assess practical problem-solving skills.

The written evaluation and minimum requirements verification are eliminatory assessment stages, essential for determining candidate eligibility.[5] Meanwhile, scores on the basic test, psycho-technical evaluation, background assessment, and interview are classificatory, contributing to a composite total that establishes candidates' rankings for available school positions. Based on these rankings, candidates sequentially choose vacancies according to their preferences. These selections are formalized during public hearings, initiating a one-year probationary appointment phase.

Figure 1: Phases and Assessment Stages in 2016 School Manager Selection Process



[5]The criteria for the tests and minimum requirements are outlined in a job functions manual prepared by the Ministry of Education (*Ministerio Nacional de Educación* - MEN) and endorsed by labor unions. The scoring matrix for evaluating candidate background was developed collaboratively by the MEN and the CNSC. Decree 915 of 2016 specifies that the basic test must account for no less than 45% of the final score, the psycho-technical test no more than 15%, the background assessment up to 35%, and the interview no more than 15%. These guidelines ensure a balanced evaluation of candidates' competencies and suitability for leadership roles.

To strengthen the integrity and effectiveness of the selection process, third-party organizations with proven expertise design and implement the assessment stages. Notable examples include the Colombian Institute for the Evaluation of Education (*Instituto Colombiano para la Evaluación de la Educación* - ICFES) and accredited higher education institutions.

The framework allows for modifications of the standard selection process to accommodate special competitions. For instance, the removal of certain assessment stages to address unique circumstances such as affirmative action initiatives for ethnic groups or tailored selection processes for regions impacted by the Colombian peace process. This flexibility means that the selection process can be adapted to diverse needs and contexts, thus improving its inclusiveness and relevance across different scenarios.

To date, the CNSC has conducted eight public selection processes, which have collectively offered 127,418 permanent positions, representing approximately 38.5% of the national teaching workforce. Of these positions, 10,912 have been educational leadership roles, including coordinators, rural directors, and principals, comprising 55% of the total leadership staff (see Table A2).[6]

To examine the impact of this nuanced approach to merit-based selection on leadership configuration, we focus on two distinct selection processes: the nationwide public selection process held in 2016 and the targeted selection process in the PDET territories in 2018. These cases allow to better understand how variations in the selection process can shape the landscape of educational leadership.

2.1 Centralized Selection Process for School Managers in 2016 and 2018

In 2016, the CNSC conducted a general selection process to fill 1,098 school management vacancies across the country. As described above, this process employed a merit-based multi-stage assessment approach. The basic test, measuring general aptitudes and specific competencies relevant to educational leadership, played a crucial role in defining merit (ICFES, 2016b).[7] Specifically, its components were weighted, allocating 60% to generic skills and 40% to functional competencies relevant to school management. This structure thus prioritized broad, general skills over role-specific abilities. The evaluation of candidates' backgrounds meanwhile favored educational qualifications over practical experience, impacting scoring and candidate rankings. Broadly, the process evaluated numerical and verbal aptitudes and incorporated a pedagogical component to assess candidates' ability to engage with knowledge, connect with their audience, and demonstrate professional competence.

The 2018 selection process began under the Territorial Development Program (*Programas de Desarrollo con Enfoque Territorial* - PDET), part of the "Final Agreement for Ending the Conflict and Building a Sta-

[6] The different processes have not resulted in a filling of all respective vacancies. For instance, only 16% of the vacancies were filled in the 2016 process.

[7] This assessment component, evaluating both general aptitude and specific competencies, was uniformly administered to all candidates, regardless of whether they were applying for teaching or school management roles. It followed the Saber Pro tests, a higher education exit examination developed by the ICFES for university students approaching graduation. The evaluation of basic competencies for school management positions followed the "Functions Manual," which outlines the core responsibilities of principals, rural directors, and coordinators, ensuring alignment with these roles (ICFES, 2016a).

ble and Lasting Peace," signed in November 2016 between the Colombian government and the guerrilla group FARC-EP. This program targeted areas affected by armed conflict and poverty, characterized by limited state institutional presence.[8] The special 2018 process aimed to fill 405 management positions, and particularly sought candidates able to adapt to challenging working conditions. The basic test and background assessment were adjusted to focus on role-specific competencies and prioritized work experience—particularly in conflict-affected areas—over academic qualifications. The interview stage was eliminated. The modified scoring system was designed to select candidates better suited to PDET territories, where practical experience and situational judgment was valued more than theoretical knowledge. This shift sought to attract and retain leaders capable of making a meaningful impact in areas most in need of educational support. Of interest to our study, these modifications offer an opportunity to analyze how selection process design changes influence candidate eligibility and profiles.

3 Data

3.1 2016 Nationwide Selection Process and 2018 PDET Selection Process

The data for both the 2016 school management selection process and the 2018 PDET selection process come from the National Civil Service Commission (*Comisión Nacional de Servicio Civil* - CNSC) and contain information on participating territorial entities, vacancies, and candidates, including demographics, educational background, performance metrics, scores, and status at each stage. A unique code (OPEC), links each territorial entity to job titles, such as coordinator, rural director, or principal.

We integrated additional data on candidates' municipality and department of birth to approximate cultural and socioeconomic background, using variables such as ethnic group affiliation, multidimensional poverty levels by quartiles, and victimization risk levels. A detailed description of these variables and their sources is provided in Appendix A.

The scoring criteria differed between the two selection processes. The 2016 process data includes basic test scores across multiple components (numerical, verbal, pedagogical, and functional), psycho-technical test results for all participants, background assessment and interview scores, as well as final scores for candidates deemed eligible for leadership roles. In contrast, the 2018 PDET process data includes the basic and psycho-technical test scores for all candidates, but the background assessment and final scores only for candidates deemed eligible.

We categorized degrees as either STEM (Science, Technology, Engineering, and Mathematics) or non-STEM (following CINE-UNESCO guidelines) using a methodology based on keywords. This approach allows to evaluate the influence of candidates' academic backgrounds on their eligibility and performance

[8] Initially, 170 municipalities in 19 departments were selected, organized into 16 subregions that represented 36% of the national territory and 24% of the rural population (Law 893 of 2017).

in the selection processes.[9]

3.2 School Labor Market in 2020 and 2023

Staff databases from 2020 and 2023, provided by Colombia's Ministry of Education, offer detailed information on the profiles of teachers and school administrators. Specifically, they contain job characteristics, such as area of expertise, salary, years of experience, and participation in ethnic education programs, making it possible to track employment statuses and roles of educational managers, and identify the schools where they work.

3.3 Full and Analytic Sample

The 2016 selection process aimed to fill 1,098 school leadership positions: 364 principals, 163 rural directors, and 571 coordinators, representing about 6% of all leadership roles. Forty-eight territorial entities participated, attracting 22,175 applicants, averaging 18.6 candidates per vacancy. However, only 16% of these positions were filled overall. Our analysis focused on the 20,293 participants who completed the initial stages —the basic and psycho-technical tests. Missing birth municipality data reduced the sample to 20,101 candidates, while missing academic degree information further narrowed it to 20,007 candidates, representing 90% of the original pool of applicants. Candidates lacking detailed professional degree data, necessary for STEM categorization, were assumed to be non-STEM.[10]

The 2018 PDET selection process received 9,697 applications to fill 405 vacancies (173 principals, 94 rural directors, and 138 coordinators) across 21 PDET territorial entities. Among all applicants, 1,803 candidates qualified as eligible, and filled approximately 86% of positions. A total of 8,796 applicants completed the initial tests. Missing demographic and academic information reduced the sample to 8,767 participants, representing 90%of the original pool of applicants. Candidates without specific undergraduate program details were classified as non-STEM.

We incorporated labor market data from 2023 for the 2016 contestants and from 2020 for the 2018 contestants.[11] This supplemented missing academic details and refined the STEM categorization for candidates with unspecified professional programs. The final samples comprise 20,007 individuals for the 2016 contest and 8,767 individuals for the 2018 contest.

[9]Specifically, we used undergraduate study program and a set of keywords to classify degrees by area. Each case was reviewed individually to ensure the most accurate categorization possible.

[10]Of the 20,101 contestants, 12.3% did not provide the necessary information for STEM classification and were thus categorized as non-STEM.

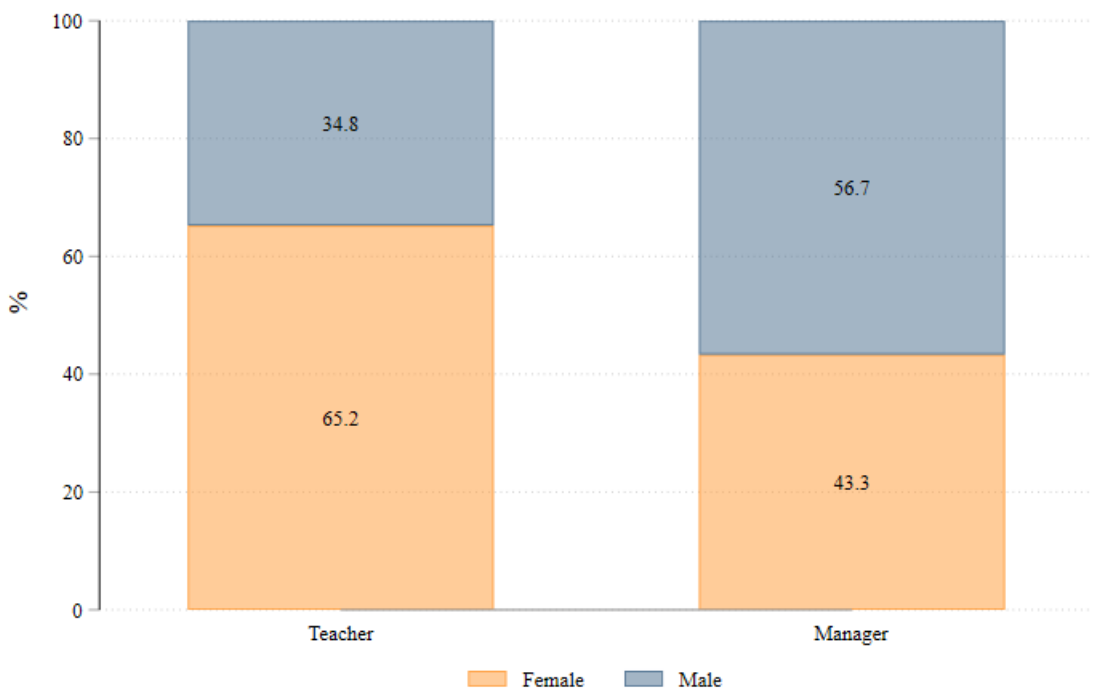
[11]Labor market information was available only for these specific years for each selection process.

3.4 Main Variables and Descriptive Statistics

The key variables for our analysis, detailed in Tables A3 and A4, reveal distinct demographic profiles and qualifications for participants in the 2016 and 2018 selection processes. In the 2016 contest, women made up 45% of the participants, a proportion that dropped to 38% in the 2018 PDET contest, possibly due to the more challenging and riskier conditions in these territories. Participants averaged 42.6 years of age in 2016 and 41.5 years in 2018. Both selection processes drew participants from municipalities in the lowest poverty quartile and with low to medium-low victimization risk. However, the 2018 PDET process saw more participants from areas with higher victimization risk, aligning with the initiative's goals. Most participants held at least a bachelor's or associate's degree. The 2016 process had a higher proportion of participants with a graduate degree (master's or doctorate), while in the 2018 process there was a modest increase in participants with STEM backgrounds.

Despite these two centralized selection processes, data from 2023 shows a persistent underrepresentation of women within school management roles: women make up 65% of the teaching workforce but account for just 43% of managerial positions (Figure 2). This discrepancy highlights the need for greater female participation in centralized selection processes and the importance of addressing the structural barriers that hinder women's career advancement in education.

Figure 2: Share of Teachers and Managers by Gender in 2023



Our 2016 selection process analysis examines three dimensions: contest outcome, employment status

in the school labor market, and characteristics of the municipality home to the management position.[12] The more limited 2018 PDET selection process data allows to assess contest outcomes, including scores from the basic and psychometric tests and the likelihood of candidates passing the basic test and meeting minimum requirements. We also employ an additional analytical approach to evaluate the 2018 contest outcomes and to conduct a descriptive comparison with the 2016 contest results.

4 Results

4.1 Nationwide 2016 Selection Process for School Managers

This section explores which factors shaped outcomes in the 2016 selection process, focusing on candidates' performance across stages and components and their progression through each phase. We focus on the process's design and assessment tools, particularly the basic test, which disproportionately hindered female candidates' advancement.

An analysis of test scores and pass rates, differentiated by gender, reveals significant disparities. Women scored lower on the general basic test, especially on the numeric and functional components, but outperformed male candidates on the pedagogical component.[13] These performance disparities created gaps in passing rates for the basic test, with only 0.5% of women advancing compared to 1.4% of men (Table 1).

[12] The first dimension concerns scores from the basic test and its four components (numerical, verbal, pedagogical, and functional), the psycho-technical test, and the likelihood of candidates passing the two key elimination stages (i.e., the basic test and minimum requirement verification). The labor market dimension captures whether individuals secured a position, using binary variables to indicate if a candidate held a school management role or a specific position such as rural director, coordinator, or principal, distinguishing between interim and permanent appointments. We also analyze salaries using the logarithm of salaries. Finally,the third dimension regards the attributes of municipalities where positions exist, where we use binary variables to indicate whether jobs exist in the poorest or least poor quartile and their level of victimization risk (high, medium-high, low). Additional variables include the ethnic population percentage, whether the school is in a rural area, and the logarithm of GDP per capita (sourced from Acevedo and Bornacelly Olivella (2014) and compiled by the Center for Economic Development Studies [*Centro de Estudios sobre Desarrollo Económico* - CEDE]; Link).

[13] For a graphical distribution of the basic test components by gender, see Figure 4.

Table 1: Descriptive Statistics of the 2016 Selection Process by Gender

Variables	Male (1)	Female (2)	Diff. (2) – (1)
Basic test score	51.62	49.10	-2.516^{***}
Numeric component score	53.96	43.86	-10.10^{***}
Verbal component score	58.09	58.18	0.090
Pedagogical component score	46.89	47.19	0.293^{*}
Functional component score	49.58	48.15	-1.431^{***}
Psycho-technical test score	49.28	49.49	0.206^{*}
Final score	67.71	66.99	−0.720
Probability of Passing Basic test	0.014	0.005	-0.009^{***}
Probability of Meeting Minimum Requirements	0.010	0.003	-0.007^{***}
Observations	11,061	8,946	–

Note: School managerial positions require candidates to achieve a minimum score of 70 out of 100 points on the Basic test. *p<0.10, ** p<0.05, *** p<0.01.

We estimate a series of regressions controlling for relevant variables to assess the performance of applicants. Column (1) of Table 2 shows that female candidates scored 0.33 standard deviations lower than their male counterparts on the basic test (extended analysis in Table A5). The likelihood of women passing the basic test and minimum requirements was 0.9 and 0.7 percentage points lower respectively (columns (7) and (8)). These reductions translate to discrepancies of 90% and 106% relative to baseline pass rates of 1% and 0.7% for these stages, indicating substantial barriers disproportionately affecting women, especially at the basic test stage. This disparity exists despite data showing no significant gender differences in education levels (Table A6).

Table 2: Effects of Gender on Outcomes in the 2016 School Manager Selection Process

			Basic test components				Approval probability	
	Basic test score (1)	Psycho-technical test score (2)	Numeric (3)	Verbal (4)	Pedagogical (5)	Functional (6)	Basic test (7)	Ver. of min. requirements (8)
Female	-0.325***	0.025*	-0.513***	-0.051***	-0.021	-0.185***	-0.009***	-0.007***
	(0.013)	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)	(0.001)	(0.001)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007
R-Squared	0.18	0.01	0.22	0.11	0.08	0.04	0.01	0.01

Note: Observations include all individuals who participated in the various tests of the competition. Columns 1 and 2 show standardized scores for the basic test and the psycho-technical test. The components of the basic test—numerical, verbal, pedagogical knowledge, and functional knowledge—are presented in columns 3 to 6 and are also standardized. Columns 7 and 8 display the probability of passing each stage of the competition. Covariates include ethnicity, age, highest level of education achieved, STEM major status, and residency characteristics such as rurality, poverty, and victimization risk indexes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A more detailed analysis of the basic test reveals that women performed less well across multiple components, including numerical and verbal aptitudes, and basic or functional competencies. The gap is

widest for the numerical component, even after adjusting for socioeconomic background and academic qualification.

This disparity in part reflects the different educational paths chosen by female participants, who are less likely to have pursued STEM-related undergraduate programs compared to their male counterparts (38% of women vs. 49% of men). In addition, historical data shows that women generally score lower than men on aptitude tests across educational levels, from primary through high school (Arredondo et al., 2019; Bernal and Bernal, 2016; Gelber et al., 2016). Results from the past seven years of the *Saber 11* test, required for higher education admission in Colombia, reveal that women consistently score lower than men in both mathematics and overall performance. A similar pattern appears on the *Saber PRO* test, a mandatory college exit exam.[14] It has been argued that this performance gap is due to higher levels of test anxiety among women in high-stakes exams, particularly in mathematics—a factor heightened in competitive settings (Arias et al., 2023; Azmat et al., 2016; Cai et al., 2019; Jurajda and Münich, 2011).

The selection process outcomes show women initially comprising 43.6% of applicants, yet only 24% of this group passed, compared to 76% of male applicants. This suggests that in placing significant emphasis on generic competencies such as numerical and verbal skills, the basic test put female candidates at a disadvantage. Notably, the basic test is modeled after the *Saber Pro* test, thus indicating broader issues with educational quality and underscoring the learning and performative gaps faced by women in Colombia.

4.1.1 Effects on Labor Market Outcomes

Data on the applicants in the 2016 selection process also allows to examine labor market outcomes for school managers in 2023.[15] Specifically, we assess gender differences in school management positions and explore how candidates deemed eligible for leadership roles have performed. The variable *Eligible* serves as an explanatory factor.

Table 3 investigates the likelihood of securing a managerial position, distinguishing between permanent and temporary appointments (detailed results in Table A7). A permanent position implies having passed the competitive selection process and successfully completed the probationary period, and thus being full integrated into the education managerial profession, including associated career rights.[16]

[14] For more details on gender trends in *Saber 11* and *Saber PRO* results, see Figures 5, 6, and 7.

[15] Data constraints limit labor market data to 2023, and prevent matching this data with the 2018 selection process.

[16] In passing the selection process, choosing a vacancy, and receiving an appointment to that position through a public hearing, the job remains temporary for a probationary period. Successful evaluation of this period secures the position, failure results in termination. "Provisional" and "temporary" appointments designate interim positions that remain open until filled through the formal selection process. These temporary appointments provide continuity in teaching and management roles until permanent staff are selected.

Table 3: Effects of Gender on Labor Market Outcomes in the 2016 School Manager Selection Process

		School Manager		Rural director		Coordinator		Principal		
	School Manager	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Log(Salary)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Eligible	0.647***	0.648***	-0.001	-0.010	-0.000	0.243***	-0.000	0.415***	-0.000	0.075***
	(0.038)	(0.038)	(0.003)	(0.010)	(0.001)	(0.033)	(0.002)	(0.022)	(0.001)	(0.022)
Female	-0.067***	-0.066***	-0.001*	-0.005***	-0.000	-0.020***	-0.000	-0.041***	-0.000*	0.018**
	(0.006)	(0.006)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)	(0.003)	(0.000)	(0.007)
Female × Eligible	-0.037	-0.038	0.001	0.005	0.000	0.216***	0.001	-0.259***	0.000	-0.049
	(0.086)	(0.086)	(0.006)	(0.022)	(0.002)	(0.074)	(0.005)	(0.050)	(0.003)	(0.051)
Covariables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007	3,978
R-Squared	0.07	0.07	0.00	0.00	0.00	0.03	0.00	0.04	0.00	0.28

Notes: Observations include all individuals who participated in the various tests of the competition, except for column 10, which is estimated only for individuals working as principals in 2023. Covariates include ethnicity, age, highest level of education achieved, STEM major status, and residency characteristics such as rurality, poverty, and victimization risk indexes.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Eligible individuals (0.7% of all participants) had a substantially higher likelihood (64.8 percentage points) of securing permanent leadership roles in schools. This advantage includes an increase of 24.3 percentage points for coordinator roles and 41.5 percentage points for principal positions, with no impact on the likelihood of becoming a rural director. Eligible candidates earned a 7.5 percentage point higher salary.

Among female candidates, women had a 7 percentage point lower chance of attaining permanent leadership positions across all roles. The largest disparity appears for the role of principal, with a 4.1 percentage point gap, followed by that of coordinator at 2 percentage points, and rural directors at 0.5 percentage points. However, women in leadership roles earned 1.8 percentage points more than their male counterparts, suggesting that the women who do secure these positions tend to have higher skill levels.

While gender, combined with eligibility, did not significantly impact the overall likelihood of becoming a manager, columns 6 and 8 reveal that eligible women are more likely to secure coordinator roles than principal positions compared to men. This finding indicates potential structural barriers that limit women's advancement to principal roles, possibly due to preferences for jobs with greater flexibility and fewer working hours.

4.1.2 Effects on Geographical Outcomes

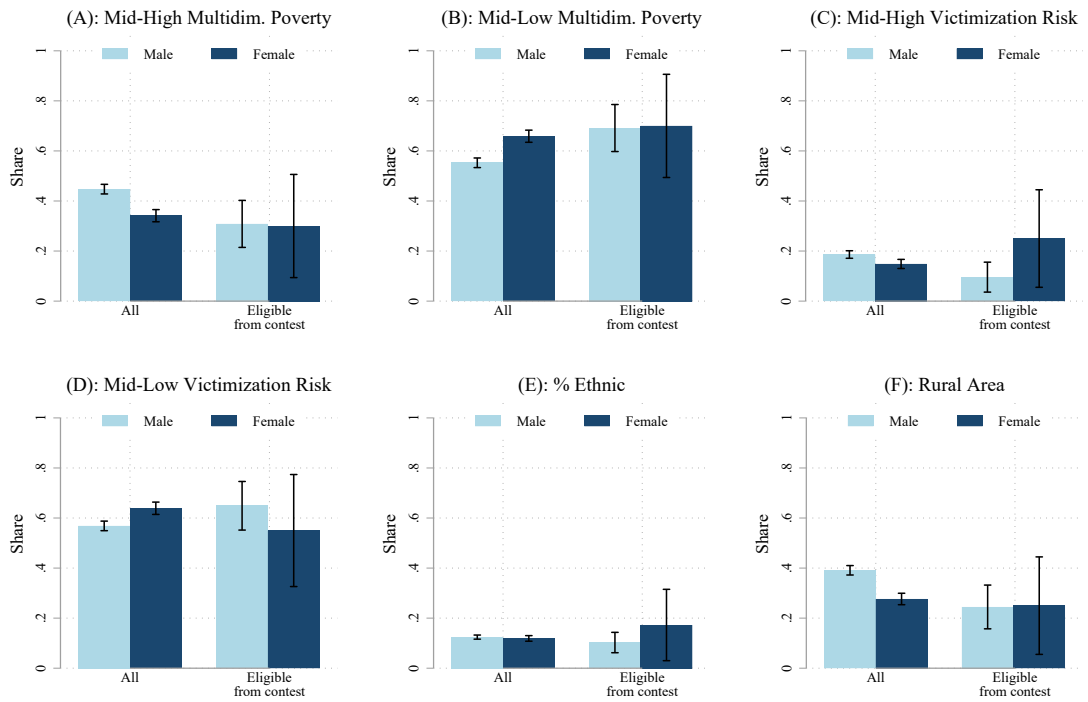
We further explore gender disparities within school management by examining the characteristics of schools where managers are employed. These characteristics are inferred from municipal-level variables, with the exception of school rurality, which comes from the labor market dataset. We analyze how these dynamics shift based on candidates' eligibility status in the 2016 selection process.

Figure 3 shows that female school managers work in municipalities with lower levels of poverty and victimization risk compared to their male counterparts. Men are more likely to work in areas with higher poverty and victimization levels. On average, both genders chose positions in municipalities with lower

poverty and victimization risks. However, female candidates' choices showed greater variability, likely due to their lower representation among those who qualified as eligible for leadership roles in the 2016 selection process.

The ethnic composition of municipalities where school managers work showed no significant differences, across both the general sample of principals and those who passed the 2016 selection process. However, women work less in rural schools. Eligibility status influenced the preference for urban positions, as eligible men and women assumed leadership roles in urban rather than rural settings.

Figure 3: Characteristics of Principal's School Location by Gender in the 2016 School Principal Selection Process



4.2 Selection Process for School Managers in PDET Territories in 2018

We extend the analytical approach from Section 4.1 to analyze the PDET 2018 selection process. As described above, this process introduced substantial modifications designed to recruit applicants to the hard-to-staff PDET territories. It addressed the unique demands of these areas by prioritizing relevant competencies and knowledge and incorporating a test format that included case studies reflective of the PDET context. Unlike the 2016 process, which emphasized numerical abilities, the 2018 process prioritized experience and awarded additional points to candidates affected by conflict or originating from the PDET territories.

Table 4 reveals no significant gender disparities in basic test scores, indicating equal opportunities in pass-

ing this initial stage. However, women scored lower on the psycho-technical test, leading to lower overall scores. A two-percentage-point gap in meeting minimum requirements emerged, largely attributable to differences in experience and female candidates' qualifications. This shift in selection criteria for the 2018 PDET process reflects an effort to improve candidate suitability for positions in these challenging regions.

Table 4: Descriptive Statistics of the PDET 2018 Selection Process by Gender

Variables	Male (1)	Female (2)	Diff. (2)-(1)
Basic test score	63.75	63.43	-0.314
Psycho-technical test score	64.90	64.32	-0.580**
Final score	59.12	57.79	-1.327***
Probability of Passing Basic test	0.282	0.281	-0.001
Probability of Meeting Minimun Requirements	0.211	0.191	-0.020**
Observations	5,477	3,290	-

Note: School managerial positions require candidates to achieve a minimum score of 70 out of 100 points on the basic test.
* p<0.10, ** p<0.05, *** p<0.01.

We estimate a series of regressions using standardized scores on the basic and psycho-technical tests, and the probability of passing the elimination stages (basic test and minimum requirements verification) as dependent variables. These estimates control for confounding factors, consistent with the 2016 analyses. Table 5 supports the previous results, showing that women scored 0.06 standard deviations lower in both assessed areas. They were also 2.4 percentage points less likely to meet the minimum requirements (see Table A8 for an extended analysis). Unlike the 2016 process, the 2018 PDET contest presented fewer barriers for women, suggesting that adjustments to the selection criteria and process design contributed to narrowing the gender gap in school leadership selection.

Table 5: Effects of Gender on Outcomes in the PDET 2018 School Manager Selection Process

			Approval probability	
	Basic test score (1)	Psycho-technical test score (2)	Basic test (3)	Ver. of min. requirements (4)
Female	-0.063***	-0.064***	-0.011	-0.024***
	(0.022)	(0.022)	(0.010)	(0.009)
Covariables	Yes	Yes	Yes	Yes
Observations	8,767	8,767	8,767	8,767
R-Squared	0.07	0.03	0.04	0.03

Note: Observations include all individuals who took the various tests of the competition. Columns 1 and 2 show standardized scores for the basic test and the psycho-technical test. Columns 3 and 4 display the probability of passing each stage of the competition. Covariates include ethnicity, age, highest level of education achieved, STEM major status, and residency characteristics such as rurality, poverty, and victimization risk indexes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Focusing on candidates who qualified as eligible, we compare applicant characteristics between the 2016

selection process and the 2018 PDET competition. In Table A9, we observe minimal gender disparities between the two contests. However, the gender gap in progression through the competition stages was smaller in the PDET 2018 process compared to that of 2016. The 2018 contest also saw a larger representation of participants from economically disadvantaged municipalities with higher rates of victimization, in line with the focus on PDET territories where candidates had higher chances of qualifying as eligible for leadership roles. While individuals holding a postgraduate degree more frequently qualified in both years, this factor was less decisive in 2018 as the proportion of postgraduates remains consistent from registration to eligibility qualification.

This descriptive comparison between the 2016 and 2018 contests highlights how selection process design can influence the profile of qualifying candidates, in this case increasing the representation of women and individuals from disadvantaged regions. The 2018 basic test contributed to this outcome by emphasizing competencies more relevant to rural contexts, providing a more equitable evaluation. Notably, the PDET process also filled more vacancies: 16% filled in 2016 compared to 86% in 2018, leading to more women securing permanent positions in 2018. Because the 2018 PDET process targeted specific regions with distinct characteristics, direct causal comparisons with the 2016 nationwide process are not possible. Nonetheless, our analysis demonstrates how selection criteria can affect gender representation in leadership roles. The findings suggest that carefully designed selection processes may help reduce gender gaps in educational leadership, offering important considerations for future policy design.

5 Discussion

Ensuring women's representation in leadership positions is critical for advancing gender equity and fostering inclusive development across all sectors. Research highlights their significant contributions to societal outcomes, particularly in the provision of public goods such as infrastructure, education, and health. Women leaders are also less likely to engage in corrupt practices (Baskaran and Hessami, 2023; Bhalotra and Clots-Figueras, 2014; Brollo and Troiano, 2016; Chattopadhyay and Duflo, 2004; Clots-Figueras, 2012). In education, female leaders play a pivotal role in creating collaborative environments, implementing inclusive policies, and serving as crucial role models (Bartanen and Grissom, 2021; Branch et al., 2012; Eagly and Karau, 2002; Shaked et al., 2018; Xu and Yao, 2015). These benefits extend to student outcomes, with evidence showing that female leadership positively influences academic achievement and aspirations, particularly for female students (Bettinger and Long, 2005; Carrell et al., 2010; Dee, 2005; Lim and Meer, 2017; Paredes, 2014; Xu and Yao, 2015).

Despite these documented benefits, gender gaps persist across sectors in Latin America and the Caribbean (LAC), including education. Women occupy less than one-third of leadership roles in government, corporate boards, and multilateral organizations (Gonzalez and Ibanez, March 8, 2024). In Colombia, women make up 65% of teachers but only 34% of school principals, underscoring structural barriers that limit their advancement. These include inadequate childcare, inflexible work schedules, male-dominated lead-

ership networks, and geographic mobility constraints—particularly for roles in remote areas. Additionally, recruitment and selection processes may inadvertently favor male candidates, perpetuating existing inequities.

Our analysis of two centralized school manager selection processes in Colombia highlights how institutional design can either reinforce or help mitigate these barriers. The 2016 nationwide process illustrates how seemingly neutral criteria, such as an overreliance on standardized testing, can disadvantage women. In contrast, the 2018 PDET process demonstrates how thoughtfully designed reforms can promote equity by recognizing diverse competencies and contextual challenges.

Specifically, the 2016 selection process emphasized standardized testing, particularly quantitative components, which created significant gender disparities. Although women represented 45% of applicants, only 20% of eligible candidates were female. These findings align with research indicating that high-stakes testing often disadvantages women, especially in numerical assessments. In contrast, the 2018 PDET process reduced the weight of standardized tests and prioritized practical competencies and leadership experience suited to the challenges of PDET regions. These adjustments contributed to narrowing the gender gap: women's representation among eligible candidates increased from 20% in 2016 to 35% in 2018. Furthermore, the PDET process achieved an 86% vacancy fill rate, compared to just 16% in 2016, suggesting a better alignment of selection criteria with leadership needs. However, women's continued underrepresentation among applicants (38%) indicates that deeper structural barriers persist beyond the scope of selection process reforms.

While the 2018 PDET process demonstrates promising progress, it is important to acknowledge its limitations. The process targeted distinct geographic regions with unique characteristics, and participants self-selected into the competition. As a result, causal claims about the effectiveness of specific modifications cannot be definitively established. Nevertheless, the descriptive evidence suggests that recruitment reforms emphasizing diverse competencies can foster greater gender equity in educational leadership.

Three key policy implications emerge from our findings. First, selection processes should balance quantitative assessments with broader leadership competencies. The PDET experience shows that recognizing diverse forms of expertise can expand the pool of qualified candidates while maintaining high standards. Incorporating practical skills and context-specific competencies ensures that selection criteria align with the multifaceted demands of educational leadership. Second, geographical considerations are critical. Data from 2016 reveal that women often favor positions in urban areas with lower safety risks. This underscores the importance of addressing barriers related to security, transportation, and infrastructure in remote regions to make leadership opportunities more accessible to women. Third, structural barriers must be addressed to achieve lasting change. The persistent gender imbalance in applicants highlights the need for complementary policies, such as increased childcare support, more flexible work arrangements, mentorship programs, and safety measures in high-risk areas. While implementing these interventions requires substantial resources, the long-term benefits of enhanced gender equity and improved educational leadership justify the investment.

Scaling the PDET reforms to a national level would require careful adaptation to regional contexts and institutional capacities. The success of targeting competencies relevant to specific challenges indicates that such adjustments could strengthen nationwide selection processes. However, these reforms must be tailored to diverse geographic and institutional realities to ensure effectiveness.

Several important questions remain for future research. First, longer-term studies are needed to evaluate how different selection criteria influence student outcomes and overall school performance. Such research could provide insights into the sustainability and broader impact of recruitment reforms. Second, cost-benefit analyses of support programs, such as childcare and mentorship, would help policymakers prioritize interventions by assessing their relative effectiveness and feasibility. Finally, comparative analyses across regions with varying institutional and socioeconomic contexts could identify which institutional reforms most effectively promote women's advancement into leadership roles. Addressing these questions is essential for developing evidence-based policies that advance both equity and educational quality.

The Colombian experience offers valuable insights for educational systems worldwide. When thoughtfully designed, centralized selection processes can advance equity and merit-based leadership. The cases examined here show that recruitment reforms acknowledging diverse competencies can reduce gender disparities without compromising quality standards. However, selection reform is only one component of a comprehensive strategy to close the gender gap in educational leadership. Broader policy approaches are needed to address both institutional and structural barriers that hinder women's advancement. These efforts are essential not only for achieving gender equity but also for fostering an educational system that benefits from the diverse perspectives and talents women bring to leadership roles.

By addressing these challenges, educational systems can build stronger, more inclusive leadership structures that enhance the quality of education for all.

References

Acevedo, K. and Bornacelly Olivella, I. D. (2014). Panel municipal del cede.

Adelman, M. and Lemos, R. (2021). *Managing for learning: Measuring and strengthening education management in Latin America and the Caribbean*, World Bank Group, Washington, DC.

Angelov, N., Johansson, P. and Lindahl, E. (2016). Parenthood and the gender gap in pay, *Journal of Labor Economics* **34**(3): 545–579.

Aravena, F. (2020). Procesos de selección de directores escolares en Latinoamérica: Brasil, Chile, Colombia y Perú, *Education Policy Analysis Archives* **28**: 171–171.

Arias, O., Canals, C., Mizala, A. and Meneses, F. (2023). Gender gaps in mathematics and language: The bias of competitive achievement tests, *PLoS ONE* **18**(3): e0283384.
URL: *https://doi.org/10.1371/journal.pone.0283384*

Arredondo, F. G., Vázquez, J. C. and Velázquez, L. M. (2019). Stem and gender gap in latin america,

Revista de El Colegio de San Luis **9**(18): 137–158.

Azmat, G., Iriberri, N. and Calsamiglia, C. (2016). Gender diferences in response to big stakes, *Journal of the European Economic Association* **14**(6): 1372–1400.

Bailes, L. P. and Guthery, S. (2020). Held down and held back: Systematically delayed principal promotions by race and gender, *AERA Open* **6**(2).

Bartanen, B. and Grissom, J. A. (2021). School principal race, teacher racial diversity, and student achievement, *Journal of Human Resources* .

Bartanen, B., Husain, A. N. and Liebowitz, D. D. (2024). Rethinking principal effects on student outcomes, *Journal of Public Economics* **234**: 105115.

Baskaran, T. and Hessami, Z. (2023). Women in Political Bodies as Policymakers, *The Review of Economics and Statistics* pp. 1–46.

Beaman, L., Duflo, E., Pande, R. and Topalova, P. (2012). Female leadership raises aspirations and educational attainment for girls: A policy experiment in India, *Science* **335**(6068): 582–586.

Bergmann, J., Alban Conto, C. and Brossard, M. (2022). *Increasing Women's Representation in School Leadership: A promising path towards improving learning*, Florence.

Bernal, L. K. A.-G. and Bernal, G. (2016). Brechas de género en el rendimiento escolar a lo largo de la distribución de puntajes: evidencia pruebas saber 11â°, *Technical report*, Universidad Javeriana-Bogotá.

Bertrand, M. (2018). Coase lecture – the glass ceiling, *Economica* **85**(338): 205–231.

Bertrand, M., Goldin, C. and Katz, L. F. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors, *American Economic Journal: Applied Economics* **2**(3): 228–255.

Bertrand, M. and Mullainathan, S. (2004). Are emily and greg more employable than lakisha and jamal? a field experiment on labor market discrimination, *American Economic Review* **94**: 991–1013.

Bettinger, E. P. and Long, B. T. (2005). Do faculty serve as role models? the impact of instructor gender on female students, *American Economic Review* **95**(2): 152–157.

Bhalotra, S. and Clots-Figueras, I. (2014). Health and the political agency of women, *American Economic Journal: Economic Policy* **6**(2): 164–197.

Biasi, B. and Sarsons, H. (2022). Flexible wages, bargaining, and the gender gap, *The Quarterly Journal of Economics* **137**(1): 215–266.

Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations, *Journal of Economic Literature* **55**(3): 789–865.

Bloom, N., Lemos, R., Sadun, R. and Van Reenen, J. (2015). Does management matter in schools?, *The Economic Journal* **125**: 647–674.

Branch, G. F., Hanushek, E. A. and Rivkin, S. G. (2012). Estimating the effect of leaders on public sector productivity: The case of school principals, *National Bureau of Economic Research* **No. w17803**.

Brollo, F. and Troiano, U. (2016). What happens when a woman wins an election? evidence from close races in Brazil, *Journal of Development Economics* **122**: 28–45.

Buser, T., Niederle, M. and Oosterbeek, H. (2014). Gender, competitiveness, and career choices, *The Quarterly Journal of Economics* **129**(3): 1409–1447.

Cai, X., Lu, Y., Pan, J. and Zhong, S. (2019). Gender Gap under Pressure: Evidence from China's National College Entrance Examination, *The Review of Economics and Statistics* **101**(2): 249–263.

Campos-García, I. and Zúñiga-Vicente, J. (2019). The female presence in different organisational positions and performance in secondary schools: Does a woman leader function as mediator?, *PLOS ONE* **14**(9): 1–25.

Carrell, S. E., Page, M. E. and West, J. E. (2010). Sex and science: How professor gender perpetuates the gender gap, *The Quarterly Journal of Economics* **125**(3): 1101–1144.

Chattopadhyay, R. and Duflo, E. (2004). Women as policy makers: Evidence from a randomized policy experiment in India, *Econometrica* **72**(5): 1409–1443.

Clots-Figueras, I. (2012). Are female leaders good for education? evidence from India, *American Economic Journal: Applied Economics* **4**(1): 212–244.

Coelli, M. and Green, D. (2012). Leadership effects: School principals and student outcomes, *Economics of Education Review* **31**(1): 92–109.

Conto, C. A., Guilbert, N. and Devignes, F. (2023). The role of women school principals in improving learning in french-speaking Africa., *UNESCO International Institute for Educational Planning* .

Darling-Hammond, L., Wechsler, M. E., Levin, S., Leung-Gagné, M. and Tozer, S. (2022). Developing effective principals: What kind of learning matters?, *Learning Policy Institute Reports* .

Dee, T. S. (2005). A teacher like me: Does race, ethnicity, or gender matter?, *American Economic Review* **95**(2): 158–165.

Donoso-Díaz, S., Fernández-Negrete, J. P. and Araya, D. R. (2019). Directores de escuelas públicas chilenas seleccionados por alta dirección removidos de su cargo antes de finalizar su período de gestión: lecciones para américa latina, *Education Policy Analysis Archives* **27**: 43–43.

Eagly, A. H. and Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders, *Psychological Review* **109**(3): 573–598.

Elacqua, G., Munevar, I., Sanchez, F. and Santos, H. (2021). The impact of decentralized decision-making on student outcomes and teacher quality: Evidence from Colombia, *World Development* **141**: 105378.

Elacqua, G., Pérez-Núñez, G., Etcheverry, L. and Abarca, E. (2024). Diversity and representation gaps in the Latin American and Caribbean school workforce, *Technical Note, Inter-American Development Bank* .

Elacqua, Gregory, S. F. and Santos, H. (2020). School reorganization reforms: the case of multi-site schools in Colombia, *School Effectiveness and School Improvement* **32(1)**: 141–172.

Gelber, D., Treviño, E., Inostroza, P. et al. (2016). Inequidad de género en los logros de aprendizaje en educación primaria¿ qué nos puede decir terce?: resumen ejecutivo, *Technical report*, Unesco.

Gonzalez, A. and Ibanez, A. M. (March 8, 2024). There is no shortage of female leaders. there is a lack of women in leadership positions, *El País* .

Grissom, J. A., Egalite, A. J., Lindsay, C. A. et al. (2021). How principals affect students and schools, *Wallace Foundation* **2**(1): 30–41.

Grissom, J. A., Nicholson-Crotty, J. and Keiser, L. (2012). Does my boss's gender matter? explaining job satisfaction and employee turnover in the public sector, *Journal of Public Administration Research and Theory* **22(4)**.

Grissom, J., Timmer, J., Nelson, J. and Blissett, R. (2021). Unequal pay for equal work? unpacking the gender gap in principal compensation, *Economics of Education Review* **82**: 102114.

Hallinger, P. and Heck, R. H. (1996). Reassessing the principal's role in school effectiveness: A review of

empirical research, 1980-1995, *Educational Administration Quarterly* **32**(1): 5–44.

Heck, R. H., Larsen, T. J. and Marcoulides, G. A. (1990). Instructional leadership and school achievement: Validation of a causal model, *Educational Administration Quarterly* **26**(2): 94–125.

Howe-Walsh, L. and Turnbull, S. (2016). Barriers to women leaders in academia: Tales from science and technology, *Studies in Higher Education* **41**(3): 415–428.

Husain, A. N., Matsa, D. A. and Miller, A. R. (2018). Do male workers prefer male leaders? an analysis of principals' effects on teacher retention, *National Bureau of Economic Research* (Working Paper No. 25263).

ICFES (2016a). Prueba para directivo docente (rector, director rural, y coordinador), *Technical report*, ICFES.

ICFES (2016b). Prueba psicotécnica para docente directivo, *Technical report*, ICFES.

Jurajda, and Münich, D. (2011). Gender gap in performance under competitive pressure: Admissions to Czech universities, *American Economic Review* **101**(3): 514–518.

Leithwood, K., Seashore, K., Anderson, S. and Wahlstrom, K. (2004). Review of research: How leadership influences student learning, *Technical report*, University of Minnesota, Center for Applied Research and Educational Improvement.

Lemos, R., Muralidharan, K. and Scur, D. (2021). Personnel management and school productivity: Evidence from India, *Technical Report Working Paper 28336*, National Bureau of Economic Research.

Lim, J. and Meer, J. (2017). The impact of teacher–student gender matches, *Journal of Human Resources* **52**(4): 979–997.

Marks, H. M. and Printy, S. M. (2003). Principal leadership and school performance: An integration of transformational and instructional leadership, *Educational Administration Quarterly* **39**(3): 370–397.

Muñoz, P. and Prem, M. (2024). Managers' productivity and recruitment in the public sector, *American Economic Journal: Economic Policy* **16**(4): 223–253.

Neumark, D., Bank, R. J. and Van Nort, K. D. (1996). Sex discrimination in restaurant hiring: An audit study, *The Quarterly Journal of Economics* **111**: 915–941.

OECD (2019). *TALIS 2018 results (Volume I): Teachers and school leaders as lifelong learners*.
URL: *https://doi.org/10.1787/1d0bc92a-en*

Oreopoulos, P. (2011). Why do skilled immigrants struggle in the labor market? a field experiment with thirteen thousand resumes, *American Economic Journal: Economic Policy* **3**: 148–171.

Paredes, V. (2014). A teacher like me or a student like me? role model versus teacher bias effect, *Economics of Education Review* **39**: 38–49.

Pounder, D. G., Ogawa, R. T. and Adams, E. A. (1995). Leadership as an organization-wide phenomena: Its impact on school performance, *Educational Administration Quarterly* **31**(4): 564–588.

Ramachandram, V., Beteille, T., Linden, T. and Dey, S. (2017). Getting the right teachers into the right schools: Managing India's teacher workforce, *Technical report*, The World Bank.

Riach, P. A. and Rich, J. (2002). Field experiments of discrimination in the market place, *The Economic Journal* **112**.

Shaked, H., Glanz, J. and Gross, Z. (2018). Gender differences in instructional leadership: How male and female principals perform their instructional leadership role, *School Leadership & Management* **38**(4): 417–434.

Soto Arango, D. E. (2013). Legislación e imaginarios sociales en el escalafón y los salarios de los edu-

cadores de primaria en Colombia. 1952-1994, *Revista Historia de la Educación Latinoamericana* **15**(21): 229–262.

Ten Bruggencate, G., Luyten, H., Scheerens, J. and Sleegers, P. (2012). Modeling the influence of school leaders on student achievement: How can school leaders make a difference?, *Educational Administration Quarterly* **48**(4): 699–732.

UNESCO (2018). *Activating policy levers for Education 2030: The untapped potential of governance, school leadership, and monitoring and evaluation policies*, UNESCO, Paris.
URL: *https://unesdoc.unesco.org/ark:/48223/pf0000265951*

Wang, T. and Gao, S. (2022). Systematic review of research on women and educational leadership in mainland China, Hong Kong and Taiwan, *Educational Management Administration & Leadership* **0**(0): 17411432221142150.

Waters, T., Marzano, R. J. and McNulty, B. (2003). *Balanced Leadership: What 30 Years of Research Tells Us about the Effect of Leadership on Student Achievement*, Mid-Continent Research for Education and Learning, Aurora, CO.

Weinstein, J., Muñoz, G. and Flessa, J. (2019). Liderazgo directivo para la calidad de la educación: aprendizajes desde un campo de investigación emergente, *Calidad en la educación* (51): 10–14.

Xu, Y. and Yao, Y. (2015). Informal institutions, collective action, and public investment in rural China, *American Political Science Review* **109**(2): 371–391.

Zheng, Q., Li, L., Chen, H. and Loeb, S. (2017). What aspects of principal leadership are most highly correlated with school outcomes in China?, *Educational Administration Quarterly* **53**(3): 409–447.

Appendix A:

Socioeconomic Characterization of Municipalities

To capture applicants' socioeconomic background, we used a set of variables associated with their municipality of birth as a proxy. First, we employed 2018 data from the National Administrative Department of Statistics (DANE) to determine the probability that an individual belongs to an ethnic group, based on whether they were born in a municipality where 70% or more of the population identifies as such (e.g., Indigenous, Afro-Colombian, Romani, or Palenquero).[17]

We also use the 2018 DANE data to characterize each municipality by its multidimensional poverty level.[18] This index, which ranges from 0 to 1, comprises five dimensions and 15 indicators, each contributing to a municipality's score. We divided the total sample of Colombian municipalities (1,122 administrative entities) into quartiles based on multidimensional poverty levels, ranging from least poor to most poor.

To approximate the impact of armed conflict on applicants' birth municipality, we used 2022 data on victimization risk from the Victims Unit (*Unidad para las Víctimas*).[19] This index provides insight on the threat level, victimization, and vulnerability experienced within each municipality.

We incorporated all of this information into the data processing for the school manager selection contest, creating a comprehensive dataset of 1,122 municipalities, each associated with its DANE code and relevant socioeconomic variables. We then linked this dataset to each individual's municipality and department of birth.

[17] See the DANE Geoportal, *Geovisor de Autorreconocimiento Étnico*.

[18] The multidimensional poverty measure includes 15 indicators spanning five dimensions: education, health, employment, housing, and childhood, capturing factors such as literacy, school attendance, early childhood care, health insurance, and access to improved water sources. See Multidimensional poverty measure - dane.gov.co

[19] The victimization risk index is based on three dimensions: threat (presence of armed groups and incidents affecting civilians), victimization (restrictions on movement, personal safety, and life security), and vulnerability (corruption, demographics, geography, institutional and socioeconomic factors). See IRV (unidadvictimas.gov.co).

Modifications in the Design of the PDET 2018 Selection Process

In the 2016 nationwide selection process, priority was placed on educational training and advancement in the evaluation of candidate's backgrounds, while work experience was given secondary importance. Candidates' scores increased with higher levels of education, and additional points were awarded to those with qualifications in education as opposed to other fields.[20] When comparing the weight assigned to education versus work experience—which emphasized school management—the former could result in an accumulated 70 points, compared to just 30 points for the latter.

In calculating the final score, different percentage weights were also allocated to each test or assessment stage, which in turn determined the list of candidates deemed eligible for leadership roles. These weights were as follows: the basic test, 55%; psycho-technical test, 15%; background assessment, 20%; and interview, 10%. This structure emphasized general abilities and knowledge, with great value placed on education and postgraduate qualifications in the educational field.

Several modifications were made to the 2018 *PDET* selection process that altered the desired candidate profile. Firstly, the basic test focused more on competencies and knowledge directly related to the position, including situational judgment questions for scenarios specific to PDET territories. Secondly, the background assessment placed greater emphasis on work experience, assigning the latter a maximum of 70 points, while education was capped at 30 points. Experience in conflict-affected and community-based settings was particularly valued, indicating a preference for candidates with the skills to effectively manage schools in challenging contexts. Points were also awarded to candidates with a history of being affected by conflict or strong local ties. Thirdly, the interview stage was eliminated, and the weighting of the different stages accordingly reallocated: the basic test was reduced to 45%, the background assessment doubled to 40%, and the psycho-technical test remained at 15%. This reallocation placed greater value on candidates with the necessarily skills to succeed in areas affected by deprivation and armed conflict. Additionally, a policy was introduced to encourage the retention of selected candidates in these regions: applicants appointed to permanent positions could only request transfers to other PDET territories, thereby limiting mobility.

[20] For example, a candidate with a teaching degree and a master's in education could receive up to 20 points, while a candidate with equivalent qualifications in a different field would receive only half those points.

Table A1: Assessment Stages in the School Manager Selection Process Across Selected Latin American and Caribbean Countries

Tests and assessment moments	*Argentina*	*Brazil*	*Chile*	*Colombia*	*Ecuador*	*Mexico*	*Peru*	*Dom. Rep.*
Minimum requirements and/or background assessment	X	X	X	X	X	X	X	X
Technical test	X	X		X	X	X	X	X
Psycho-technical test			X	X				
Interview or colloquium			X	X			X	X
Case study and/or project solution	X				X		X	X
Probation period	X			X				

Source: Own elaboration.

Table A2: Vacancies for School Management Positions in CNSC Selection Processes for the Special Teaching Career System

	Year							
Position	*2006*	*2009*	*2012*	*2012 bis*	*2016*	*2018*	*2021*	*2006-2021*
Coordinator	1,197	1,695	1,126	173	572	138	1,676	6,577
Rural Director	270	577	55	9	159	94	98	1,262
Principal	324	652	577	49	367	173	931	3,073
Total	1,791	2,924	1,758	231	1,098	405	2,705	10,912

Source: Author's elaboration based on call agreements for each selection process.

Note: The 2012 bis contest refers to a special ethnic-based process conducted that year for Afro-Colombian, Raizal, and Palenquero ethnic groups.

Table A3: Descriptive Statistics of Covariates in the 2016 School Manager Selection Process

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Female	20,007	0.447	0.497	0	1
Ethnic group	20,007	0.057	0.232	0	1
Age	20,007	42.6	7.846	18	67
Rurality	20,007	0.12	0.325	0	1
Multidimensional poverty index					
1st quartile	20,007	0.478	0.500	0	1
2nd quartile	20,007	0.184	0.387	0	1
3rd quartile	20,007	0.200	0.400	0	1
4th quartile	20,007	0.138	0.345	0	1
Risk of victimization index					
Low	20,007	0.254	0.435	0	1
Medium-Low	20,007	0.439	0.496	0	1
Medium	20,007	0.188	0.391	0	1
Medium-High	20,007	0.089	0.285	0	1
High	20,007	0.029	0.169	0	1
Highest level of education					
High School/Technician	20,007	0.001	0.032	0	1
Normal School	20,007	0.004	0.067	0	1
Bachelor's/Undergraduate	20,007	0.250	0.433	0	1
Specialization	20,007	0.409	0.492	0	1
Postgraduate	20,007	0.336	0.472	0	1
STEM Program	20,007	0.445	0.497	0	1

Table A4: Descriptive Statistics of Covariates in the 2018 PDET School Manager Selection Process

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Female	8,767	0.375	0.484	0	1
Ethnic group	8,767	0.078	0.267	0	1
Age	8,767	41.5	8.353	19	68
Rurality	8,767	0.13	0.336	0	1
Multidimensional poverty index					
1st quartile	8,767	0.435	0.496	0	1
2nd quartile	8,767	0.178	0.382	0	1
3rd quartile	8,767	0.215	0.411	0	1
4th quartile	8,767	0.172	0.377	0	1
Risk of victimization index					
Low	8,767	0.145	0.352	0	1
Medium-low	8,767	0.424	0.494	0	1
Medium	8,767	0.228	0.42	0	1
Medium-High	8,767	0.146	0.353	0	1
High	8,767	0.057	0.233	0	1
Highest level of education					
High School/Technician	8,767	0.005	0.073	0	1
Normal School	8,767	0.019	0.135	0	1
Bachelor's/Associate's	8,767	0.408	0.491	0	1
Specialization	8,767	0.293	0.455	0	1
Postgraduate	8,767	0.275	0.447	0	1
STEM Program	8,767	0.493	0.500	0	1

Figure 4: Score Distribution by Basic Test Component and Gender

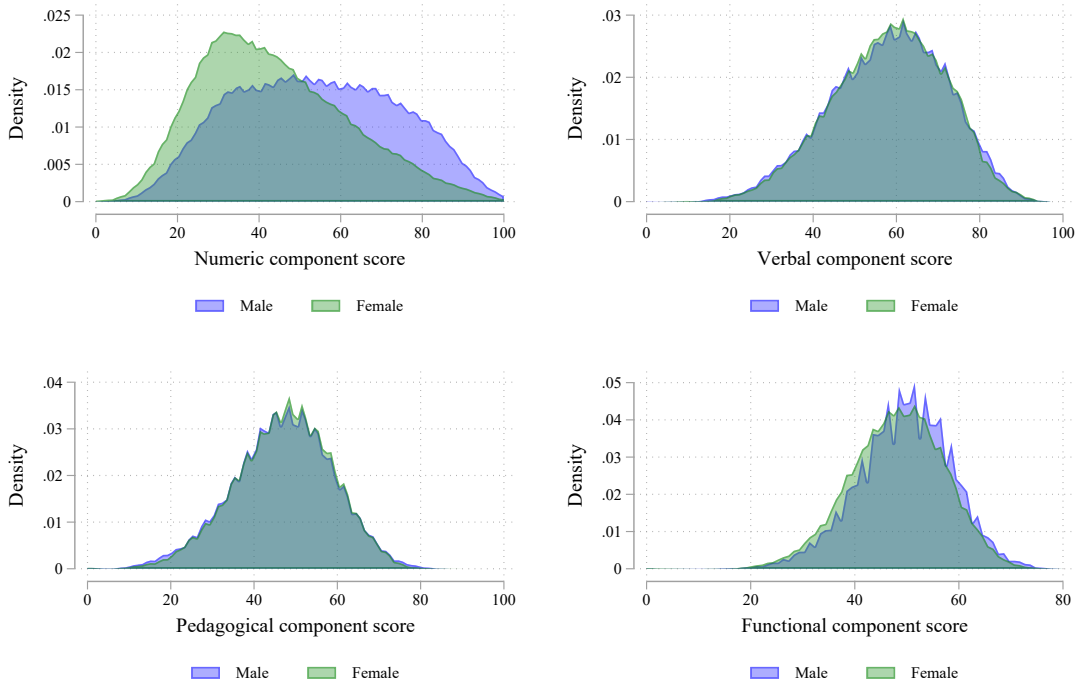


Figure 5: Trends in *Saber 11* Test Results by Gender

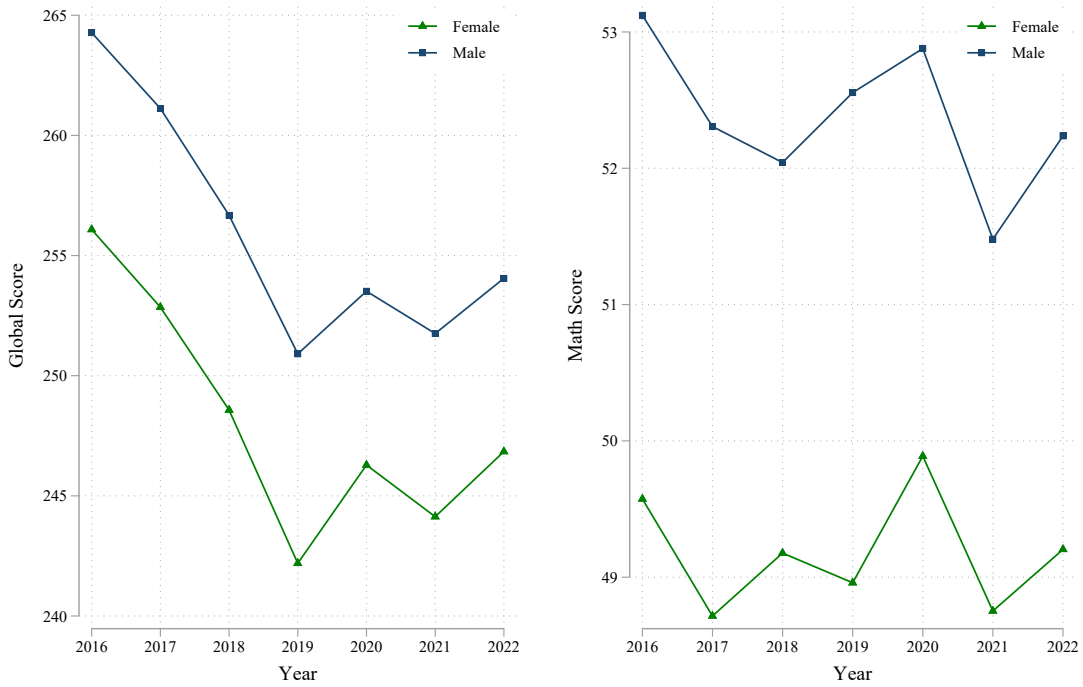


Figure 6: Results by Gender on *Saber 11* and *Saber PRO* Tests

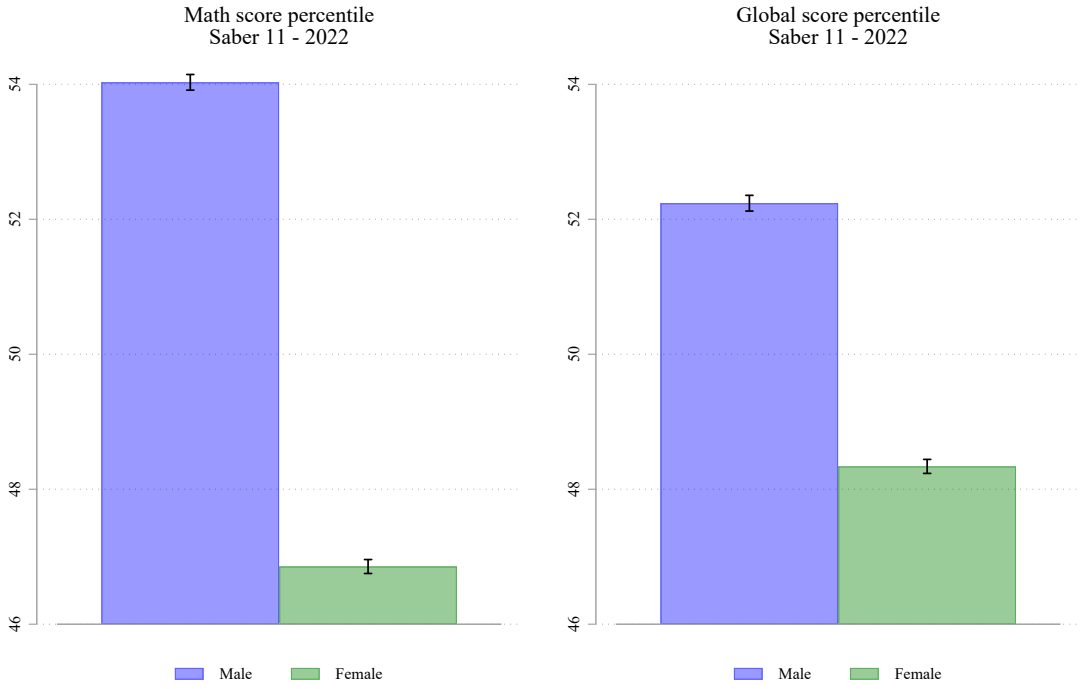


Figure 7: Results by Gender in *Saber 11* and *Saber PRO* Tests in the Field of Education

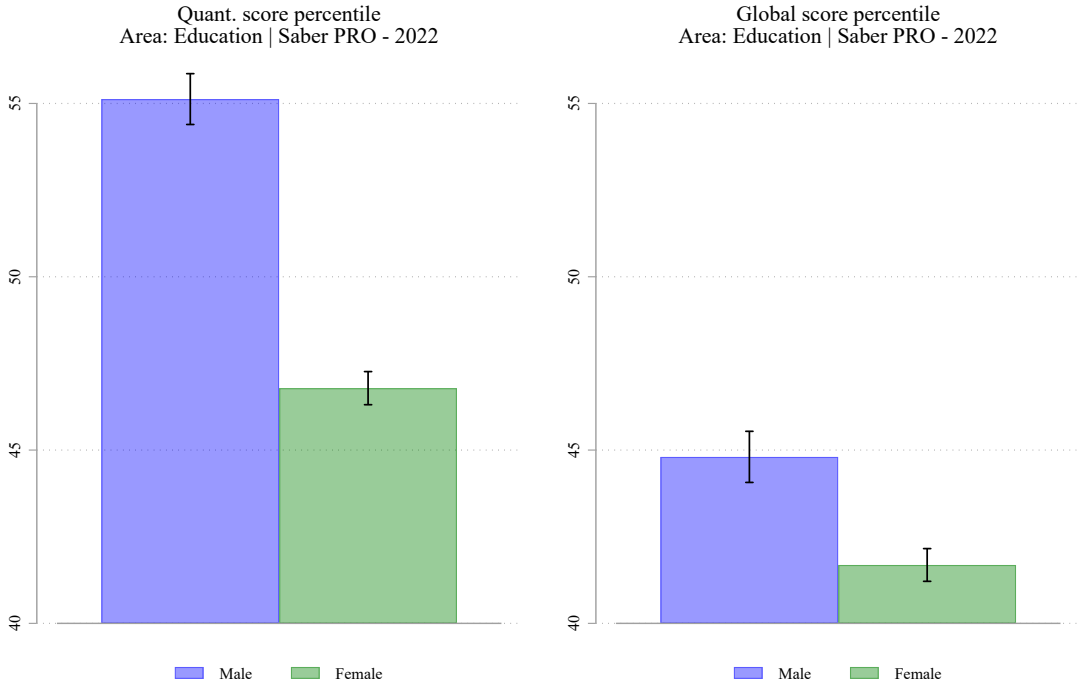


Table A5: Test Results and Probability of Passing Stages in the 2016 Selection Process

			Basic test components				Approval probability	
	Basic test score (1)	Psycho-technical test score (2)	Numeric (3)	Verbal (4)	Pedagogical (5)	Functional (6)	Basic test (7)	Ver. of min. requirements (8)
Female	-0.325***	0.025*	-0.513***	-0.051***	-0.021	-0.185***	-0.009***	-0.007***
	(0.013)	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)	(0.001)	(0.001)
Ethnic group	-0.160***	-0.002	-0.077**	-0.136***	-0.168***	-0.094***	0.001	0.001
	(0.031)	(0.034)	(0.030)	(0.032)	(0.033)	(0.034)	(0.003)	(0.003)
Age	-0.023***	0.002**	-0.024***	-0.021***	-0.014***	-0.004***	-0.001***	-0.000***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Rurality	0.100***	-0.097***	0.118***	0.086***	0.065***	0.008	0.000	-0.000
	(0.022)	(0.024)	(0.021)	(0.022)	(0.023)	(0.023)	(0.002)	(0.002)
Multidimensional Poverty Index								
2nd Quartile	-0.134***	0.018	-0.123***	-0.151***	-0.104***	-0.012	-0.002	0.000
	(0.018)	(0.020)	(0.017)	(0.019)	(0.019)	(0.019)	(0.002)	(0.002)
3rd Quartile	-0.296***	-0.018	-0.172***	-0.304***	-0.227***	-0.155***	-0.006***	-0.003*
	(0.018)	(0.020)	(0.018)	(0.019)	(0.020)	(0.020)	(0.002)	(0.002)
4th Quartile	-0.343***	0.016	-0.259***	-0.369***	-0.244***	-0.115***	-0.005*	-0.003
	(0.024)	(0.026)	(0.023)	(0.024)	(0.025)	(0.025)	(0.003)	(0.002)
Victimization Risk Index								
Medium-Low	0.008	0.038**	-0.029*	0.037**	0.020	0.011	0.002	0.002
	(0.016)	(0.018)	(0.016)	(0.017)	(0.017)	(0.017)	(0.002)	(0.001)
Medium	-0.034*	-0.012	-0.000	-0.029	-0.064***	-0.018	0.002	0.002
	(0.020)	(0.022)	(0.019)	(0.021)	(0.021)	(0.021)	(0.002)	(0.002)
Medium-High	-0.035	0.022	-0.022	-0.024	-0.050*	-0.009	0.001	0.002
	(0.028)	(0.031)	(0.027)	(0.029)	(0.030)	(0.030)	(0.003)	(0.002)
High	-0.074*	0.107**	-0.110***	-0.040	-0.074*	0.017	-0.001	0.002
	(0.041)	(0.046)	(0.040)	(0.043)	(0.044)	(0.045)	(0.005)	(0.004)
Formal education								
Normal School	0.685***	0.120	0.488**	0.364	0.580**	0.486**	0.010	-0.001
	(0.224)	(0.247)	(0.219)	(0.233)	(0.238)	(0.242)	(0.025)	(0.020)
Bachelor's/Undergraduate	0.633***	0.208	0.348*	0.497**	0.507**	0.458**	0.004	0.003
	(0.203)	(0.223)	(0.198)	(0.211)	(0.215)	(0.219)	(0.022)	(0.018)
Specialization	0.893***	0.293	0.522***	0.657***	0.664***	0.682***	0.005	0.004
	(0.203)	(0.223)	(0.198)	(0.211)	(0.215)	(0.219)	(0.022)	(0.018)
Postgraduate	1.295***	0.412*	0.823***	0.977***	0.980***	0.885***	0.018	0.012
	(0.203)	(0.223)	(0.198)	(0.211)	(0.215)	(0.219)	(0.022)	(0.018)
STEM Program	0.153***	-0.009	0.448***	-0.022	-0.047***	-0.067***	0.007***	0.005***
	(0.013)	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)	(0.001)	(0.001)
Constant	0.228	-0.426*	0.563***	0.357*	0.009	-0.333	0.024	0.016
	(0.207)	(0.227)	(0.201)	(0.215)	(0.219)	(0.223)	(0.023)	(0.018)
Observations	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007
R-Squared	0.18	0.01	0.22	0.11	0.08	0.04	0.01	0.01

Note: Observations include all individuals who participated in the various tests of the competition. Columns 1 and 2 show standardized scores for the basic test and the psycho-technical test. The components of the basic test—numerical, verbal, pedagogical knowledge, and functional knowledge—are presented in columns 3 to 6 and are also standardized. Columns 7 and 8 display the probability of passing each stage of the competition. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Mean Differences by Selection Process and Gender

	2016 Contest			*PDET* 2018 Contest				
	(1)	(2)	Diff.	(3)	(4)	Diff.	Diff.	
Variables	Male	Female	(2)-(1)	Male	Female	(4)-(3)	(3)-(1)	(4)-(2)
Ethnic group	0.06	0.05	−0.012***	0.08	0.07	−0.006	0.017***	0.023***
Age	43.15	41.82	−1.336***	42.12	40.54	−1.574***	−1.038***	−1.276***
Rurality	0.12	0.11	−0.011**	0.13	0.12	−0.010	0.009*	0.010
Multidimensional poverty index								
1st Quartile	0.46	0.51	0.050***	0.43	0.45	0.024**	−0.029***	−0.055***
2nd Quartile	0.18	0.18	−0.001	0.18	0.17	−0.006	−0.004	−0.009
3rd Quartile	0.20	0.20	−0.009	0.21	0.22	0.010	0.007	0.026***
4th Quartile	0.16	0.12	−0.040***	0.18	0.15	−0.028***	0.026***	0.038***
Risk of victimization index								
Low	0.24	0.27	0.038***	0.14	0.15	0.001	−0.093***	−0.129***
Medium-Low	0.45	0.43	−0.021***	0.42	0.42	0.000	−0.025***	−0.004
Medium	0.19	0.19	−0.004	0.23	0.23	0.007	0.035***	0.046***
Medium-High	0.09	0.08	−0.011***	0.15	0.15	0.001	0.052***	0.063***
High	0.03	0.03	−0.002	0.06	0.05	−0.008	0.030***	0.024***
Higher level of education								
High School/Technician	0.00	0.00	−0.000	0.00	0.01	0.002	0.003***	0.006***
Normal School	0.01	0.00	−0.002*	0.02	0.02	−0.005*	0.015***	0.012***
Bachelor's/Undergraduate	0.25	0.24	−0.010	0.40	0.42	0.016	0.148***	0.174***
Specialization	0.41	0.41	−0.005	0.29	0.29	−0.002	−0.118***	−0.114***
Postgraduate	0.33	0.35	0.018***	0.28	0.27	−0.011	−0.048***	−0.077***
STEM Program	0.49	0.38	−0.110***	0.53	0.43	−0.100***	0.036***	0.046***
N	11,061	8,946	-	5,477	3,290	-	-	-

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7: Labor Market Outcomes for the 2016 Selection Process

		School Manager		Rural director		Coordinator		Principal		
	School Manager (1)	Permanent (2)	Temporary (3)	Permanent (4)	Temporary (5)	Permanent (6)	Temporary (7)	Permanent (8)	Temporary (9)	Log(Salary) (10)
Eligible	0.647***	0.648***	-0.001	-0.010	-0.000	0.243***	-0.000	0.415***	-0.000	0.075***
	(0.038)	(0.038)	(0.003)	(0.010)	(0.001)	(0.033)	(0.002)	(0.022)	(0.001)	(0.022)
Female	-0.067***	-0.066***	-0.001*	-0.005***	-0.000	-0.020***	-0.000	-0.041***	-0.000*	0.018**
	(0.006)	(0.006)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)	(0.003)	(0.000)	(0.007)
Female × Eligible	-0.037	-0.038	0.001	0.005	0.000	0.216***	0.001	-0.259***	0.000	-0.049
	(0.086)	(0.086)	(0.006)	(0.022)	(0.002)	(0.074)	(0.005)	(0.050)	(0.003)	(0.051)
Ethnic group	-0.035***	-0.034**	-0.001	-0.005	-0.001***	-0.020*	-0.001	-0.009	0.001*	0.005
	(0.014)	(0.013)	(0.001)	(0.004)	(0.000)	(0.012)	(0.001)	(0.008)	(0.000)	(0.015)
Age	0.005***	0.005***	0.000	0.000*	-0.000	0.004***	0.000	0.001***	-0.000	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rurality	0.010	0.011	-0.001	0.001	-0.000*	-0.003	-0.001	0.013**	0.000	-0.003
	(0.009)	(0.009)	(0.001)	(0.002)	(0.000)	(0.008)	(0.001)	(0.005)	(0.000)	(0.010)
Multidimensional poverty index										
2nd Quartile	0.007	0.007	-0.000	-0.001	-0.000	0.004	-0.000	0.004	0.000	0.006
	(0.008)	(0.008)	(0.001)	(0.002)	(0.000)	(0.007)	(0.000)	(0.005)	(0.000)	(0.009)
3rd Quartile	0.006	0.005	0.001	0.004*	-0.000	-0.003	0.001**	0.004	-0.000	-0.013
	(0.008)	(0.008)	(0.001)	(0.002)	(0.000)	(0.007)	(0.000)	(0.005)	(0.000)	(0.009)
4th Quartile	0.044***	0.042***	0.002**	0.009***	0.001***	0.006	0.001*	0.027***	-0.000	-0.009
	(0.010)	(0.010)	(0.001)	(0.003)	(0.000)	(0.009)	(0.001)	(0.006)	(0.000)	(0.011)
Risk of victimization index										
Medium-Low	0.021***	0.021***	0.001	0.003*	-0.000	0.018***	0.001	0.000	0.000	-0.007
	(0.007)	(0.007)	(0.001)	(0.002)	(0.000)	(0.006)	(0.000)	(0.004)	(0.000)	(0.008)
Medium	0.037***	0.037***	0.000	0.009***	-0.000	0.015**	-0.000	0.012**	0.000	-0.017*
	(0.009)	(0.009)	(0.001)	(0.002)	(0.000)	(0.007)	(0.000)	(0.005)	(0.000)	(0.010)
Medium-High	0.047***	0.047***	0.000	0.012***	0.001***	0.026**	-0.001	0.009	-0.000	-0.031**
	(0.012)	(0.012)	(0.001)	(0.003)	(0.000)	(0.010)	(0.001)	(0.007)	(0.000)	(0.013)
High	0.039**	0.038**	0.001	0.004	-0.000	-0.003	-0.001	0.037***	0.002**	-0.062***
	(0.018)	(0.018)	(0.001)	(0.005)	(0.000)	(0.016)	(0.001)	(0.010)	(0.001)	(0.019)
Highest level of education										
Normal School	0.077	0.077	-0.000	0.023	0.000	0.053	0.000	0.001	-0.000	0.000
	(0.097)	(0.097)	(0.007)	(0.025)	(0.002)	(0.084)	(0.006)	(0.057)	(0.004)	(.)
Bachelor's/Undergraduate	0.116	0.114	0.002	0.010	0.000	0.073	0.001	0.030	0.000	0.356***
	(0.088)	(0.088)	(0.006)	(0.023)	(0.002)	(0.076)	(0.005)	(0.051)	(0.003)	(0.092)
Specialization	0.234***	0.234***	0.000	0.014	0.000	0.156**	0.000	0.064	0.000	0.562***
	(0.088)	(0.088)	(0.006)	(0.023)	(0.002)	(0.076)	(0.005)	(0.051)	(0.003)	(0.091)
Postgraduate	0.271***	0.271***	0.000	0.012	0.000	0.175**	0.000	0.083	0.000	0.733***
	(0.088)	(0.088)	(0.006)	(0.023)	(0.002)	(0.076)	(0.005)	(0.051)	(0.003)	(0.091)
STEM Program	-0.038***	-0.037***	-0.000	-0.004***	-0.000	-0.021***	-0.000	-0.013***	-0.000	-0.020***
	(0.006)	(0.006)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)	(0.003)	(0.000)	(0.007)
Constant	-0.227**	-0.227**	-0.000	-0.012	0.000	-0.165**	-0.001	-0.049	0.001	14.898***
	(0.089)	(0.089)	(0.006)	(0.023)	(0.002)	(0.077)	(0.005)	(0.052)	(0.003)	(0.093)
N	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007	20,007	3,978
R-Squared	0.07	0.07	0.00	0.00	0.00	0.03	0.00	0.04	0.00	0.28

Notes: Observations include all individuals who participated in the various tests of the competition, except for column 10, which is estimated only for individuals working as principals in 2023. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Test Results and Probability of Passing Stages in the 2018 PDET Selection Process

			Approval probability	
	Basic test score (1)	Psycho-technical test score (2)	Basic test (3)	Ver. of min. requirements (4)
Female	-0.063***	-0.064***	-0.011	-0.024***
	(0.022)	(0.022)	(0.010)	(0.009)
Ethnic group	-0.491***	-0.204***	-0.159***	-0.115***
	(0.043)	(0.044)	(0.020)	(0.018)
Age	-0.020***	-0.008***	-0.007***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Rurality	0.090***	0.024	0.031**	0.023
	(0.034)	(0.034)	(0.015)	(0.014)
Multidimensional poverty index				
2nd Quartile	-0.087***	-0.034	-0.038***	-0.022*
	(0.029)	(0.030)	(0.013)	(0.012)
3rd Quartile	-0.082***	-0.033	-0.040***	-0.022*
	(0.030)	(0.031)	(0.014)	(0.012)
4th Quartile	-0.029	-0.049	-0.009	0.006
	(0.036)	(0.037)	(0.016)	(0.015)
Risk of victimization index				
Medium-Low	-0.068**	0.044	-0.021	-0.031**
	(0.032)	(0.032)	(0.014)	(0.013)
Medium	-0.114***	0.014	-0.025	-0.021
	(0.035)	(0.036)	(0.016)	(0.014)
Medium-High	0.020	-0.026	0.047**	0.022
	(0.042)	(0.043)	(0.019)	(0.017)
High	0.157***	-0.010	0.099***	0.063***
	(0.054)	(0.055)	(0.024)	(0.022)
Highest level of education				
Normal School	0.537***	0.309*	0.211***	0.152**
	(0.160)	(0.164)	(0.073)	(0.066)
High School/Technician	0.504***	0.348**	0.193***	0.154***
	(0.142)	(0.145)	(0.065)	(0.058)
Specialization	0.621***	0.494***	0.223***	0.197***
	(0.143)	(0.146)	(0.065)	(0.059)
Postgraduate	0.839***	0.637***	0.293***	0.279***
	(0.143)	(0.146)	(0.065)	(0.059)
STEM Program	-0.044**	-0.041*	-0.016*	-0.008
	(0.021)	(0.021)	(0.010)	(0.009)
Constant	0.365**	-0.079	0.364***	0.186***
	(0.152)	(0.156)	(0.070)	(0.063)
Observations	8,767	8,767	8,767	8,767
R-Squared	0.07	0.03	0.04	0.03

Note: Observations include all individuals who participated in the various tests of the competition. Columns 1 and 2 show standardized scores for the basic test and the psycho-technical test. Columns 3 and 4 display the probability of passing each stage of the competition. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Mean Differences by Selection Process, Eligibility, and Gender

	2016 Contest			2018 *PDET* Contest				
	(1)	(2)	Diff.	(3)	(4)	Diff.	Diff.	
Variables	Total	Eligible	(2)-(1)	Total	Eligible	(4)-(3)	(3)-(1)	(4)-(2)
Female	0.45	0.20	−0.252***	0.38	0.35	−0.023*	−0.072***	0.156***
Ethnic group	0.06	0.05	−0.012	0.08	0.04	−0.034***	0.020***	−0.001
Age	42.56	38.31	−4.249***	41.53	40.49	−1.038***	−1.031***	2.180***
Rurality	0.12	0.08	−0.044	0.13	0.14	0.012	0.010**	0.066**
Multidimensional poverty index								
1st Quartile	0.48	0.59	0.109**	0.44	0.45	0.020	−0.043***	−0.132***
2nd Quartile	0.18	0.21	0.027	0.18	0.17	−0.007	−0.006	−0.040
3rd Quartile	0.20	0.12	−0.080**	0.22	0.20	−0.017	0.015***	0.078**
4th Quartile	0.14	0.08	−0.055*	0.17	0.18	0.004	0.034***	0.094***
Risk of victimization index								
Low	0.25	0.20	−0.051	0.14	0.16	0.014	−0.109***	−0.044
Medium-Low	0.44	0.51	0.072*	0.42	0.40	−0.023*	−0.016**	−0.111**
Medium	0.19	0.20	0.007	0.23	0.22	−0.008	0.040***	0.024
Medium-High	0.09	0.07	−0.021	0.15	0.14	−0.002	0.057***	0.076**
High	0.03	0.02	−0.007	0.06	0.08	0.019***	0.028***	0.054**
Highest level of education								
High School/Technician	0.00	0.00	−0.001	0.01	0.00	−0.005***	0.004***	0.001
Normal School	0.00	0.00	−0.004	0.02	0.02	−0.002	0.014***	0.017
Bachelor's/Undergraduate	0.25	0.15	−0.099***	0.41	0.32	−0.087***	0.158***	0.170***
Specialization	0.41	0.17	−0.236***	0.29	0.28	−0.015	−0.116***	0.105***
Postgraduate	0.34	0.68	0.341***	0.28	0.38	0.109***	−0.060***	−0.293***
STEM Program	0.45	0.70	0.254***	0.49	0.49	−0.001	0.048***	−0.207***
Observations	20,007	133	-	8,767	1,787	-	-	-

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$