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Training Leaders for School Management in Pernambuco

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Inter-American Development Bank
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TECHNICAL NOTE

TRAINING LEADERS FOR SCHOOL MANAGEMENT IN PERNAMBUCO

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CONTENTS

1. INTRODUCTION

School managers, especially principals, play a central role in ensuring quality education, whether by working to improve teaching effectiveness or by supporting student learning and development.[1] They are responsible for monitoring and finding ways to enhance teaching quality and student attitudes and learning. School managers must also ensure the appropriate implementation of the curriculum, as well as manage the people, processes, and financial administration of their establishment. A principal can impact the general conditions of the school (e.g., by developing a governance structure or creating an inclusive school culture) as well as the specific conditions of its classes (e.g., by adjusting their size or allocating teachers efficiently).[2]

Several international studies demonstrate the positive impact of principals on the student learning process, focusing particularly on math and reading performance.[3] However, research on the effect of specific principal characteristics has produced mixed results. For instance, Clark et al.[4] observe that level of education and previous work experience (e.g., years of teaching) do not affect the quality of principals. However, these scholars also show that management experience is positively correlated with student outcomes. Meanwhile, Dhuey and Smith[5] find different results, suggesting that fixed characteristics of principals are more relevant than experience or time in the position.

According to the conceptual framework proposed by Leithwood et al.,[6] school managers contribute to the learning process and integral development of their students indirectly (e.g., through their influence on various educational actors). Therefore, leadership—defined as the ability to exert this influence and define directions effectively—seems to be a common skill of good management. Waters et al.[7] carry out a meta-analysis and identify a series of skills that are essential for good leadership, highlighting the positive relationship between the presence of these skills in school managers and students' academic results. A study comparing school managers from eight different countries by Bloom et al.[8] similarly shows how different management practices, such as good people supervision skills and the ability to define goals and objectives, among others, are positively associated with student academic performance. These scholars also reveal that Brazil, the focus of our study, ranks second to last among the eight countries analyzed in terms of scores on a school management practices scale, ahead only of India.

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1. Darling-Hammond et al., 2022.
2. Leithwood et al., 2004
3. Branch et al., 2012; Coelli and Green, 2012; Dhuey and Smith, 2014.
4. Clark et al., 2009.
5. Dhuey and Smith, 2014.
6. Leithwood et al., 2004.
7. Waters et al., 2003.
8. Bloom et al., 2015.

Despite the importance of effective school management for the academic success of students, training opportunities and continuing education programs for principals are limited, and this is especially true in Brazil. This means that many principals have had little formal instruction in the management of school financial resources. Yet, critically, and contrary to previous research indicating that greater educational expenditures are not associated with better outcomes, recent work demonstrates that financial resources are, in fact, important to ensuring quality education.[9]

Furthermore, these resources must be distributed between and within schools in such a way as to ensure efficiency, effectiveness, and, above all, equity.[10]

In Brazil, school principals have little autonomy when it comes to raising funds or choosing how to use them. However, they are essential actors in the management of human resources, as they work directly with teachers and other members of the staff. Although efforts to decentralize resources for schools[11] have been ongoing for almost three decades, strengthening school autonomy in this regard has been hindered by poorly or insufficiently prepared principals and administrative staff in the management of financial resources. Most Brazilian states and capitals offer continuing education for school administrators, but these tend to consist of lectures focusing solely on pedagogical issues.[12]

9. Coleman, 1966; Hanushek, 1997. Jackson et al., 2015; Jackson, 2020; Handel and Hanushek, 2023.
10. Iatarola and Stiefel, 2003; King et al., 2005; Wolf, 2018.
11. An example in this regard is the Direct Money to School Program (Programa Dinheiro Direto na Escola - PDDE), created in 1995 by the federal government; similar initiatives have since been added at the state and municipal levels.
12. Simielli et al., 2023.

The international literature on the decentralization of educational resources relates greater autonomy to better educational results, but only in contexts of greater institutional development. In more vulnerable contexts, giving greater agency to local agents can have negative consequences if they do not have the capacity to carry out such tasks.[13] In Brazil, work on decentralization has tended to focus on the effects of municipalizing the educational offer.[14] A few studies have explored the implications of decentralizing school financial resources, though this has historically been a delicate topic, intersecting with questions of democratic and participatory management and school autonomy.

A study carried out by the Learning Police Institute in partnership with the Wallace Foundation[15] highlights that quality initial and continuing education for school managers is associated with important indicators for educational advancement. These are diverse and include, for example, managers' feeling that they are prepared to engage and retain teachers, and have greater capacity to ensure improvements in student learning. Among the necessary characteristics for quality training, the study highlights:

- Learning opportunities focused on the challenges of the profession
- Content that examines teacher, staff, and organizational development
- Strategies that help in the management of change
- Support between peers

Although the demands on school managers are different from those on teachers, when it comes to professional development and effective training, both benefit from adult learning theories.[16] Two aspects in particular are important to consider for the design of effective training methodologies in this context: 1) learners (i.e., teachers and managers) not only already have knowledge about the training topics, but their professional experiences guide their understanding; 2) the learning experiences provided must take into account the concrete demands of the participants, dialoguing with them and providing structured reflections on their performance.

13. Galiani et al., 2002, 2008; Hanushek et al., 2013; Mookherjee, 2015.
14. Madeira, 2007.
15. Darling-Hammond et al., 2022.
16. Drago Severson, 2009; Merriam and Bierema, 2013.

An example of a training program designed for school managers is the Certificate in Education Finance (CEF), offered by the Edunomics Lab at Georgetown University (USA) and led by its director, Professor Marguerite Roza.[17] The methodological approach implemented is in line with current best training practices for managers.[18] The CEF is an "interdisciplinary program that combines school finance, economic sciences, leadership, public policy, and administration, helping students build fluency in managing decision-making and broad-ranging policies, and allocating resources to impact the success of students in different contexts, including the particular context of the participant of the course." We further discuss this program in Section 3.

In Brazil, most management training courses focus solely on conceptual aspects of democratic administration and regulatory and legal frameworks. Among the various Brazilian experiences analyzed, only the Progestão program specifically addresses the issue of financial resource management.[19] First offered by the Council of Secretaries of Education (CONSED) in 2001 and updated in 2009, Progestão includes a module that asks "How to manage financial resources?" The content is divided into: basic aspects of financial management in schools (including constitutional principles), a description of available resources, recommendations for planning and reporting on resource use, and alternative ways of raising additional resources. Its methodology combines texts that connect normative aspects to the school's daily routine and reflection exercises on practice, mainly using fictitious cases.
In this context, the Pernambuco School Manager Training Program (Programa de formação de Gestores escolars de Pernambuco – PROGEPE) emerged as an example of manager training focused on improving school results. This online course, promoted by the Pernambuco Department of Education and Sports (Secretaria de Educação e Esportes de Pernambuco (SEE-PE), is designed for the continued training of school managers. It has been offered since 2012 to develop diagnostic, formative, and evaluative actions with school managers in the state education network, and help improve the efficacy of their day-to-day management of school resources. Until 2023, PROGEPE certification was a mandatory step for those wishing to compete for the position of public school principal.[20]

In 2022, in partnership with the Inter-American Development Bank (IDB) and the Singularidades Institute, the SEE-PE approved a structural change to the PROGEPE, which resulted in the following modifications:

15. Darling-Hammond et al., 2022.
16. Drago Severson, 2009; Merriam and Bierema, 2013.
17. Roza, 2020.
18. Darling-Hammond et al., 2022; Alladatin et al., 2024.
19. Brooke and Rezende, 2020.
20. Decree No. 47.297/2019 requires principals to have obtained PROGEPE certification and present a school management plan prior to appointment. Decree No. 55.509/2023 amends this to allow principals to present their PROGEPE certificate up to 180 days after their appointment.

1- The workload increased from 60 to 72 hours;

2- Based on a methodological review, new forms of interaction with the course content, diversification of languages, and pedagogical tools, among others, were incorporated;

3- New modules on the topic of spending efficiency were added, focusing on the use of financial resources, aspects of accountability, and parameters for making budgetary decisions. These took inspiration from the above-mentioned Certificate in Educational Finance.

In addition to offering school managers an opportunity for ongoing training through the PROGEPE, the SEE-PE also implemented the Management Efficiency Supplement (Adicional de Eficiência Gerencial - AEG), a policy that encourages all principals to report their plans at the beginning of each school year, including, for example, information on the grouping of students and assignment of teaching hours in the school they manage. Based on this participation, managers who obtain the network's operational efficiency indicator receive additional variable compensation. The AEG allows the SEE-PE to make better predictions regarding the (under)utilization of teachers in each school, thus significantly increasing efficiency for schools and the education network.[21]

Two relevant considerations emerge from these initiatives. First, **the new training focus of the PROGEPE—aimed at the efficient management of financial resources—enhances other educational policies adopted by the SEE-PE. In other words, training school managers in the efficient and equitable use of financial resources and providing strategies and tools that can be adopted in their day-to-day practices increases the impact of other State Department of Education (Secretaria Estadual de Educação) policies.**

Secondly, it is worth noting that debate over the efficient use of resources aligns with recent educational policy discussions at the national level, particularly the implementation of the New Fund for the Maintenance and Development of Basic Education and the Appreciation of Professionals in Education (Novo Fundo de Manutenção e Desenvolvimento da Educação Básica e de Valorização dos Profissionais da Educação – FUNDEB), approved at the end of 2020. The main function of FUNDEB is to redistribute a portion (which represents more than half of the revenue from basic education in Brazil) of the resources constitutionally linked to education among Brazilian states and municipalities, based on enrollment numbers in each stage and type of education.[22]

21. Cruz et al., 2019.
22. Cruz et al., 2019; Callegari, 2020.

The new FUNDEB determined that 70% of its constituent resources should be invested in the remuneration of education professionals. In practice, however, personnel expenses are often higher than expected.[23] In Pernambuco, for example, almost 80% of annual school spending is spent on payroll, mostly for teachers. The efficient use of resources to pay teachers and equitable distribution between and within schools is, therefore, clearly of utmost importance. Notably, in Pernambuco, spending per student in schools with high socioeconomic status is at least 1.5 times higher than in schools with low socioeconomic status, largely influenced by the concentration of more qualified teachers (and therefore with higher salaries) in these schools.[24]

Although school administrators generally have little autonomy in terms of raising funds for their schools, they do play a central role in ensuring efficiency and equity in their use. In this sense, the PROGEPE is, for a variety of reasons, a training experience worth analyzing:

1– The PROGEPE aligns with an international academic literature concerned with the professional development of school managers and their potential to improve the quality of education offered by schools.

2– The PROGEPE is consistent with the objectives and policies adopted by Pernambuco, particularly the aim of bettering the management of educational financial resources in the school system.

3- With the implementation of the Pernambuco Cost System (Sistema de Custos de Pernambuco - SICPE), which allows comparison of cost per student between different schools and teaching modalities, the state of Pernambuco is, in Brazil, at the forefront of improving resource management at the school level.[25]

4- The PROGEPE offers a basis for broader national discussion about educational resources and the appreciation of education professionals.

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23. Cruz et al., 2019.
24. Cruz et al., 2019; Bertoni et al., 2023.
25. Elacqua et al., 2019.

The objective of this technical note is to examine Pernambuco's experience identifying the profile of future managers and reformulating its management course based on the CEF methodology. We are furthermore interested in these managers' perceptions and knowledge—before and after the course—about education finance at the national, local, and school levels. The note also investigates aspects related to the effectiveness of the PROGEPE, offering a critical reflection on possible paths and good practices that may be replicated or adapted to other locations.[26]

The instruments used to analyze participant perceptions are presented throughout the report and based on the application of a questionnaire carried out both before the start of the PROGEPE (questionnaire Wave I) and upon its completion (questionnaire Wave II). We use data from these questionnaires to discuss the profiles of the participating managers and their views on different aspects of school management.

Below, we describe the Georgetown experience and the evolution of the current version of PROGEPE in detail, aiming to clarify the main training needs, as well as the early perceptions of the participants and changes in their views upon completion of the program. The PROGEPE reveals a need for training that addresses the relationship between the financing policies of the Education Departments and the impact of the latter on schools. PROGEPE participants showed growth relative to various indicators. Our analysis further suggests that there is also a need to improve the instruments that assess the financial management of schools.[27]

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26. Rhe data collected do not allow for an assessment of the causal impact of the training on management practices and school success indicators. It is, nonetheless, essential to combine studies that assess the quality of the offer with those that assess its impact..
27. It is not easy to find a questionnaire in the literature aimed at better understanding financial management in education. While there are many survey models and instruments for pedagogical aspects related to principals, teachers, and students, very few address knowledge of management, financing, budget, investment, application, and efficiency of resources.

2. WHO ARE THE FUTURE SCHOOL MANAGERS OF PERNAMBUCO AND WHAT ARE THEIR VIEWS?

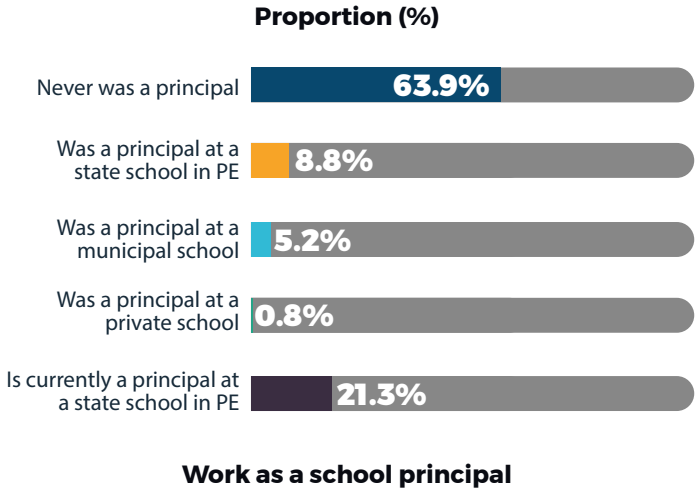
2.1. Who are the managers?

The main objective of the School Manager Training Program (Programa de Formação de Gestor Escolar - PROGEPE), an initiative of the Pernambuco Department of Education and Sports (Secretaria de Educação e Esportes de Pernambuco - SEE-PE), is to train school principals to efficiently manage Pernambuco public school resources. Despite having been initially designed as a continuing education program for currently employed principals, PROGEPE has also become a minimum training requirement for those applying for principal positions in the state of Pernambuco. As shown in Figure 1, participants thus partly consist of principals in the school network looking for continued training (around 21%). Mainly, however, they are teachers and school coordinators seeking to prepare themselves for a management position (64%). Our results therefore largely reveal information about teachers who are or aspire to become managers. What knowledge do these teachers, seeking to be principals, have about school and education financing?

THE RESEARCH SAMPLE

The sample used in this study (5,586 responses) consists of program participants who responded to both the entry questionnaire (administered before the start of the program) and exit questionnaire (applied at the end of the program). We obtained entry-questionnaire responses from 6,493 participants. Since the questionnaires were an integral part of the program, administered on the same platform where teachers were supposed to read the materials and watch the classes, this participation implies a high course completion rate (over 86%). Statistical analysis of attrition shows that the participants who did not respond to the exit questionnaire are no different from the others, considering a series of demographic characteristics.

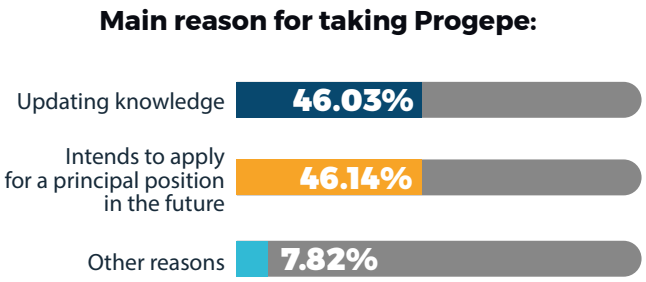
Figure 1. Distribution of PROGEPE participants according to school principal employment



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students).

As seen in Figure 2, when asked about their main motive for signing up for the PROGEPE, participants are equally divided between those seeking to update their knowledge (approximately 46%) and those who intend to apply for a school manager position in the near future (46%).

Figure 2. Distribution of PROGEPE course participants according to their motive for participating in the training program



Note. Prepared by the authors. The analysis corresponds to the participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students).

Tables 1 and 2 present general descriptive statistics of the profile of the PROGEPE participants. The majority are Brown women, between the ages of 40 and 49. In addition, around 77% have a postgraduate degree or specialization. No major differences are observed between participants who have never been principals and those who have worked or are currently employed in a school management position. Though, participants who have never been principals are, generally, younger than average.

Table 1. Descriptive statistics on the profile of program participants – Part I

	Overall average	Never been a principal	Principal at a state school in PE	Previously a principal in another context
Sex (%)				
Male	32,6%	32,7%	32,0%	32,8%
Female	67,4%	67,3%	68,0%	67,2%
Race (%)				
Black	9,5%	9,4%	9,7%	9,4%
Brown	51,7%	51,8%	50,9%	52,7%
Indigenous	0,5%	0,5%	0,5%	0,4%
White	37,0%	37,0%	37,5%	36,4%
East Asian	1,3%	1,3%	1,4%	1,2%
Age Group (%)				
Between 20 and 29	1,7%	2,7%	0,2%	0,0%
Between 30 and 39	21,6%	29,2%	8,7%	7,4%
Between 40 and 49	42,5%	42,4%	42,3%	43,4%
Between 50 and 59	27,4%	21,4%	38,0%	37,8%
Between 60 and 69	6,5%	4,1%	10,6%	10,6%
70 or older	0,3%	0,1%	0,3%	0,8%
Level of Education (%)				
Bachelor's degree or degree in teaching	6,6%	7,7%	4,3%	5,4%
Postgraduate/specialization	76,7%	75,6%	80,1%	76,6%
Master's degree	14,0%	13,7%	14,2%	15,4%
PhD	2,6%	3,0%	1,4%	2,6%
Number of observations	**5586**	**3567**	**1189**	**830**
% of total observations	**100,0%**	**63,9%**	**21,3%**	**14,9%**

Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students).

Note that all program participants are from the school system. As seen in Table 2, PROGEPE participants who are already school principals also have more prior experience as teachers (almost 90% of them have more than 10 years of experience) than those who have never been principals (73.5%). In addition, principals who work in state schools in Pernambuco are more concentrated in regular schools when compared to other participants (whether principals in other contexts, or those who have never held this position).

Appendix A presents all analyses of participant perceptions and prior knowledge by characteristics related to their experience and prior training. Namely:

(i) work experience as a school principal (never having held this position versus currently or previously employed as a principal);

(ii) teaching experience (less versus more than 10 years of experience);

(iii) level of education (less versus master's degree and/or doctorate);

(iv) background or degree in pedagogy (versus another area).

The results do not present specific patterns that would associate greater experience or training with having more or less prior knowledge about education financing.

Table 2. Descriptive statistics on the profile of course participants– Part II

	Overall average	Never been a principal	Principal at a state school in PE	Previously a principal in another context
School location (%)				
Only rural	7,4%	7,1%	9,1%	6,1%
Only urban	91,5%	91,6%	90,1%	92,9%
Rural and urban	1,2%	1,3%	0,8%	1,1%
School type (%)				
Full-time school	52,0%	54,2%	47,7%	48,6%
Regular school	29,0%	26,9%	36,3%	27,5%
Technical school	5,9%	6,1%	4,6%	6,7%
Indigenous school	0,0%	0,0%	0,0%	0,1%
Does not work as a teacher	13,1%	12,8%	11,4%	17,1%
Experience as a teacher (%)				
Never been a teacher	5,3%	8,0%	0,1%	1,6%
Less than 3 years	0,6%	0,6%	0,4%	0,8%
Between 3 and 5 years	4,0%	5,2%	2,3%	1,4%
Between 5 and 10 years	10,4%	12,7%	8,2%	3,6%
More than 10 years	79,6%	73,5%	89,0%	92,5%
Experience as a principal (%)				
Never been a teacher	63,8%	100,0%	0,0%	0,0%
Less than 3 years	8,2%	0,0%	15,9%	32,0%
Between 3 and 5 years	7,1%	0,0%	14,0%	27,6%
Between 5 and 10 years	12,1%	0,0%	39,7%	24,3%
More than 10 years	8,9%	0,0%	30,4%	16,0%
Number of observations (%)	**5586**	**3567**	**1189**	**830**
% of total observations	**100,0%**	**63,9%**	**21,3%**	**14,9%**

Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students).

2.2. What are future managers' perceptions of education financing?

What exactly do we mean when we talk about education financing? Concepts related to education financing are diverse and can have various meanings, and administrators' interpretations and knowledge levels can impact decisions related to school financial resources. Providing school administrators with a better understanding of these concepts is thus paramount to making their efforts to improve educational quality and equity as effective as possible.

To capture the initial perceptions of program participants about education financing, the first questionnaire asked them to share the first three words that come to mind when thinking about "public financing of educational investments." Figure 3 presents the word cloud formed from this exercise, where the most frequently used terms appear largest: "Responsibility" with 1,395 citations, followed by "Transparency," with 1,106 citations.

Figure 3. Word cloud reflecting the thoughts of PROGEPE participants relative to education financing (before beginning the program)

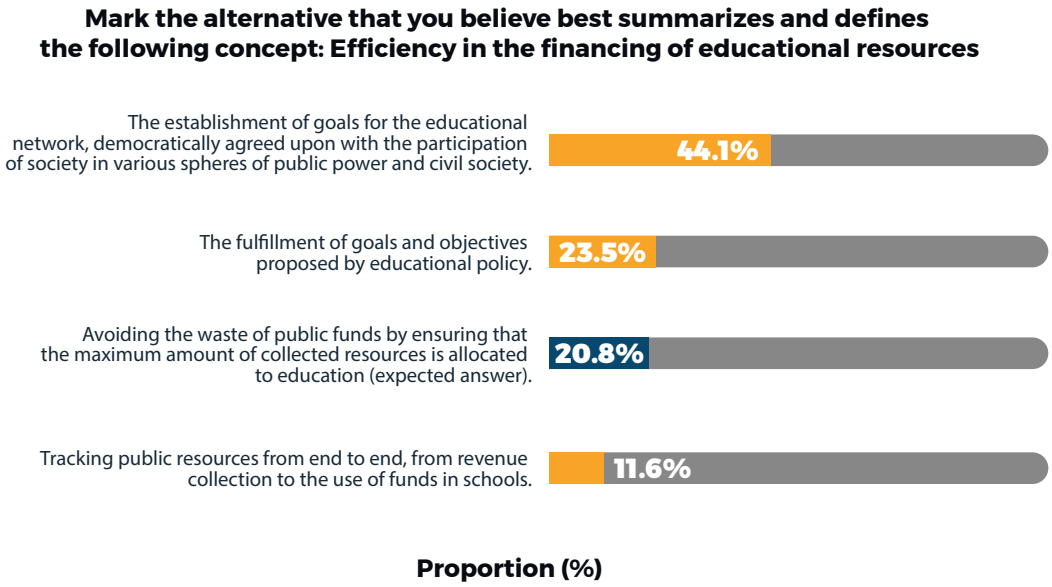
Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students).

Given the importance of "Efficiency," "Equity," and "Effectiveness," (the "3 Es") in resource management— particularly within the theoretical framework proposed by the PROGEPE training—we were especially interested in whether these words emerged in students' initial perceptions of the concept of education financing. We observe that the word "Efficiency" ranked fourth among the most cited words (616 citations), "Equity," ninth (270 citations), and "Effectiveness," 36th, with only 75 citations. Of course, these concepts had yet to be formally introduced, as the participants had not yet begun the program, perhaps explaining the differences in their initial frequency.[28]

Similarly, we see in Figure 4 that many participants did not yet fully understand the concept of spending efficiency (only 20.8% answered the question correctly). While efficiency is about doing the most with the least amount of resources,[29] almost half of the participants (44.1%) responded that the concept had to do with the establishment of goals for the educational network, democratically agreed upon with the participation of society. While Section 4 discusses changes in participants' perceptions after having completed the PROGEPE, it is worth noting here that the percentage of correct answers to this particular question rose to 44% in the second-wave questionnaire, administered after the training program.

28. The activity that generated the word cloud was carried out just before the program began.
28. In the PROGEPE, the concept of efficiency was presented as "doing the most with the existing amount of resources." This framing differs slightly from the broader concept in that it does not assume the possibility of reducing resources to increase efficiency.

Figure 4. Prior knowledge of efficiency in the financing of educational resources



Nota. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students). The figure displays the question asked, as well as the available response options. The correct answer is marked in blue.

The concepts of "effectiveness" and "equity" deal, respectively, with the ability to achieve desired results with available resources, and ensure similar educational opportunities. Educational opportunities refer, on the one hand, to providing equal learning conditions for all (e.g., similar access to school resources/inputs) and, on the other hand, to guaranteeing academic outcomes that are not determined by prior conditions (i.e., not related, for example, to student race, gender, or socioeconomic level).[30] PROGEPE participants were introduced to these three concepts (the 3 Es), and considered practical applications for educational and school financing that are efficient, effective, and equitable..

2.3. What are future managers' perceptions of resource management at the national level?

Before considering participants' perceptions of educational resource management at a national level, it is worth considering the main federal policies. This also allows for a better understanding of the level of familiarity of PROGEPE participants with concepts, structures, and policies operating throughout the national territory, or that concern the relationship between the federal government, states, and municipalities.

30. (Simielli, 2015)

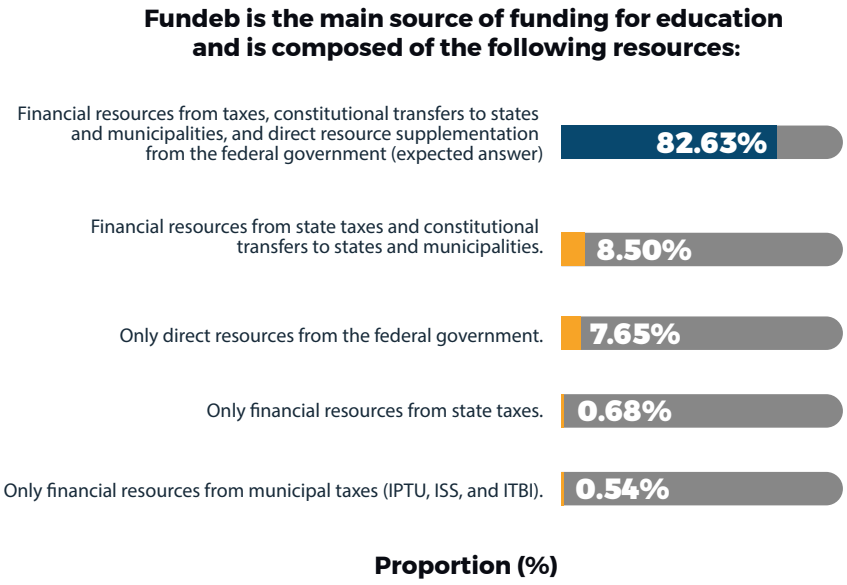
The Brazilian federal government is primarily responsible for the higher education system, and municipal and state revenues are the main sources of funding for basic education. Even so, a significant portion of federal education spending is annually directed to basic education. Most intergovernmental transfers are made by the National Fund for the Development of Education (Fundo Nacional de Desenvolvimento da Educação - FNDE), a federal authority linked to the Ministry of Education. FNDE transfers are earmarked for various education programs coordinated by the federal government, including federal resources for FUNDEB.

The FNDE financing policy operates in three transfer modalities: (i) direct, (ii) automatic, and (iii) voluntary. Direct transfers occur mainly through the distribution of goods, such as textbooks. Automatic transfers can be constitutional (such as FUNDEB transfers, the "education salary,"[31] and the "Direct Money to School" program [Programa "Dinheiro Direto na Escola" - PDDE[32]], legal (such as the "National School Feeding Program"), or discretionary (resulting from the "Articulated Action Plan" or other FNDE initiatives). Most FNDE resources are transferred through automatic mechanisms. Voluntary transfers are generally not provided for by law and involve the signing of agreements.[33]

Although transfers from the federal government to FUNDEB are made through automatic transfers from FNDE, most of FUNDEB's resources come from redistribution within the states. Figure 5 shows that before beginning the PROGEPE, participants had a good understanding of the sources used by FUNDEB, suggesting the program has the potential to deepen their knowledge, especially relative to the management of local resources (at the secretariat level).

31. The "education salary" is a social contribution paid or credited by companies and entities (public and private) linked to social security to finance public basic education. It represents 2.5% of the companies' contribution salary.
32. Through the PDDE, the federal government transfers resources directly to schools with certain characteristics, according to the programs subscribed to by each establishment (in some cases, the municipality is responsible for adherence).
33. Cruz and Silva, 2020.

Figure 5. Prior knowledge of FUNDEB resources



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students). The figure displays the question asked, as well as the available response options. The correct answer is marked in blue.

2.4. What are future managers' perceptions of resource management at the local level?

In addition to federal policies, future school managers should be familiar with the type of policies that concern the Department of Education, thus enhancing their understanding of the relationship between their responsibilities as school managers and those who formulate and implement policies in their state or municipality.

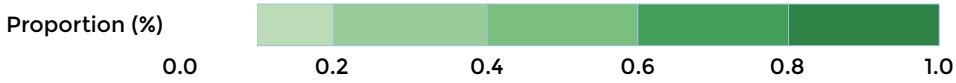
To this end, we explored participants' prior knowledge of the SEE-PE budget. Specifically, participants were asked to order the main monthly expenses of the Department of Education based on five available options. Figure 6 shows the relationship between the correct ordering and that given by participants before beginning the PROGEPE. Diagonally, in bold, appear the proportions of trainees who ordered each of the items correctly. Above and below this diagonal, we observe the percentages of participants who underestimated or overestimated the importance of certain expenses. The results reveal the utility of the program's focus on education financing at the local level. For example, less than half (approximately 48%) of the participants answered that the main expense is the payment of teacher and pedagogical support staff salaries. What is more, almost 20% of the participants indicated that this expense is the least relevant among the options presented.

In contrast, infrastructure and building maintenance services (cleaning, repairs, etc.) are greatly overestimated. Just 13.5% of the participants considered this category to be the least financially relevant. Generally, the response patterns indicate that the participants are not sure about the true ordering of expenses.

Figure 6. Prior knowledge of Department of Education monthly expenditures (proportion of correct responses diagonally in bold)

Order from 1 to 5 the monthly expenses of the Secretariat for each of the items below, with 1 for the highest expense and 5 for the lowest expense.					
Expected order	1	2	3	4	5
Salaries of teachers and pedagogical support staff	**48.06%**	12.43%	8.36%	11.85%	19.30%
School meals and transportation	18.26%	**34.41%**	19.14%	17.42%	10.76%
Electricity, water, office supplies, and vehicles	9.35%	18.46%	**28.36%**	26.23%	17.60%
Pedagogical programs, continuing education, software, etc.	15.63%	12.75%	14.65%	18.10%	**38.87%**
Infrastructure services and building maintenance (cleaning, repairs, etc.)	8.70%	22.0%	29.50%	26.4%	13.5%

Order given by participants

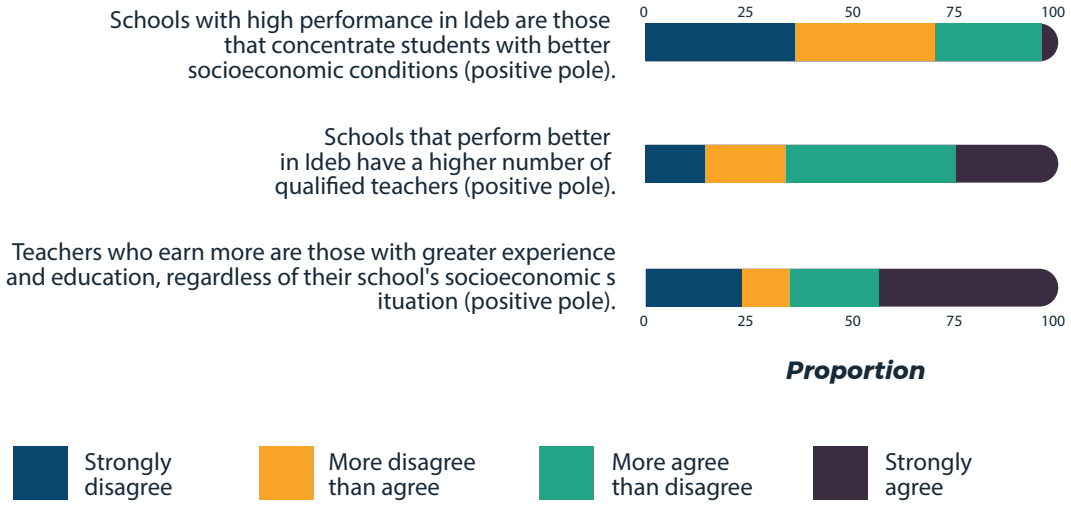


Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students). The figure displays the question asked, as well as the available response options. The quadrants relate the correct ordering (vertical axis, top to bottom) together with the ordering given by the participants (horizontal axis). On the diagonal, we observe the proportions of participants who ordered each of the expenses correctly.

Figure 7 presents an applied example of program participants' perceptions of local education financing policies. Using a Likert scale of agreement, the students were asked their opinions about various aspects related to the quality of education. For "positive pole" items, we expected to observe students agreeing more than disagreeing with the statements, while more disagreement was expected for the "negative pole" items. A large proportion of the course participants (65%) agree that there is a direct relationship between a school's IDEB (Basic Education Development Index) and the quality of the teachers assigned there, and are aware of the unequal allocation of teachers (and therefore resources) among schools, which favors those with a higher IDEB. A similar proportion agrees (fully or partially) that teacher pay is more related to experience and training than to criteria for an equitable distribution of teachers among schools of different socioeconomic levels.

However, although the participants demonstrate an understanding of the efficiency of local education financing policies (e.g., teacher allocation), the same proportion of participants do not relate a school's IDEB to exogenous factors, such as the socioeconomic distribution of students in the school network. Such divergence may derive from the (correct) perception of the importance of school management for IDEB performance. **Certainly, managers must be aware of inequities in the distribution of students and resources between schools with higher and lower performance, and the fact that such inequities are often related to the socioeconomic level of students.**

Figure 7. Prior knowledge of aspects relating to the quality of education.



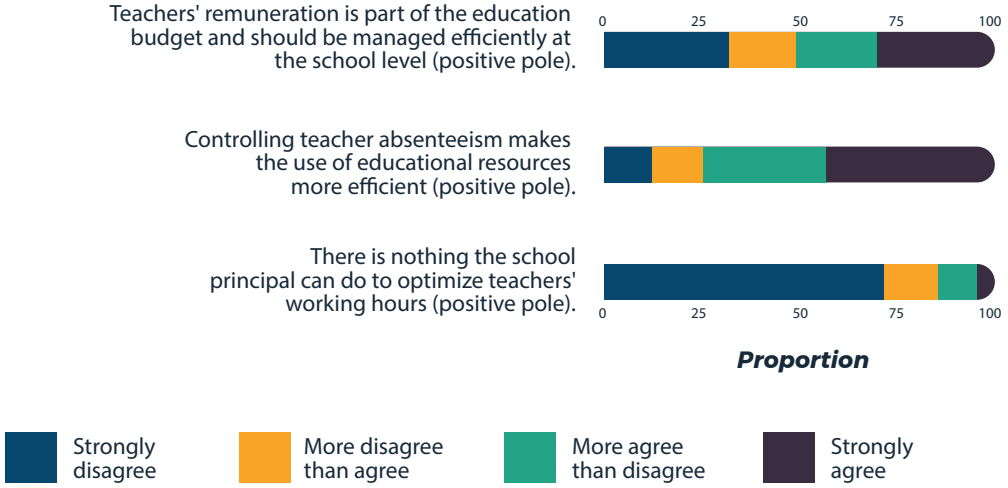
Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students). The figure displays the questions asked, as well as the available response options. The "poles" of the items represent the correct response. We expect participants to agree more with positive pole items and disagree more with negative pole items.

2.5. What are future managers' perceptions of resource management at the school level?

Yet another aspect analyzed in the first-wave questionnaire was PROGEPE participants' understanding of educational policies that are directly related to their future performance as school administrators. The aim here being to assess their perceptions of the policies that school principals have the autonomy to adopt, as well as the impacts of these policies. Figure 8 indicates that approximately 50% of future managers agree on the importance of efficiently managing teacher compensation. This percentage is, however, rather low, given that most educational resources are allocated to education professionals. Although they do not make hiring decisions, it is nonetheless essential that principals see themselves as part of this process. In other words, understanding teacher allocation as a financing policy is an important point that can potentially be improved through the PROGEPE.

The other responses presented in Figure 8 reflect more positive rates of prior knowledge, demonstrating, in general, that participants have a relatively good understanding of actions adopted at the school level. Approximately 75% of the course participants agree (partially or totally) that monitoring teacher absenteeism improves efficiency in the use of educational resources, and almost 90% believe that school principals can do things to optimize teachers' workloads.

Figure 8. Prior knowledge of resource management at the school level



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before beginning the PROGEPE (N = 5,586 students). The figure displays the questions asked, as well as the available response options. The poles of the items represent the correct response. We expect participants to agree more with positive pole items and disagree more with negative pole items.

In sum, the PROGEPE offers a potential means of supporting future managers, particularly in terms of increasing their knowledge of resource management at the local level (i.e., decisions by the Education Departments). Indeed, while the program offers an opportunity to deepen a relatively good understanding of education finance at the federal and school levels, a greater discrepancy is observed between the perceptions of future managers and the actual allocation of resources of Brazilian Education Departments at the local level. As further reflected in Appendix A, training and experience are not sufficient for effective knowledge on this subject. Finally, we observe no specific pattern that would associate perceptions and prior knowledge with specific participant profiles, thus reinforcing the importance of training in education financing for all.

3. BUILDING A TRAINING PROGRAM FOR EDUCATION MANAGERS: EFFICIENCY, EFFECTIVENESS, AND EQUITY IN THE FINANCIAL MANAGEMENT OF SCHOOLS

3.1. A reference: The Georgetown University Certificate in Education Finance

The Inter-American Development Bank (IDB), the Singularidades Institute, and the Pernambuco State Department of Education came together to develop a new training model focused on a challenging but crucial topic: the financial management of schools. In this, the program conducted by the Edunomics Lab at Georgetown University (USA)—The Certificate in Education Finance (CEF)—led by Dr. Marguerite Roza, served as an important reference. The CEF is described as an "interdisciplinary program that combines school finance, economics, leadership, public policy, and administration, helping students build fluency in how to manage broad-ranging decision-making and policy, and how to allocate resources to impact student success in a variety of contexts."[34]

The methodological approach is presented as more strategic than other training courses, as it focuses on making decisions and on the communication of resource allocation to strengthen the trust of school communities. It furthermore aligns with best training practices for managers, as identified by Alladatin,[35] namely: coherence between theory and practice; curriculum aligned with the skills already acquired in daily school life; up-to-date regarding technological aspects; and provision of peer-to-peer learning activities.

The choice of using the CEF as a reference for the training program was also made due to the similar emphasis placed on efficiency and equity in financial management. From an efficiency perspective, the CEF underlines the importance of school principals understanding how decisions related to the allocation and management of teachers' working hours impact the student learning process. The key consideration from the CEF perspective is how each amount can be invested to enhance results and school success. The premise, therefore, is not to save money to reduce investments, but rather to allocate, as best as possible, the available resources. This vision aligns with the Management Efficiency Supplement (Adicional de Eficiência Gerencial - AEG) policy, implemented in the Pernambuco state education system, which aims to encourage efficient management of teachers' working hours.

34. Free translation from the Association of School Business Officials International
35. Alladatin et al., 2024.

Georgetown University Certificate in Educational Finance (CEF)

This hybrid course (presential and remote sessions) unfolds over 3 months with a workload of 30 hours. It is aimed primarily at American school principals. Its main components include: (1) resource allocation and accountability structures; (2) work models related to deliveries, (3) the impacts of national and local educational policies on the day-to-day management of schools, (4) productivity analysis, and (5) the main cost components in the financial management of schools as well as strategies for their optimization.

The CEF learning objectives, summarized below,[a] are broadly similar to the premises of the collaboration between the IDB, Instituto Singularidades, and SEE-PE:

- How public policies affect the use of financial resources and their equity;
- How to effectively consume and use financial information from federal, state, and local education systems;
- How to make more strategic decisions about the allocation of financial resources to achieve the desired results and avoid undesirable consequences that may negatively impact students, schools, and their communities;
- How to understand and effectively face the challenges of productivity and decision-making between different alternatives, considering budgetary limitations in the school environment;
- How to report financial strategies and related decisions to the school community.

Methodologically, the CEF combines interactive classes with real case studies, reading, self-reflection exercises, and hands-on individual and group activities. An innovative pedagogical approach for adult learning widely used in the CEF are "situational judgments." According to Roza, the playful exercise of asking students "What would you prefer?" allows them to explore conflicting alternatives for educational investments. This applies not only to decisions about monetary allocation, but also to other scarce resources such as school time and education professionals.

[a]. Free translation from Edunomics Lab.

From an equity perspective, the CEF discusses inequalities in funding between schools. To this end, it cross-analyzes the resources invested per student and vulnerability metrics, based on financial and accounting information from federal, state, and local education systems. This approach is similar to that developed by the Pernambuco state education network in the context of the "Costs per School System" (Sistema de Custos por Escola), which compares cost components that represent unfair disparities between schools,[36] allowing decision-makers—including at the school level—to gather concrete evidence for new equity initiatives in the distribution of educational inputs.

36. Elacqua et al. (2019).

3.2. Adaptation of the design for inclusion in the PROGEPE

The PROGEPE offers a good training opportunity for school managers. Firstly, it aligns with the recommendations of the related international literature in providing future candidates with the basic knowledge needed to adequately fulfill their management role. Given its mandatory nature, the program also naturally sees widespread participation of trainees. Furthermore, the program is delivered by the State Department of Education itself, and the content is produced by experts in professional development activities for educators, thus facilitating coherence with other training strategies in the school network and adaptation of the content to the local context. The hybrid format of the program is conducive to the needs of educators, who can participate in activities at times that do not conflict with their working hours, even those with high workloads. Finally, it is noteworthy that PROGEPE notices and regulations are publicly accessible, allowing transparency and planning for course participants in terms of dates, procedures, and stages.

The collaborative effort between the IDB, Singularidades, and SEE-PE led to the decision to incorporate financial management modules inspired by the CEF into the existing PROGEPE, generating both:

1. Greater public reach: more than 7 thousand educators registered for the PROGEPE, all of whom needed the mandatory certification to compete for the position of school manager in the state network, creating a strong incentive against dropout (a common problem in distance learning);

2. Remodeling of the proposed activities: both for the financial management and other modules, consisting mostly of an asynchronous workload. To this end, group discussion activities were replaced by synchronous chat message exchange sessions, called “Dialogues.”

Given that the PROGEPE aims to provide elemental training for participants, it was also necessary to present the fundamentals of the structure of basic education financing. The content of the module on financial management from the original training (i.e., prior to the partnership with the IDB and Singularidades Institute) was thus transformed into three new modules related to the efficient, effective, and equitable use of educational resources, as shown in the figure below. To adapt the CEF model to the SEE-PE context, information on bureaucratic procedures for collecting taxes and reporting accounts was incorporated, in a way that interconnects with the concepts of effectiveness and efficiency. Thus, the final structure of the training in educational resource management starts from basic aspects of the financial

dimension of educational management (in which the efficiency-effectiveness-equity tripod is presented as a guide), then delves into the costs related to education professionals (the main cost component), as well as addresses the other cost categories, particularly decentralized resources and their uses.

Figure 9. New modules in the "Paths to greater efficiency, effectiveness, and equity in the allocation of educational resources" (July 2022) and inclusion of prior 2019 PROGEPE content

New training modules		Which cost and resource usage content was present in Progepe 2019?
Basic structure of education funding in Brazil	Includes the following topics >>>	> Types of expenses; > Constitutional principles of public administration; > Types of public spending control in Brazil
Allocative decisions regarding education professionals	100% new module	*<Content not included in 2019>*
Practices for optimizing and managing pedagogical, operational, and student well-being costs	Includes the following topics >>>	> Resource planning and execution cycle; > GUT matrix; > Tax withholdings; > Step-by-step process for financial accountability.

Note. Authors' own drafting

3.3. Final design of an innovative training program for future managers

Compared to the course offered by SEE-PE in 2019, the new PROGEPE allowed for a shift in training focus, with greater emphasis on the use of financial resources in the state education network. Bureaucratic aspects of accountability gave way to parameters that guide decision-making, thus enhancing skills in resource management and facilitating the development of more effective administrative practices.

Broadly, the PROGEPE now consists of 7 modules:

- Management of the school network, including democratic administration, enrollment, and school registration;

- Full and professional education, the flagships of the expansion of the teaching offer in the state school network;

- Pedagogical management, including the BNCC,[37] the New High School,[38] and human rights education;

- Management for results, addressing the Pact for Education (Pacto pela Educação)[39] and prioritization of outcomes;

- Structure of education financing in Brazil;

- Allocative decisions about education professionals;

- Practices for optimizing and managing pedagogical, operational, and student well-being costs.

The three training modules on financial management, totaling 37 hours, have significantly expanded this content in the PROGEPE. In 2022, it was expected that about 12 hours would be specifically dedicated to the basic structure of education financing in Brazil. The figure below summarizes the different objectives and learning hypotheses for the three training modules on financial management.

37. The National Common Curricular Base (Base Nacional Comum Curricular - BNCC) is a normative document that defines what should be taught in Brazilian schools throughout basic education—i.e., from early childhood education to high school—and aims to guarantee the right to learning and full development of all students.
38. The New High School is the outcome of a Brazilian government education policy that increased the minimum time spent by high school students in school from 800 to 1,000 hours per year and reorganized the curricular structure to make it more flexible, taking into account the BNCC and offering different formative itineraries to students, focusing on different areas of knowledge and technical and professional training.
39. The Pact for Education is a policy aimed at increasing the quality of public education based on results-oriented management, with education monitoring, evaluation plans, and integrated educational management models between states and municipalities.

Figure 10. Summary of 2022 PROGEPE financial management modules

New training modules	Module Objectives	Workload	Learning Hypotheses
Basic structure of education funding in Brazil	Discuss public budgeting as an expression of allocative priorities, identifying guidelines for effectiveness, equity, and efficiency, while considering the financing system regulations from the perspective of federal relations.	12h	Understand, differentiate, and apply the conceptual guidelines of efficiency, effectiveness, and equity in practice.
			Learn the basic regulations of different types of educational expenses.
			Understand the functioning of the inter-federative system of education-linked resources.
			Identify the types of allocative decisions related to the public budget.
			Relate educational inequalities to the design of the education financing system.
Allocative decisions regarding education professionals	Develop an understanding of the cost dimension of teachers and other education professionals in Pernambuco and Brazil, both from the perspective of variables and from the viewpoint of measures that can bring efficiency and equity to allocative decisions.	12,5h	Recognize human resources as part of the education budget and understand their management.
			Assess the magnitude of education professional costs in Brazil and worldwide.
			Establish a relationship between teacher costs and the allocation of their working hours in schools.
			Understand the phenomenon of teacher absenteeism and its mitigation strategies.
			Learn and apply parameters for the efficient and effective allocation of teachers' workloads.
			Identify inequalities in teacher allocation criteria and the incentive mechanisms to promote equity.
Practices for optimizing and managing pedagogical, operational, and student well-being costs	Expand the repertoire of practices for efficiency, effectiveness, and equity in managing decentralized resources for schools, as well as understanding the evidence from the School Cost System, which can support the optimization of operational and well-being costs in schools.	12,5h	Understand the School Cost System and its potential for promoting spending efficiency through school comparisons.
			Identify and apply expense optimization practices for school operations.
			Learn different models of well-being cost provision and compare them to recognize the most efficient and effective strategies.
			Understand the regulations of budget decentralization programs (PDDE and Investe Escola Pernambuco), including tax withholdings and financial accountability, and their effects on efficiency and equity.
			Learn and apply budgeting and planning methods for efficiency, effectiveness, and equity in financial management.
			Understand the importance of social oversight for the quality of educational investment and recognize strategies for mobilizing the educational community.

Note. Prepared by the authors.

This programmatic content was modeled on the CEF training methodology and adapted to self-instructional training needs, enabling study in a virtual environment with graphic resources favoring the participant's permanence on the page. It is worth emphasizing that the methodological components include video-recorded classes focused on the practice of school management, situational judgment exercises with closed alternatives ("Challenges"), case studies via podcast ("Testimonials"), and synchronous interaction activities between course participants and speakers specialized in financial management ("Dialogues"). These transpositions to a fully remote and large-scale reproduction of the CEF approach offered real-time surveys on situational judgments for discussion in class, synchronous expository classes presenting data and real cases, and discussions in small groups.

The "Challenges," specific to the financial management modules and inspired by "What would you prefer?" tests,[40] were designed to stimulate reflection on decision-making in situations where resource allocation is necessary. Aimed at embedded learning, they are based on the concepts of efficiency, effectiveness, and equity. In total, 35 challenges were made available in a virtual environment, including 31 multiple-choice questions (with 4 hypothetical, single-choice options) and 4 open challenges for reflection (without recording the answer). Notably, despite being optional, the "Challenges" had an average participant engagement rate of around 60% to 70% throughout the course.

Figure 11. Methodological comparison between the CEF and 2022 PROGEPE

Methodological Aspects	CFE / Georgetown University	Progepe 2022 / Pernambuco State Network
Modality	Hybrid, 100% Synchronous	Remote, mostly asynchronous
Number of Participants	Average of 50 participants	More than 5,000 participants
Class Format	Synchronous lectures via video	Asynchronous lectures via video and text
Activity Methodology	Would you rather methodology, with live situational judgment polls	Challenges methodology, with asynchronous situational judgment polls
Best Practices	Case studies and evidence presented in synchronous sessions (both in-person and remote)	Case studies presented asynchronously (testimonies in podcast format)
Participant Interaction	Small group discussions on decision-making in the school context (both in-person and remote)	Synchronous interaction activities between participants and financial management experts (Dialogues)

Note. Prepared by the author.

Drawing inspiration from reputable international parameters for financial management training and adapting the latter to local reality ensured sufficient practice content. Throughout the program's implementation, an open channel for listening to the trainees was also maintained through chats in synchronous activities, allowing for course corrections to improve learning conditions. This permitted further explanation in the asynchronous content and clarification of expectations for the situational judgment exercises (voluntary and without an answer key). Adjustments to the information on the learning platform could also be made. As participants' main request was to have more time to view the content asynchronously, the time allotted for completion of the training was extended, both in terms of calendar and workload.

40. Roza, 2020.

4. FUTURE MANAGERS' PERCEPTIONS AFTER THE COURSE

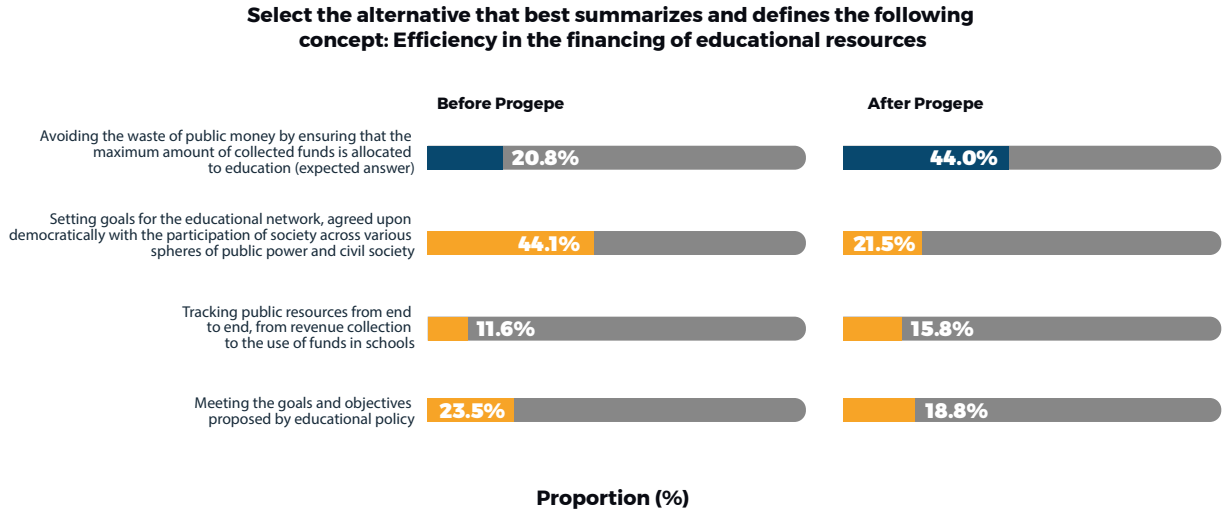
The PROGEPE included 37 hours of in-depth content related to financial management and school resources, with a particular focus on efficiency, effectiveness, and equity in educational spending. This section explores whether and how this new model changed the perceptions and knowledge of program participants about the topics presented.

Before doing so, it is of interest to highlight program participation. Completion was quite high (over 86%), and participants were actively involved in the live broadcasts at the end of each of the seven PROGEPE modules, which had, on average, 10 thousand views and were transmitted on weekends. The number of views was almost double that of the trainees who completed the course, indicating that some probably watched the broadcasts on different devices.

4.1 Perceptions of efficiency, effectiveness, and equity in education financing

The changes made to the PROGEPE sought to deepen participants' understanding of efficiency, effectiveness, and equity—also called the "3 Es"—in education financing and school resource management. In Section 2, we saw that approximately 20% of the course participants had good knowledge of efficiency before the PROGEPE training (see Figure 4). After the program, however, this number rose to approximately 44% of the trainees, as can be seen in Figure 12.

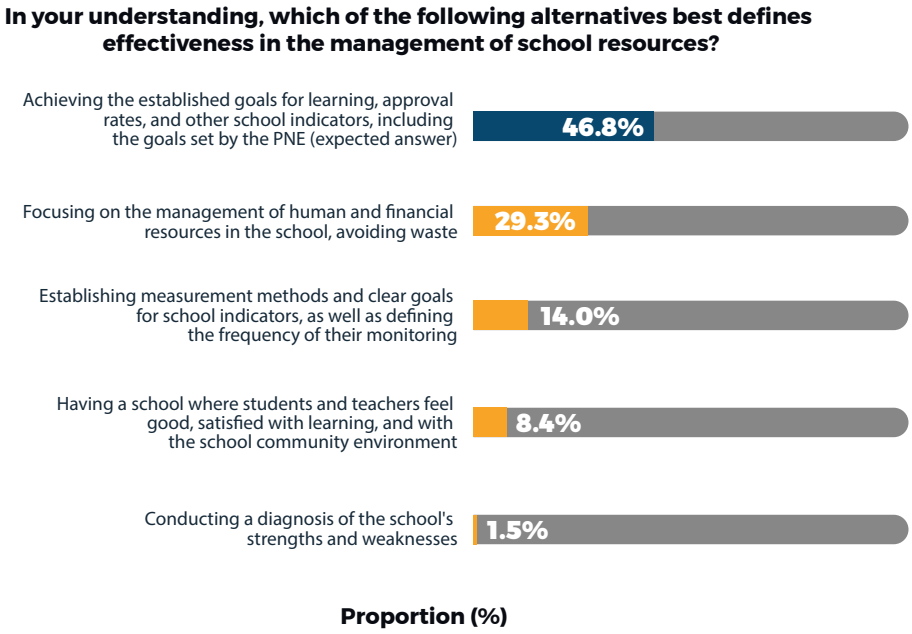
Figure 12. Participants' understanding of the concept of "efficiency" after the PROGEPE



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students). The figure displays the question asked as well as the available response options. The correct answer is marked in blue.

This portion of participants who demonstrated an understanding of the concept of efficiency after the program is similar to that who showed full comprehension of "effectiveness": Figure 13 shows that approximately 47% of participants correctly responded to the question about effectiveness in the management of school resources. As participants were not asked this question before the program, a comparison of responses over time is not possible.

Figure 13. Participants' understanding of the concept of "effectiveness" after the PROGEPE

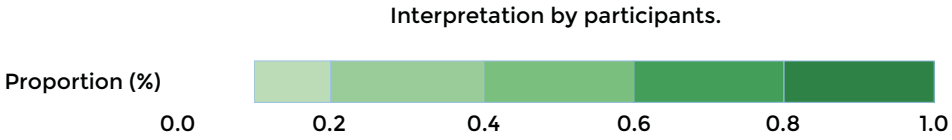


Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered after the PROGEPE (N = 5,586 students). Note that this question was not asked before the PROGEPE. The figure displays the question as well as the available response options. The correct answer is marked in blue.

Figure 14 suggests that even after receiving the training, a considerable portion of the participants showed some confusion between the concepts of efficiency and effectiveness. Specifically, they were asked to classify school descriptions based on the 3 Es. The portions of participants who responded correctly appear in bold, diagonally in the figure. Approximately 70% responded correctly for the school corresponding to all three concepts together (72.14%), or only the concepts of efficiency and effectiveness (68.15%). However, this percentage drops to less than 50% when the school descriptions refer to efficiency and equity, or effectiveness and equity, indicating difficulty distinguishing between efficiency and effectiveness. In contrast, the concept of equity seems to be well understood.

Figure 14. Participant understanding of the 3 Es after the PROGEPE (efficiency, effectiveness, and equity) (proportion of correct responses diagonally in bold

Consider the intersections between the concepts of Efficiency, Effectiveness, and Equity, and classify each school example based on its description (on the left).				
Detailed Description of Schools	**Efficient & Effective**	**Efficient & Equitable**	**Effective & Equitable**	**Efficient, Effective & Equitable**
The school meets its goals and achieves the best possible results given the available resources but observes inequality among students of different races, genders, or socioeconomic levels.	**68.15%**	**10.85%**	**9.56%**	**11.44%**
The school achieves high performance given its level of investment and does not observe inequality among students of different races, genders, or socioeconomic levels, but it does not meet the established goals.	**10.2%**	**47.3%**	**35.3%**	**7.3%**
The school ensures that all students meet learning goals regardless of race, gender, or socioeconomic level but could achieve better results given the resources invested.	**12.2%**	**28.1%**	**45.2%**	**14.5%**
The school meets established goals, does not waste financial resources, and does not present inequalities among students of different races, genders, or socioeconomic levels.	**6.23%**	**10.69%**	**10.94%**	**72.14%**



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered after the PROGEPE (N = 5,586 students). This particular question was not asked before the PROGEPE. The figure displays the question asked, with the school descriptions on the vertical axis, and how participants classified the latter on the horizontal axis. On the diagonal, we observe the proportion of participants who classified the different schools correctly.

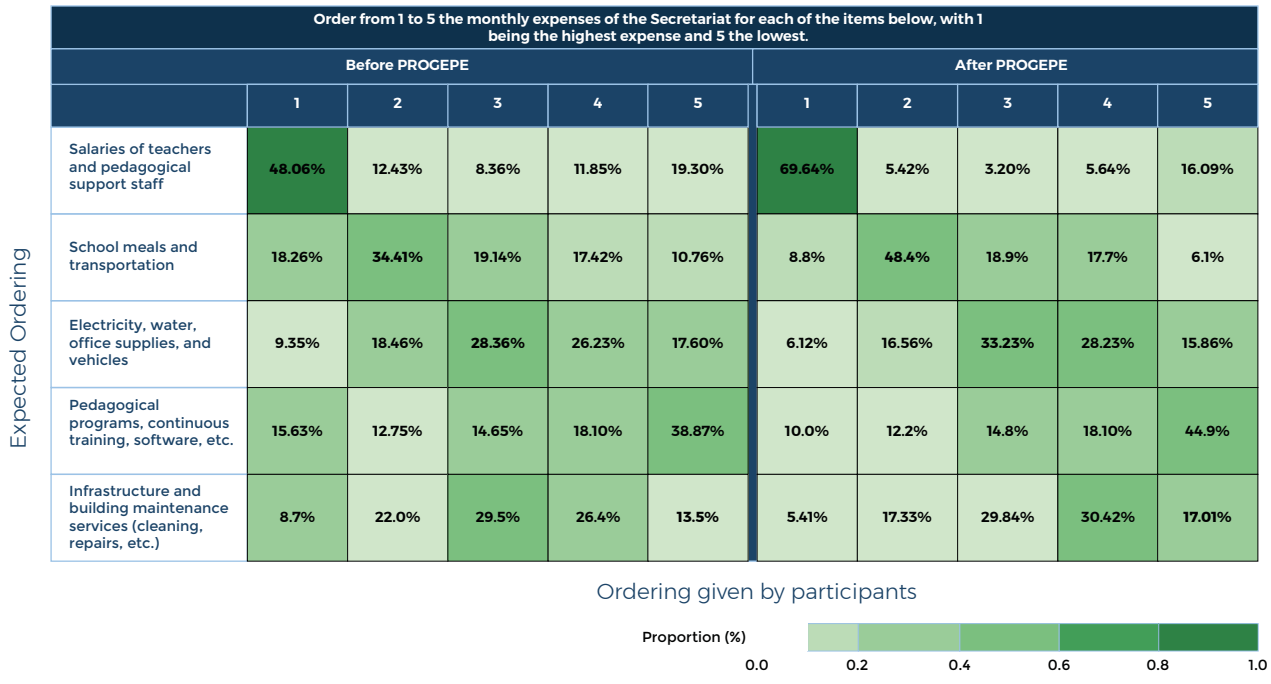
4.2 Perceptions of resource management at the national, local, and school levels

In Section 2, we saw that participants already had good prior knowledge of federal financing policies—specifically, the sources of resources that make up FUNDEB. They demonstrated, however, less knowledge about local decisions (those of the Education Departments) regarding how education financing works. This was therefore an area that needed more attention in the PROGEPE. Although a full analysis of the causal impact of the program is beyond the scope of this study, it would seem that the participants' knowledge improved in the areas of greatest need (i.e., where there was the least prior knowledge).

Figure 15 displays the responses of the course participants after the PROGEPE to the same question presented in Figure 6 concerning the management of educational resources through local-level policies of the Department of Education. Along the diagonal, in bold, are the proportions of participants who ordered each of the expenses correctly. Notably, the proportion of participants who understand teacher salaries to be the main expense of a typical Department of Education in Brazil jumped from 48% (pre-PROGEPE) to almost 70% of the participants (post-PROGEPE).

In fact, the proportions improved for almost all expense items, except for "Pedagogical programs, continuing education, software, etc.," which only 18% of the course participants indicated as the fourth most relevant item for the budget of a Department of Education (a proportion similar to that observed before the PROGEPE). Generally, these results suggest that the PROGEPE improved participants' knowledge about the magnitude and relevance of different aspects of Department of Education expenditures.

Figure 15. Understanding of Department of Education monthly expenditures, after the PROGEPE (proportion of correct responses diagonally in bold)

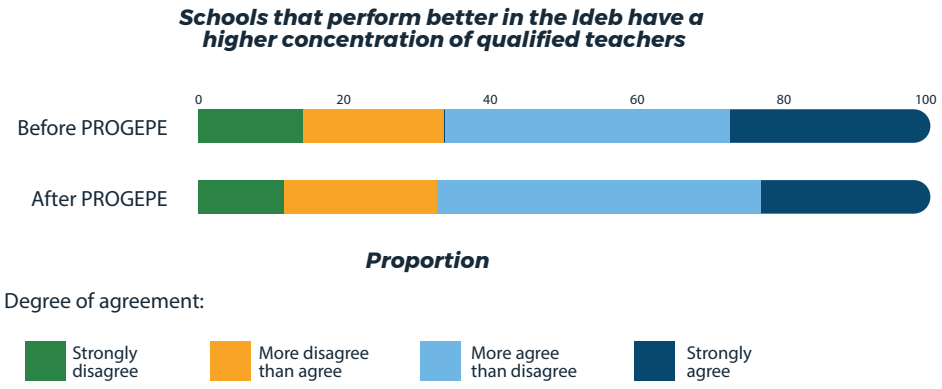


Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students). The figure displays the question, as well as the available response options. The quadrants relate the correct ordering (vertical axis) together with the ordering given by the participants (horizontal axis). On the diagonal, we observe the proportion of participants who ordered each of the expenses correctly. The responses given before the PROGEPE can also be found in Figure 6.

Figures 16 and 17 revisit the statements highlighted in Figure 7, on participant understanding of the management of educational resources at the local level. In Section 2, we saw that the majority of the program participants (approximately 65%) already had a good understanding—before the PROGEPE—of the relationship between teacher allocation and school performance, as measured by the IDEB. In other words, they knew that the schools with the best performance on the IDEB were those with the greatest concentration of qualified teachers. After the program, as shown in Figure 16, there was no significant change in the proportion of participants who agreed with this statement (although the proportion that completely disagreed slightly decreased, as did the proportion that completely agreed). Thus, a large portion of the participants intuitively answered correctly before beginning the PROGEPE, and the program maintained their perception.

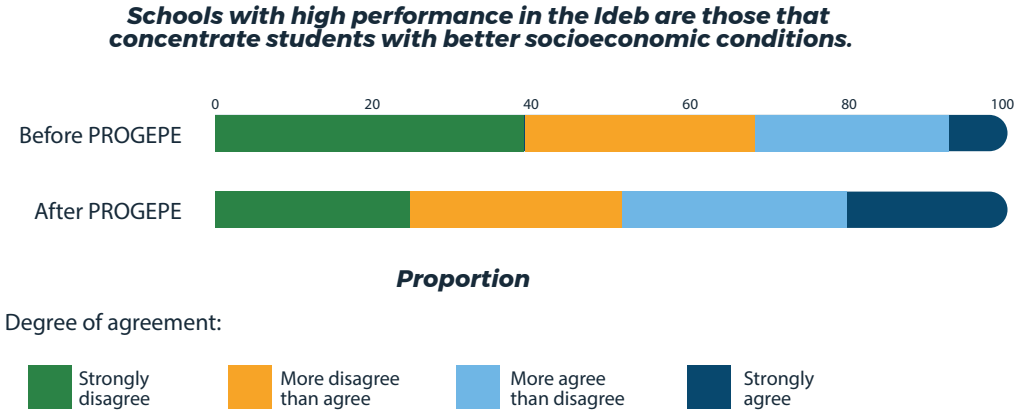
In contrast, before the program, less than a third of the course participants (approximately 30%) related a school's IDEB performance to the socio-demographic profile of its student body (see Figure 7). Schools with the best performance on the IDEB are, in fact, those attended by students with better socioeconomic conditions. After the program, the proportion of participants who agreed (fully or partially) with the statement relating these two variables rose to approximately 47.5%, as can be seen in Figure 17. Although it is not possible to draw causal conclusions, PROGEPE participants ultimately seem to show greater understanding of financing at the local level.

Figure 16. Knowledge of the use of resources at the Department of Education level – Part I, before and after the PROGEPE



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students).

Figure 17. Knowledge of the use of resources at the Department of Education level – Part II, before and after the PROGEPE

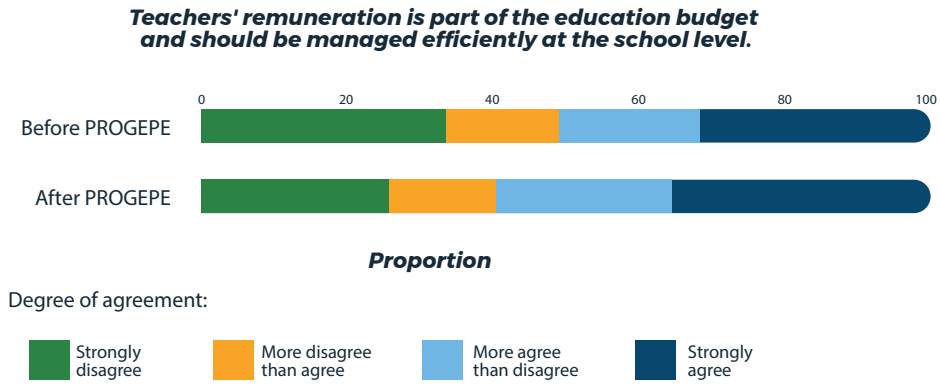


Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students).

Participant perceptions of the management of educational resources at the school level significantly changed after the PROGEPE. Figure 18 shows a 10-percentage point increase (p.p.) in the number of participants who agreed (fully or partially) with the statement, "Teachers' remuneration is part of the education budget and must be managed efficiently at the school level." In other words, before the training, 50% of the participants agreed (fully or partially) with this statement; after the training, this proportion increased to around 60%.

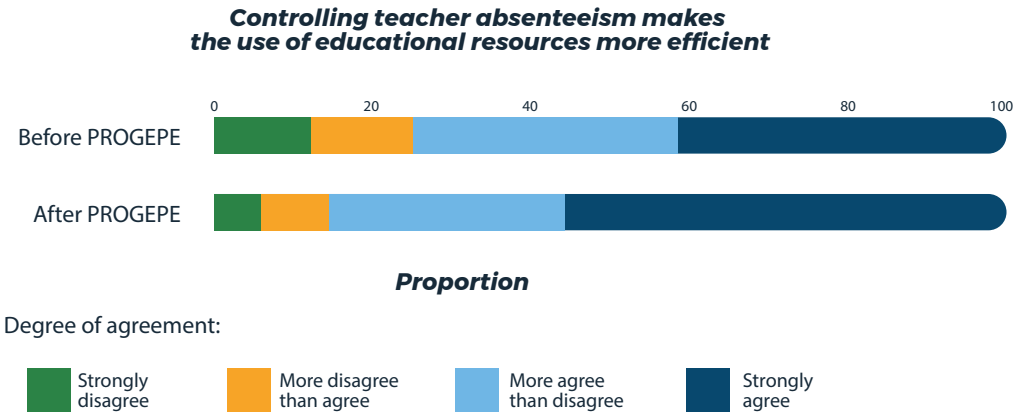
Similarly, Figure 19 shows an increase of the same magnitude (about 10 p.p.) for the portion of participants who agreed with the statement, "Controlling teacher absenteeism makes the use of educational resources more efficient." Notably, this rise is due to an expansion in the number of participants who completely agreed with the statement, along with a consequent reduction among the other groups (particularly those who completely or partially disagreed).

Figure 18. Knowledge of resource management at the school level – Part I, before and after the PROGEPE



Note. Note: Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students).

Figure 19. Knowledge of resource management at the school level – Part II, before and after the PROGEPE



Note. Note: Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students).

To assess whether learning was heterogeneous among participants, Appendix B presents a "pseudo differences-in-differences" analysis.[41] Specifically, we compare differences in the proportion of correct answers according to certain participant characteristics. Controlling for differences before the program, we do not observe any statistically significant results. In other words, no student profile (considered variables) gave more correct answers at the end of the PROGEPE.

Finally, the observed perception changes, which occurred over a relatively short time frame, show the importance of including education financing training in the ongoing instruction of school principals. The PROGEPE offers an opportunity to generate necessary input on financing topics and to address implementation challenges. In the vast majority of cases, in Brazil and elsewhere around the world, school principals worked as teachers before becoming managers.[42] Their initial education thus prepared them to work on curricular and social issues, but many have had little (or no) training in administration and finance, necessary for the bureaucratic-pedagogical management of schools. Improving ongoing training through short courses such as the PROGEPE offers a means of alleviating this problem, though it is likely not enough to fully prepare new principals. More structural changes are needed, including in the initial training of teachers, to truly improve the quality of financial management in schools.

41. "Pseudo differences-in-differences" analyses were carried out based on the following participant characteristics: (i) previous experience as a school principal, (ii) experience as a teacher, (iii) master's and/or doctorate degree, (iv) training in pedagogy, and (v) having already obtained a PROGEPE certificate.

42. In Brazil, according to the 1996 Law of Directives and Bases of National Education (Lei de Diretrizes e Bases da Educação - LDB), "teaching experience is a prerequisite for the professional exercise of any other teaching functions, in accordance with the norms of each education system." According to the LDB, school management is understood as a teaching function and, therefore, school principals must previously have been employed as teachers to enter this career.

5. LESSONS FOR THE FUTURE TRAINING OF SCHOOL MANAGERS

School managers play a central role in ensuring quality education.[43] However, professional development opportunities are scarce worldwide, especially in Brazil, and when available, tend to focus on theoretical and conceptual aspects of democratic management or local regulatory and legal frameworks. Training that addresses effective school management practices, particularly concerning the administration of educational resources, remains rare[44].

The vast majority of school managers in Brazil and around the world are career teachers who have little or no knowledge or experience in matters of education financing and resource management. Yet, the skills required for school leadership in financial organization and decision-making on the use of public resources are very different from those needed for pedagogical work in the classroom.[45] Training in the management of educational resources is thus crucial to ensure quality performance, particularly for those entering this profession for the first time. However, data shows that just 11% of principals participated in an 80-hour course in school management (Brazilian average).[46] The correct management of financial resources requires specific knowledge in areas such as budget planning, accountability, raising additional resources, and making strategic financial decisions. **Without adequate preparation, principals may struggle to allocate resources efficiently, ensure transparency in the use of the school budget, and promote equity in the distribution of resources between the different needs of the school.** Despite a clear need and demand, not only is practical training scant, but so too is literature on the effectiveness of such training. Little is known about what is needed and what works in education finance training for teachers who aspire to become principals.

Our analysis of the training offered by the Pernambuco State Department of Education (SEE-PE) for school administrators in the Pernambuco public education system (the Pernambuco School Administrator Training Program - PROGEPE) offers important insights for future training programs in the area of education management. We observe that future administrators would benefit from greater knowledge of the management of local resources (decisions made by the Departments of Education), and particularly the relationship between the school and the Department of Education. Our study indicates that future administrators know little about the actual allocation of resources on the part of Brazilian Departments of Education. Although this finding is specific to the Pernambuco participants, other Departments of Education may share a similar reality, especially given the few training opportunities on this topic in Brazil.

43. Darling-Hammond et al., 2022.
44. Bloom et al., 2015; Brooke and Rezende, 2020.
45. Darling-Hammond et al. (2022) e Grissom et al., 2021.
46. Simielli et al., 2023

The completion rate of the program, which was entirely asynchronous, was above 86%, and participants were highly engaged in activities throughout the course, highlighting the program's scalability potential. Furthermore, the analysis indicates that the trainees' knowledge improved in the areas of greatest need (where prior knowledge was poorest), suggesting that training courses such as the PROGEPE can improve the performance of managers.

Critical analysis of training programs is essential for the development, improvement, and effectiveness of future courses for school managers. In particular, such study allows to:

- Recognize the most effective practices and approaches for training managers;
- Identify areas that need improvement;
- Direct efforts to correct gaps;
- Strengthen skills;
- Ensure that managers are adequately prepared to face the challenges of school management.

Future research should assess not only the learning of managers on this topic, but also the impact of the knowledge acquired on their management practices and, in turn, school outcomes. **The experiences and lessons learned from the PROGEPE may serve as inspiration and reference for other states or countries in Latin America seeking to strengthen the training of education managers. Sharing good practices and lessons learned is essential to promote the exchange of knowledge and contribute to the development of more effective training programs aligned with local needs.**

In short, training school managers is an ongoing process necessary to ensure efficient, effective, and equitable management in schools. Investing in quality training that addresses topics such as financial management has the potential to improve education conditions and outcomes. The lessons learned from the PROGEPE represent a step towards a future where school managers are provided with robust training, preparing them for the challenges of contemporary education management.

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A. HETEROGENEITY TESTS BY COURSE PARTICIPANT PROFILE

TABLE A1. Differences in averages: correct answers from course participants vs. experience as school principal

	% of correct/expected answers		Difference between
	Has been or is a school principal	Has never been a school principal	the groups (in p.p.)
Summary of the concept: "efficiency in financing educational resources"	20,7%	20,9%	-0.002
Main source of Fundeb resources	83,0%	82,5%	0.005
Correct ranking: school meals and transportation	35,7%	33,7%	0.02
Correct ranking: infrastructure and building maintenance services (cleaning, repairs, etc.)	12,4%	14,1%	-0.017
Correct ranking: electricity, water, office supplies, and vehicles	26,4%	29,5%	-0.031*
Correct ranking: teachers' and pedagogical support staff salaries	51,7%	46,0%	0.057***
Correct ranking: pedagogical programs, continuing education, software, etc.	18,3%	18,0%	0.003
Agreement: schools with high Ideb scores concentrate students with better socioeconomic conditions	23,1%	25,5%	-0.024*
Agreement: schools with high Ideb scores have a higher number of qualified teachers	41,5%	39,8%	0.017
Agreement: teachers with higher salaries are those with more experience and education	20,8%	21,5%	-0.007
Agreement: teachers' remuneration is part of the budget and should be managed at the school level	19,1%	20,0%	-0.009
Agreement: controlling teacher absenteeism makes resource utilization more efficient	33,5%	34,0%	-0.005
Agreement: there is nothing the principal can do to optimize teachers' working hours (negative pole)	87,8%	87,7%	0.001
Total observations (N)	**2018**	**3567**	**-**

Note. Prepared by the authors. The items selected are those discussed in Section 2. To calculate the mean difference, only the proportion of course participants who responded correctly to each item was considered.

TABLE A2. Differences in averages: correct answers from course participants vs. experience as a teacher

	% of correct/expected answers		Difference between
	More than 10 years of experience as a teacher	Less than 10 years of experience as a teacher	The groups (in p.p.)
Summary of the concept: "efficiency in financing educational resources"	20,3%	23,0%	-0.027*
Main source of Fundeb resources	82,6%	82,7%	-0.001
Correct ranking: school meals and transportation	35,0%	32,2%	0.028
Correct ranking: infrastructure and building maintenance services (cleaning, repairs, etc.)	13,9%	11,7%	0.022*
Correct ranking: electricity, water, office supplies, and vehicles	27,7%	31,0%	-0.033*
Correct ranking: teachers' and pedagogical support staff salaries	49,0%	44,3%	0.047**
Correct ranking: pedagogical programs, continuing education, software, etc.	18,8%	15,4%	0.034**
Agreement: schools with high Ideb scores concentrate students with better socioeconomic conditions	23,8%	27,9%	-0.041**
Agreement: schools with high Ideb scores have a higher number of qualified teachers	39,6%	43,5%	-0.039*
Agreement: teachers with higher salaries are those with more experience and education	20,3%	25,1%	-0.048***
Agreement: teachers' remuneration is part of the budget and should be managed at the school level	19,1%	22,1%	-0.03*
Agreement: controlling teacher absenteeism makes resource utilization more efficient	33,7%	34,2%	-0.005
Agreement: there is nothing the principal can do to optimize teachers' working hours (negative pole)	87,7%	87,7%	0
Total observations (N)	**4447**	**1138**	-

Note. Prepared by the authors. The items selected are those discussed in Section 2. To calculate the mean difference, only the proportion of course participants who responded correctly to each item was considered.

TABLE A3. Differences in averages: correct answers from course participants vs. education level

	% correct/expected answers		Differences between
	Master's degree and/or doctorate	No master's degree and/or doctorate	Groups (in p.p.)
Concept summary: "efficiency of financing educational resources"	21,6%	20,5%	0.011
Main source of FUNDEB resources	84,1%	82,4%	0.017
Correct ordering: school lunch and transportation	34,6%	34,5%	0.001
Correct ordering: infrastructure services and building maintenance (cleaning, repairs, etc.)	12,4%	13,7%	-0.013
Correct ordering: electricity, water, office supplies, and vehicles	29,1%	28,2%	0.009
Correct ordering: salaries of teachers and pedagogical support staff	46,7%	48,5%	-0.018
Correct ordering: pedagogical programs, continuing education, software, etc.	17,9%	18,2%	-0.003
Agreement: schools with high IDEB have more students with better socioeconomic conditions	25,6%	24,4%	0.012
Agreement: schools with high IDEB have a greater number of qualified teachers	44,9%	39,6%	0.053**
Agreement: teachers with higher salaries are those with greater experience and training	22,4%	21,1%	0.013
Agreement: teacher remuneration is part of the budget and should be managed at the school level	17,4%	20,2%	-0.028*
Agreement: controlling teacher absenteeism makes the use of resources more efficient	37,1%	33,3%	0.038*
Agreement: there is nothing the director can do to optimize teaching hours (negative pole)	90,1%	87,3%	0.028*
Total observations (N)	**910**	**4566**	**-**

Note. Prepared by the authors. The items selected are those discussed in Section 2. To calculate the mean difference, only the proportion of course participants who responded correctly to each item was considered.

TABLE A4. Differences in averages: correct answers from course participants vs. degree in pedagogy

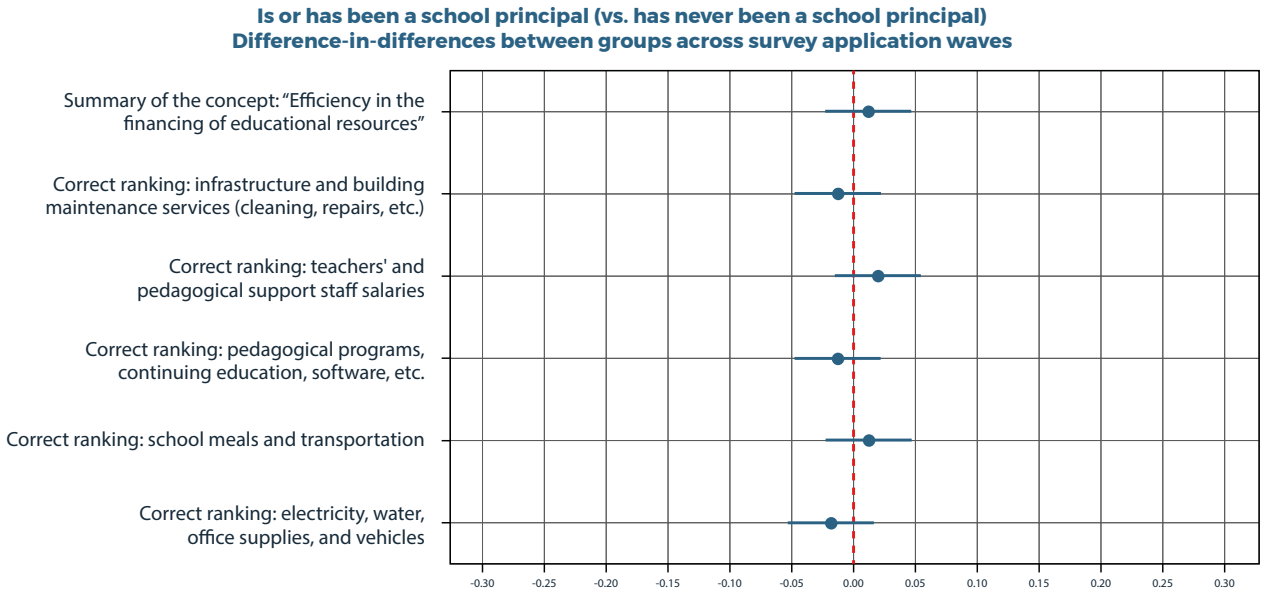
	% correct/expected answers		Differences between
	Graduated in Pedagogy	Graduated in other fields	(in p.p.)
Concept summary: "efficiency of financing educational resources"	20,0%	21,0%	-0.01
Main source of FUNDEB resources	82,3%	82,7%	-0.004
Correct ordering: school lunch and transportation	35,0%	34,3%	0.007
Correct ordering: infrastructure services and building maintenance (cleaning, repairs, etc.)	14,9%	13,2%	0.017
Correct ordering: electricity, water, office supplies, and vehicles	26,2%	28,7%	-0.025
Correct ordering: salaries of teachers and pedagogical support staff	49,5%	47,8%	0.017
Correct ordering: pedagogical programs, continuing education, software, etc.	19,1%	17,9%	0.012
Agreement: schools with high IDEB have more students with better socioeconomic conditions	21,4%	25,2%	-0.038*
Agreement: schools with high IDEB have a greater number of qualified teachers	37,0%	41,0%	-0.04*
Agreement: teachers with higher salaries are those with greater experience and training	17,4%	21,9%	-0.045**
Agreement: teacher remuneration is part of the budget and should be managed at the school level	18,8%	19,9%	-0.011
Agreement: controlling teacher absenteeism makes the use of resources more efficient	35,0%	33,6%	0.014
Agreement: there is nothing the director can do to optimize teaching hours (negative pole)	87,2%	87,8%	-0.006
Total observations (N)	**821**	**4762**	-

Note. Prepared by the authors. The items selected are those discussed in Section 2. To calculate the mean difference, only the proportion of course participants who responded correctly to each item was considered.

B. DIFFERENCES AMONG PARTICIPANT PROFILES OVER TIME

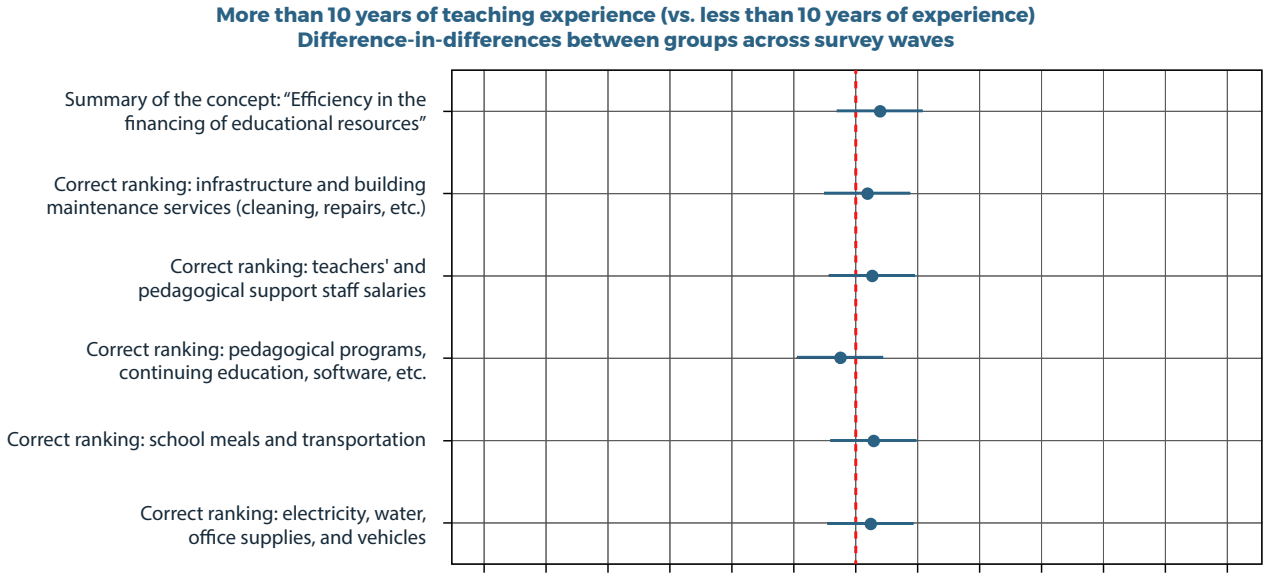
The difference between the analysis presented below and the heterogeneity analysis (presented in Appendix A) lies in the assessment of the differences between the responses throughout the administration of the entry and exit surveys.

Figure B1. Difference between participants who are or have previously worked as school principals (vs. those who have never been principals) throughout the questionnaire administration



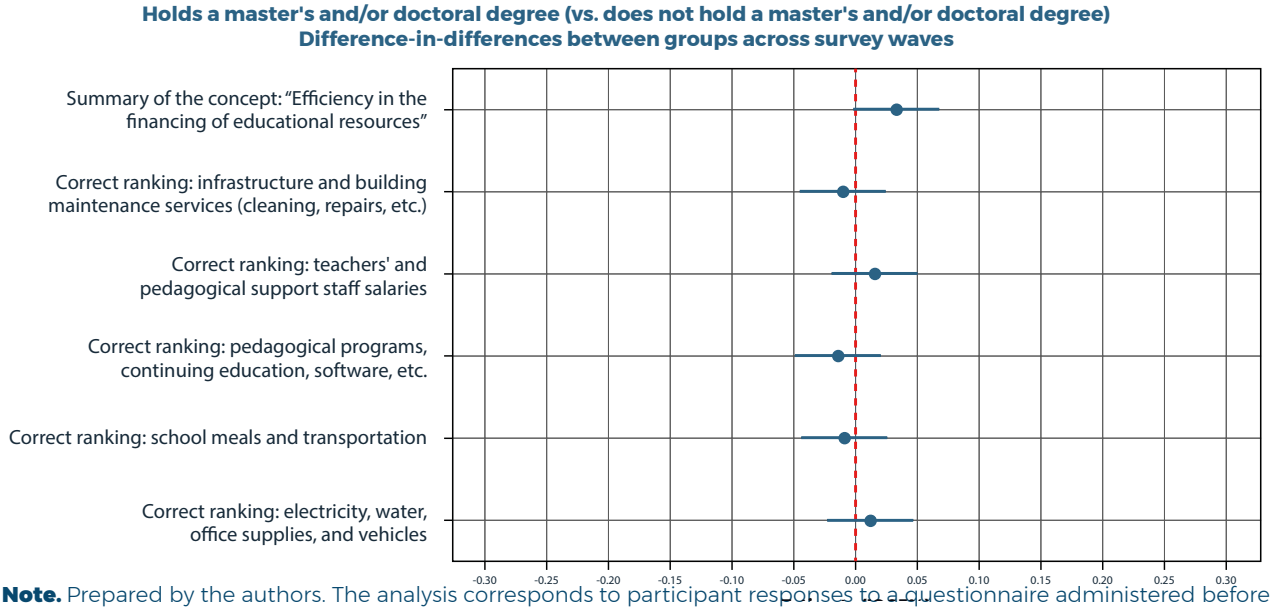
Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students). The results are measured based on the correct answer to each question described in the figure.

Figure B2. Difference between participants who have more than ten years of experience as a teacher (vs. none) throughout the questionnaire administration



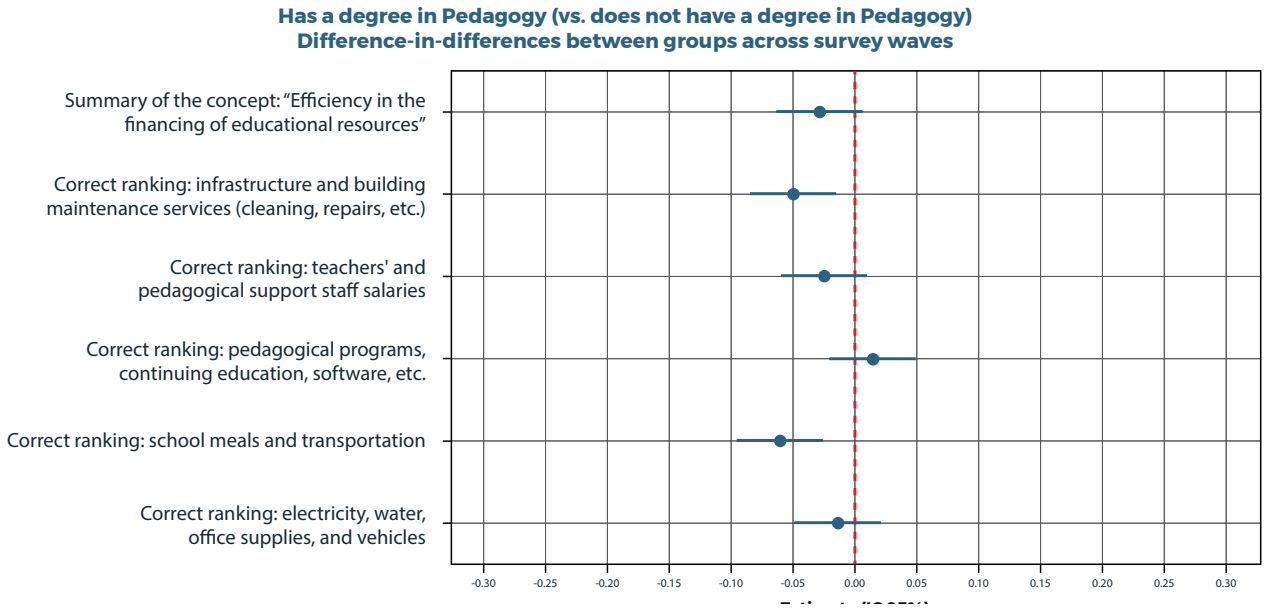
Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students). The results are measured based on the correct answer to each question described in the figure.

Figure B3. Difference between participants who have a master's degree and/or doctorate (vs. those who do not) throughout the questionnaire administration



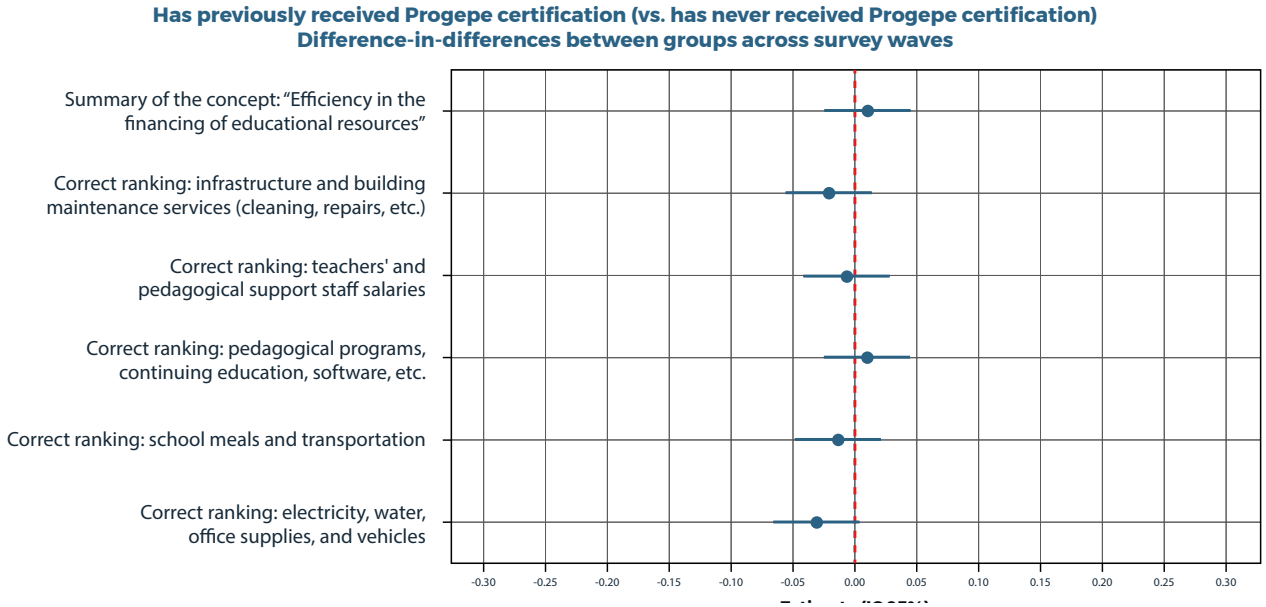
Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students). The results are measured based on the correct answer to each question described in the figure.

Figure B4. Difference between participants who have a degree in pedagogy (vs. who do not) throughout the questionnaire administration



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students). The results are measured based on the correct answer to each question described in the figure..

Figure B5. Difference between participants who have previously received a PROGEPE certificate (vs. those who have not) throughout the questionnaire administration



Note. Prepared by the authors. The analysis corresponds to participant responses to a questionnaire administered before and after the PROGEPE (N = 5,586 students). The results are measured based on the correct answer to each question described in the figure.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