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Implementing a Results-Based Financing Mechanism for Subnational Governments to Improve Education Outcomes

AN IMPLEMENTATION GUIDE INSPIRED BY THE CASE OF CEARÁ, BRAZIL

Implementing a Results-Based Financing Mechanism for Subnational Governments to Improve Education Outcomes:

An Implementation Guide Inspired by the Case of Ceará, Brazil

This document presents a detailed implementation guide for a results-based financing (RBF) mechanism designed to improve education outcomes, inspired by the successful case of the state of Ceará in Brazil, which achieved universal literacy. The document provides concrete steps for governments that are willing to establish an RBF mechanism to incentivize subnational governments to improve education outcomes with a focus on learning.

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A SUCCESSFUL EXAMPLE OF CREATING INCENTIVES FOR SUBNATIONAL GOVERNMENTS TO IMPROVE EDUCATION QUALITY: THE CASE OF CEARÁ

1 — A SUCCESSFUL EXAMPLE OF CREATING INCENTIVES FOR SUBNATIONAL GOVERNMENTS TO IMPROVE EDUCATION QUALITY: THE CASE OF CEARÁ

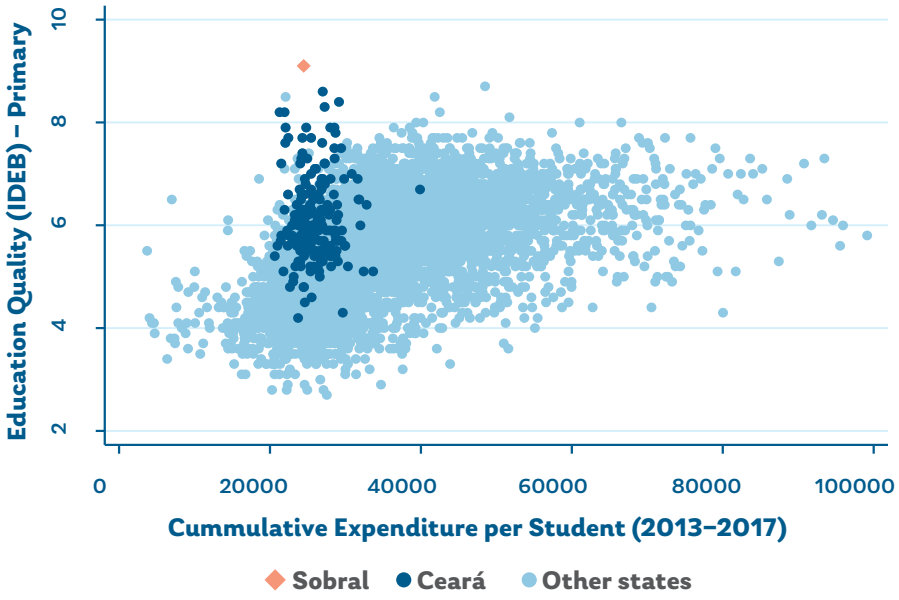
The state of Ceará, in Brazil, transformed its education system and is currently among the top performers in the country, despite its low socioeconomic status. Ceará is a poor state with around 9 million people, roughly the size of Austria or Papua New Guinea. It is the fifth poorest of Brazil's 26 states. Yet, Ceará has seen the largest increase in the national education quality index in both primary and lower secondary education since 2005, with 10 municipalities among the top 20 in the national ranking. A set of education reforms initiated in 2007 led the state to occupy fourth place among all Brazilian states in the 2017 national ranking of education quality for lower secondary education and sixth place in primary education.

Ceará revolutionized fiscal transfers to municipalities by creating incentives to improve education outcomes. Before 2007, revenues from the state consumption tax were distributed to municipalities based on their population size and level of income, which is still the case in most Brazilian states. A new state law was passed at the end of 2007—the first in the country—that made one-quarter of that transfer dependent on municipal performance in education, health, and environmental outcomes, with education quality having by the far the greatest weight. The focus was on improvement rather than achieving certain levels, so every municipality had the possibility of succeeding. Approximately one in every five Brazilian Reais that municipalities receive from the state are driven by education results. In this context, municipal leaders had a strong incentive to get their education results right, and part of that meant selecting secretaries of education using technical, rather than political criteria.

FIGURE 1 — *The conditions for success in Ceará*

The results-based financing (RBF) mechanism works with other critical education reforms that also had learning as the ultimate goal. The state government of Ceará established incentives for municipalities to achieve education outcomes, provided extensive technical assistance[1] to those municipalities, accelerated the devolution of the management of lower-secondary schools to municipal governments, and established regular monitoring of learning and action based on that learning (Figure 1). At the heart of this series of reforms was sustained political leadership and focus.[2]

FIGURE 2 — *The municipalities in Ceará have better education outcomes despite having fewer resources*



Spending in primary and lower secondary education in Ceará is very efficient. Municipalities in Ceará are highly efficient in the use of resources to generate education outcomes, spending less than one third the amount of the richest Brazilian states, like São Paulo, while achieving higher education quality index scores (figure 2). These reforms cost money, and Ceará has increased its education spending, but it still gets more for its money than most. Even with spending increases, Ceará's municipalities consistently fall in the bottom half of the country in spending per student, yet most of its municipalities are in the top half of the distribution of education quality in Brazil.[3]

1 For more details on the implementation of a technical assistance in education for subnational governments, see the companion guide: Loureiro, A.; Alves, F.; Cruz, L.; Assunção, M.; Cardoso, T. *Technical Assistance for Subnational Governments to Improve Education Outcomes: An Implementation Guide Inspired by the Case of Ceará, Brazil, World Bank, 2020.*

2 A timeline of the education reforms in Ceará is presented in Annex 2.

3 For more information on how Ceará improved its education outcomes, see: Loureiro, Cruz, Lautharte, and Evans. *The State of Ceará in Brazil is a Role Model for Reducing Learning Poverty*, World Bank, 2020. https://openknowledge.worldbank.org/handle/10986/34156

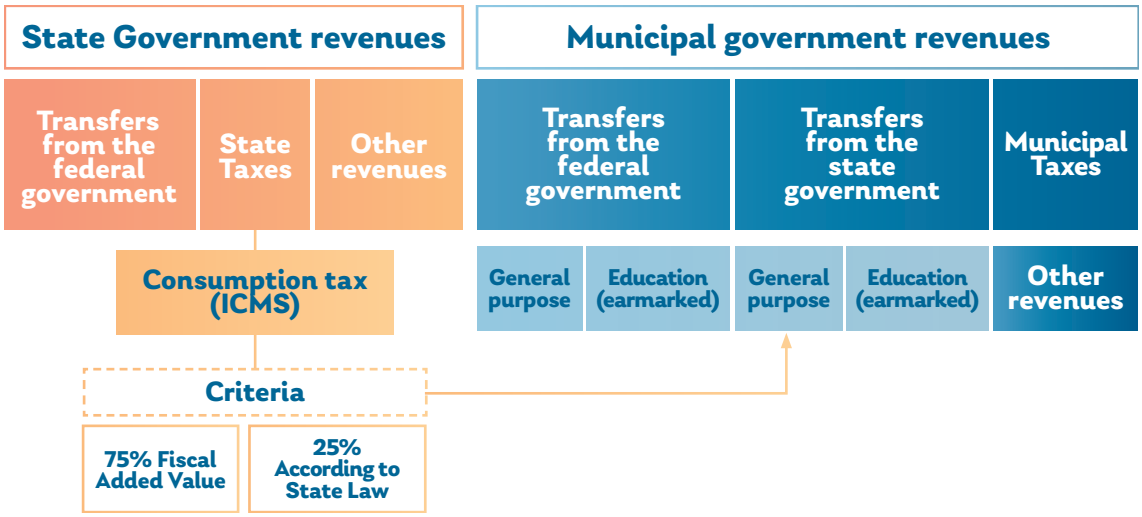
02

THE RESULTS-BASED FINANCING MECHANISM IN CEARÁ

2 — The results-based financing mechanism in Ceará

Fiscal transfers between different levels of government are common for most developing countries. Intergovernmental transfers are important instruments to mitigate economic inequality, working as a bond that holds the country together. In its first generation, the transfers were made by discretion and mostly driven by political interest. In the second generation, discretion was substituted by rules using economic, geographic, and social indicators, mostly output based. The third generation of transfers emerges when output is replaced by outcome indicators.

The Brazilian constitution establishes that state governments have to transfer to the municipalities a fraction of the revenue of some state taxes, including the state consumption tax. The state consumption tax (ICMS) is one of the most important revenues for subnational governments. Collected by state government, 25 percent of total revenue must be transferred to municipalities, 75 percent according to economic activity, and the remaining 25 percent (called ICMS-quota) is distributed according to the respective state law (discretionary).[4] The flow of revenues between state and municipal governments is depicted in figure 3.



Source: World Bank, based on Brazilian legislation on intergovernmental financing

FIGURE 3 — *State consumption tax redistribution to municipalities in the Brazilian states*

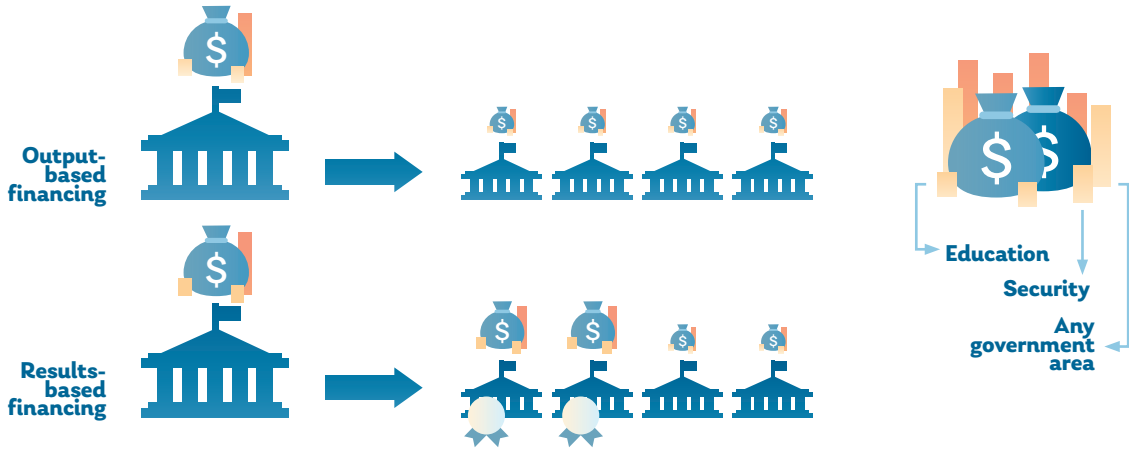
4 A recent constitutional amendment increase the discretionary part to 35%.

Ceará innovated in its education policy by establishing a mechanism of financial incentives to spur improvements in student performance. As primary and lower secondary education are mostly provided by municipalities, the state government established a results-based financing (RBF) mechanism to foster improvements in learning outcomes. The reform linked the transfer of consumption tax revenue to municipalities according to education performance, making education quality a priority for mayors. Ceará was the first state to implement a performance-based criterion for the ICMS-quota, with education results as the main component (18 percent) in addition to a heath indicator (5 percent) and an environment indicator (2 percent). The ICMS-quota represents a substantial share of the municipal budget in Ceará, making education improvements a priority for municipal governments, their secretaries of finance, and their mayors.

The incentive mechanism to improve education results in Ceará is coupled with technical assistance for municipalities. The state government provides technical assistance to municipalities under the umbrella of the program that Ceará established in 2007, 'The Program to Achieve Literacy at the Right Age,' which provided extensive support to schools operated by the municipalities. Municipal education secretariats receive guidance, training, and structured learning materials that provide a clear routine for classes and prioritize basic skills, especially literacy, in the early grades. The state also provides training and materials to help municipal education secretariats increase teaching time in classes, reduce the number of classes with more than one grade in them, adopt meritocratic criteria for the selection of school principals, and provide incentives—financial and non-financial—for teachers whose students meet literacy targets. The government also directly rewards high-performing schools in the municipalities, but to qualify, the high-performing schools need to assist low-performing schools.

FROM OUTPUT- TO OUTCOME-BASED TRANSFERS

The results-based financing model in Ceará is singular, since it uses only outcome indicators in its rules for fiscal transfers. Reforming a transfer mechanism to make its conditions solely based on outcomes is not trivial. Policymakers are used to output-based financing that, despite its egalitarian rationale, does not close equity gaps and frequently generates inefficiency. Introducing a results-based mechanism involves a change of mindset, and it sends a very powerful message: if a subnational entity wants more resources, it has to deliver outcomes not just generate outputs (figure 4).



Source: World Bank

FIGURE 4 — *Output-based financing vs Results-based financing*

One quarter of the transfers to municipal governments related to the state's main tax is distributed according to the outcomes obtained by the municipalities in the previous year. The RBF mechanism in Ceará is established by a law approved at the state congress. For education, the outcomes selected were student grades on standardized tests for primary schools.[5] The child mortality rate was the outcome for health and the construction of solid waste disposal was the outcome for the environment. (A complete description of the formulas used is presented in annex 1.) The partition of funds in relation to the total revenue collected in Ceará is depicted in Figure 5.

FIGURE 5 — *Criteria for distribution of funds based on results in Ceará*

Source: Ceará state legislation on ICMS transfers for municipal governments

The results-based mechanism fosters efficiency without jeopardizing education financing. The ICMS quota is a general purpose transfer whose resources can be spent on any sector, not only on education, health, and environment. A high-performing municipality can invest more resources in education, but it does not necessarily depend on the ICMS revenues to improve its outcomes. This happens because the ICMS reform did not change the education financing structure, and municipal governments still receive other sources of fund that are targeted to education and allow them to cover current costs, such as school meals, textbooks, infrastructure maintenance and personnel.

The results-based financing mechanism in Ceará was inspired by a results-focused World Bank investment project with the state government. Starting in 2005, the World Bank supported the state government of Ceará through a sequence of multisector investment projects, with financing linked to disbursement-linked indicators. The indicators were designed to achieve results in several sectors, including education, and this experience played a role in motivating the creation of a new lending instrument in the World Bank called Program for Results (PforR). The projects also helped to strengthen the capacity of the state government to identify indicators and targets. The rationale for conditioning disbursements on the achievement of targets for relevant indicators for the sectors supported by project was then replicated by the state government of Ceará—outside of World Bank projects—to redesign the redistribution of ICMS funds for municipal governments (Loureiro, Cruz, Lautharte, and Evans, 2020).

5 Grades 2 and 5. Starting in 2020, it will also include grade 9.

REWARDING LEVELS OR IMPROVEMENTS?

Having chosen the outcome indicators, an important question arises: what to reward? Learning levels (the share of students with appropriate skills) or improvements in learning (the increase in skill levels between years)? At first, Ceará focused on improvements, particularly in literacy, with a focus on the municipalities with the lowest education results. The state aimed to bring those municipalities up to par, since it would be difficult for them to compete if only the levels of learning – i.e. high performance on learning assessments – were rewarded. As the quality of education improved in the state, the government increased the weight given to improvements in the levels of literacy in grade 2 and attainment in language and mathematics in grade 5 (see figures 6a and 6b).

THE FORMULA BEHIND THE INCENTIVE MECHANISM

The design of an education quality index engaged municipalities and established a focus on specific elements of education to improve. The amount received by each municipality is defined by a formula with clear indicators for learning outcomes and progression rates. By considering clear indicators, the results-based mechanism promotes transparency and generates incentives for municipalities to improve results. The state government created an education quality index that considers the level and improvements in literacy at grade 2, learning at grade 5 (reading and mathematics), and the average progression rates in primary education (grades 1 to 5). Greater rewards are given to municipalities with the highest levels and gains. The system also penalizes municipalities that increase inequality among schools or try to reduce the take-up rate of low-performing students in exams. The formulas of the mechanism and their rationale are presented and discussed in annex 1.[6]

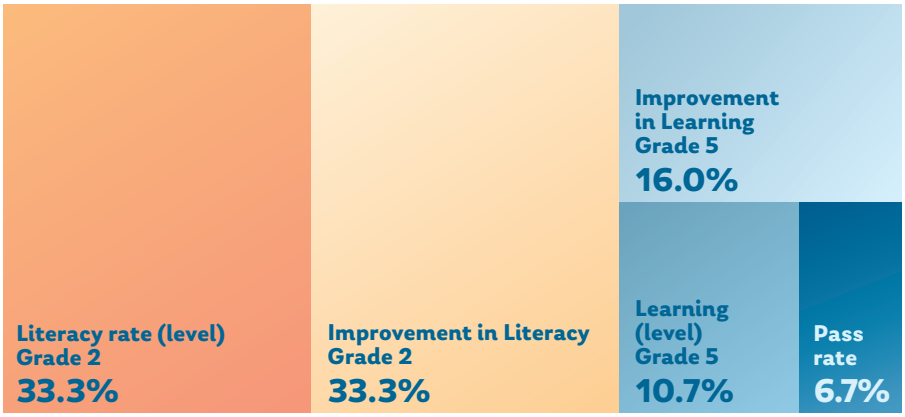


FIGURE 6A — *Components of the Education Quality Index for the distribution of funds based on results in Ceará (between 2008 and 2011)*

Source: Ceará state legislation on the RBF mechanism between 2008 and 2011

6 A decree issued in December 2019 included the 9th grade in the RBF mechanism in Ceará.

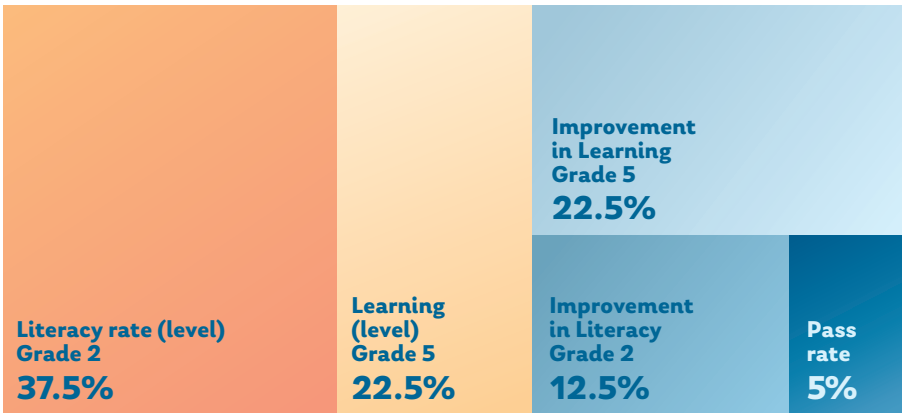


FIGURE 6B — *Components of the Education Quality Index for the distribution of funds based on results in Ceará (between 2012 and 2019)*

Source: Ceará state legislation on the RBF mechanism between 2012 and 2019

WINNERS AND LOOSERS

Since the amount of money to be shared each year is fixed and the rule rewards performance, there are going to be winners and losers. In the original design of the rule, a ceiling for the gains and a floor for the loses of the municipalities was proposed. The governor did not approve this proposal, arguing that he wanted to send a strong message about the importance of education. Note that the process that defines each municipality's share is dynamic, and a municipality being a loser in one year does not mean that it will lose again in the following year. It is all about competition.

CONTROLS FOR GAMING AND MORAL HAZARD

The incentive mechanism was designed and adjusted over time to mitigate gaming and moral hazard. The team at the Economic Research Institute of Ceará (IPECE), the governmental agency responsible for designing the incentive mechanism, incorporated control mechanisms to discourage actions that could negatively affect the goals of the mechanism. One possible adverse behavior would be the attempt to obtain higher average grades by focusing more on the best schools and students, increasing inequalities within the municipal education network (as illustrated by figure 7). In order to avoid such behavior, the average grades for each municipality are adjusted by the standard deviation of student grades so that higher averages obtained at the cost of inequalities are penalized. Another moral hazard scenario considered was a situation in which only the best students show up for exams. To prevent that scenario, the average grades are adjusted by the ratio between the number of students that took the exams and the number of students enrolled at the beginning of the school year.

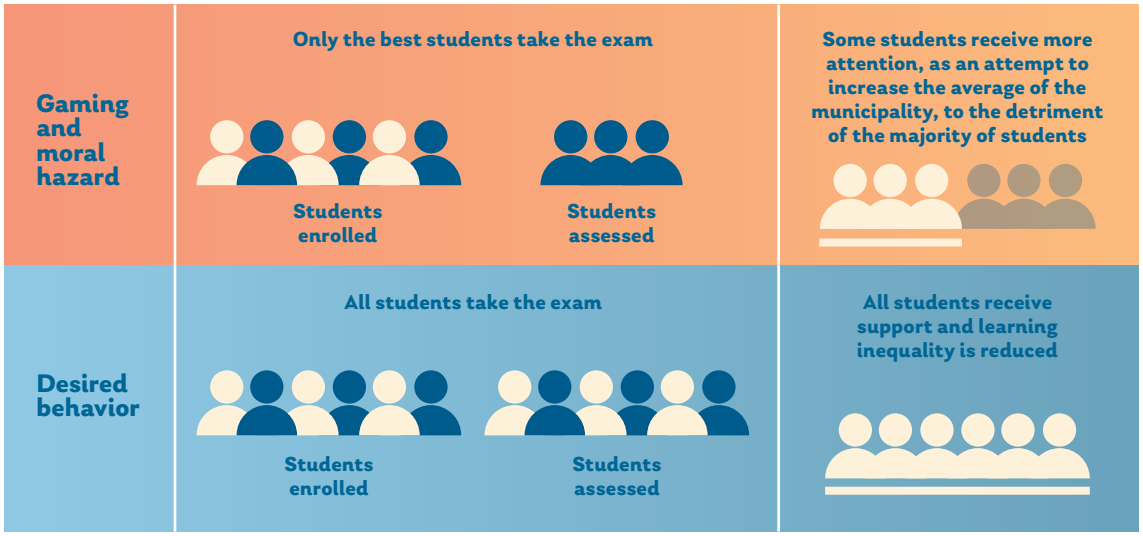


FIGURE 7 — *Controls for gaming and moral hazard*

THE AMOUNT AND THE USE OF RESOURCES

Although the size of the transfer to each municipality is linked to outcomes in education, health, and environment, the municipal governments have the freedom to use these funds in any sector. A crucial element of Ceará's results-based financing mechanism in education is that the municipalities continue to receive general transfers, in the sense that the mayors can spend the funds on any sector, even those not directly related to education, health, and environment. There were four key considerations for not earmarking the money. First, it increases the incentive for the head of the subnational government (which in Ceará is the mayor)to improve education outcomes, who is free to decide the use of the additional resources. Second, the law did not change the existing budget for education. Third, mayors are not required to put more money into education, but they have to show improvements in education results in order to access more transfer funds. Finally, mayors can have a win-win situation in which they increase the efficiency and effectiveness of education expenditures, opening space for new expenditures in the sector, and, at the same time, receive a larger budget. Such freedom provides incentives for improving outcomes for the whole municipal government—including mayors and secretaries of finance—not only for the secretariats related to the outcomes associated with the RBF mechanism.

The sum of transfers to the municipalities associated with education outcomes each year are more than the equivalent of US$100 million. For some municipalities, particularly the poorest, this can represent more than one-third of revenues from all sources. Every year, the state government of Ceará transfers resources to municipal governments upon the achievement of education outcomes, with the total amount of transfers reaching more than the equivalent of US$100 million. Depending on how well the municipalities perform on the key indicators and the size/level of income of the municipality, the transfer can reach more than one-third of the total revenues of the municipal governments.

The Ceará´s model of results-based financing became mandatory to all Brazilian states. An amendment of the Brazilian constitution in August 2020 made the Ceará's model of results-based financing linked to improvements in education results to be mandatory to all states. The Ceará model also influenced the creation of national results-based financing to school networks according to improvements in education results.

NECESSARY CONDITIONS FOR ESTABLISHING AN INCENTIVE MECHANISM IN EDUCATION FOR SUBNATIONAL GOVERNMENTS

3 — Necessary conditions for establishing an incentive mechanism in education for subnational governments

THE RIGHT CHAMPIONS AT THE RIGHT PLACES

A critical condition for implementing an outcome-based rule for the transfer of financing is strong commitments at the political and technical levels. At the political level, the champions were the head of government (in Ceará, the governor) and the education secretary. Outcomes are the ultimate goal of any public policy, but they usually require substantial changes that lead to political resistance. It is also important to have technical champions, i.e., people able to work on the design and simulation of the incentive mechanism. The design and operationalization of the RBF mechanism in Ceará were led by the IPECE, a state government institution associated with the state planning secretariat, with highly qualified economists.

THE ESTABLISHMENT OR CONSOLIDATION OF A STRONG MONITORING AND EVALUATION (M&E) SYSTEM

It is also essential to have an M&E structure in place. Once you have a rule based on outcome indicators, you need to measure them in a reliable and timely fashion. It is important that indicators are consistent from a technical point of view and are defined by institutions independent of the municipalities. The M&E system in Ceará monitors resources, practices, and performance at all levels of education, having at its core the annual standardized learning assessment of all students in public schools in grades 2, 5, and 9.

AVAILABILITY OF FUNDS

The establishment of an RBF mechanism requires the allocation of enough and stable funds, which should not compete with the funds available to finance the basic operation of schools. General purpose funds must be available in an amount sufficient to allow competition. Rewards must correspond to a share of the local budget to create meaningful incentives for the heads of government and be "free-to-use" to stimulate all local managers. The best approach to associate a substantial amount of funds to reward education outcomes in a way that they are not earmarked to spending in education is by reforming an existing general purpose intergovernmental transfer mechanism to subnational governments.

DECENTRALIZATION OF EDUCATION PROVISION WITH ACCOUNTABILITY

Results-based financing with technical assistance is only possible with some level of decentralization of the education system. The devolution of schools to the management of local governments—including a high degree of autonomy to design and implement their education policies—is a necessary condition for implementing an RBF model similar to the one that exists in Ceará. A centralized government cannot incentivize itself financially to improve education outcomes. Additionally, few countries have the staff or capacity to directly manage large education systems while maintaining high levels of performance. The decision to devolve the management of schools to subnational governments also establishes clear roles and responsibilities for each government level.

An RBF framework for local governments makes them accountable for results. A RBF mechanism that incentivizes subnational governments to improve education outcomes requires that local administrations play a leading role in the provision of education and that they have a high degree of financial, organizational, and managerial autonomy to deliver results. This is only possible if there are intergovernmental arrangements to provide incentives for municipal governments to manage schools, avoiding overlapping responsibilities between central and local education systems. Local education systems must have stable financing for their basic operations independent of the RBF mechanism.

BOX 1: INTERGOVERNMENTAL RELATIONS AND PUBLIC EDUCATION FINANCING IN BRAZIL

Intergovernmental relations in Brazil are marked by a profound decentralization across the three levels of government, with broad administrative and financial autonomy for states and municipalities. The Brazilian Constitution sets the role of federative entities in revenue collection and public services provision. The guiding principle is that more autonomy promotes a better provision of public services, considering local heterogeneities.

The Constitution prescribes a collaborative approach to education supply, in which municipalities mainly provide preschool, primary, and lower secondary education and states mainly operate at the lower and upper secondary levels. The overlap in lower secondary provision varies among states, as well as the degree of collaboration between subnational entities.[7] However, each state and municipality has broad administrative and financial autonomy to organize and manage their school networks in line with central educational guidelines and policies. They are responsible most of the education matters, such as curriculum and instruction material development, maintenance of school buildings, student meals and uniform provision, teacher hiring, and professional development. Some states and municipalities also have their own learning evaluation systems. The federal government, in turn, plays a redistributive and supplementary role in setting minimum quality standards.

Regarding finance, the mismatch between revenues and expenditures and the severe fiscal imbalances gave rise to a complex system of shared taxes across levels of government. To accomplish their constitutional mandates, many states and municipalities rely on federal transfers, primarily the States Participation Fund (FPE) and the Municipal Participation Fund (FPM), which receive, respectively, 21.5 percent and 24.5 percent of the federal taxes on income (IR) and on industrialized products (IPI). Municipalities also count on 25 percent of the revenues from the goods and services tax (ICMS), which constitutes the main source of state revenue.

The federal government also partially finances the state and municipal education networks through two instruments: The National Fund for the Development of Education (FNDE) and the supplement to the National Fund for the Development and Maintenance of Elementary Education (FUNDEB). Despite significant regional disparities, the federal government has contributed to bringing financial predictability to public education networks. FUNDEB not only created incentives for municipalities to increase student enrollment, but also contributed to promoting the devolution of the primary and lower secondary schools to local governments, reducing the problem of overlapping responsibilities between the tiers of government.

7 In both cases, Ceará stands out by devolving the full provision of lower secondary education to municipalities and by establishing a well-functioning collaborative scheme. There is a wide variation in the form and effectiveness of the cooperation between the state and municipalities, with the experience of Ceará being the most advanced in both directions, standing out for its greater institutionalization and ability to foster joint action.

KEY STEPS TO IMPLEMENTING A RESULTS-BASED FINANCING MECHANISM

4 — Key steps to implementing a results-based financing mechanism

4.1. POLICY DESIGN

The incentives must be designed to generate the desired behaviors from the subnational governments towards improving education outcomes. Once the political decision to initiate an RBF framework is made, the rule that defines the transfer needs to be designed. The key elements of designing the mechanism are the selection of the education indicators, the decision on rewarding levels or improvements of those indicators, and explicit control factors to disincentivize undesired behaviors by the municipal governments.

A well-designed results-based mechanism to improve education outcomes should:

1. **Set the monetary incentive as general and sufficiently high to generate incentives for the heads of subnational government to improve education outcomes.** The potential award received by local governments must correspond to a non-marginal portion of their annual budget. Making sure that these additional resources are not tied to education spending is critical for generating stronger incentives for mayors, not only for the education secretariat.

2. **Reward outcomes rather than outputs, selecting clear indicators and defining transparent formulas.** The index formula should be simple and explicitly focused on RBF objectives, clearly communicating what aspects most contributed to the local government's achievements.

3. **Define the right weights to level and improvement in indicators.** While level indicators incentivize local governments that are successfully maintaining good performance, improvements in indicators must have weights high enough to guarantee that the competition is dynamic and generates effective incentives to all competitors, especially to those starting at the lowest level and whose improvement is potentially faster.

4. **Identify winners and losers municipal governments under the new mechanism to better communicate policy goals.** Local governments that suffer initial losses due to the change in the criteria are incentivized by the possibility of reversing part of the loss year by year. Similarly, new winners will receive more money and increase their prestige and political capital due to their education results. There are incentives in both situations, and these must be well-communicated to galvanize civil and political support for the new mechanism.

5. **Control for adverse behaviors.** Local managers might take advantage of the information asymmetry existing between central and local governments to game the mechanism. The formula should address behaviors typically used to inflate learning outcomes but that widen learning inequalities between students and schools.

TIMING

It would be a mistake to wait "for the perfect time" to implement an incentive mechanism. Equality of opportunity for all local governments is very important, but in the real world it has to be improved alongside the implementation of the program, instead of being considered as a pre-condition to implementation.

SIMULATIONS

It is critical to simulate the changes for municipalities in terms of fund transfers considering different scenarios. Having designed the first version of the rule, it is important to simulate its impact on the transfer to each municipality, allowing for calibration in deciding on the final version of the rule. The analysis involve identifying how much each municipality will win or lose for different scenarios of education outcomes achieved by the municipalities.

4.2. POLICY IMPLEMENTATION

TRANSPARENCY AND COMMUNICATION POLICY

The central government must have a strong commitment to transparency and "showing the math" of the incentive mechanism of the policy. It is important to grant to subnational governments the right to question the indicator measurements, with a commitment by the central government to respond to concerns raised.

The central government also has an important role in communicating the incentive mechanism to subnational entities and society, convincing them that the proposal is relevant, timely, fair, and equitable. Changes in the criteria for the distribution of funds may imply a permanent loss of funds for some local governments, which can only be partially recovered through the competition. In addition, competition focused on learning outcomes forces the implementation of profound changes in school management and in the composition of local education inputs, which involves diverse interests. Those factors may generate opposing reactions by the heads of local governments and key education stakeholders. Communication with civil society can bring about very desirable social control of subnational education policies.

TECHNICAL ASSISTANCE

It is important that the central government offers technical assistance to build education performance capacity. Local governments in Brazil have administrative autonomy in primary education. They can establish their own education policies and school management guidelines. This autonomy allows for a target regime, since local governments are free to use any policy tools at their disposal to reach the desired outcome. It is important, however, that

this decentralization in education provision was strengthened by the central government's offer of technical assistance to the local governments.[8]

SHARING OF GOOD PRACTICES

It is also important that the central government has the role of the "broker of good practices." As the incentive mechanism is implemented over the years, the central government has an important role in identifying the good practices of local governments and disseminating them to others.

POLICY CONTINUITY

The continuity of an RBF policy to improve education outcomes also depends on additional efforts by the central government.

- Setting the legal basis of the incentive mechanism;
- Assuring steady availability of funds over the years;
- Adapting the incentive rule to improvements in outcomes to assure the engagement of players;
- Maintaining the financial and technical conditions to keep the M&E system operating;
- Constantly communicating results to society, with results-based accountability.

8 For details on this technical assistance component, see Alves, Cardoso, Loureiro, Cruz and Assunção. *Implementing a Technical Assistance System for Subnational Governments to Improve Education Outcomes: An Implementation Guide Inspired by the Case of Ceará, Brazil, World Bank, 2020.*

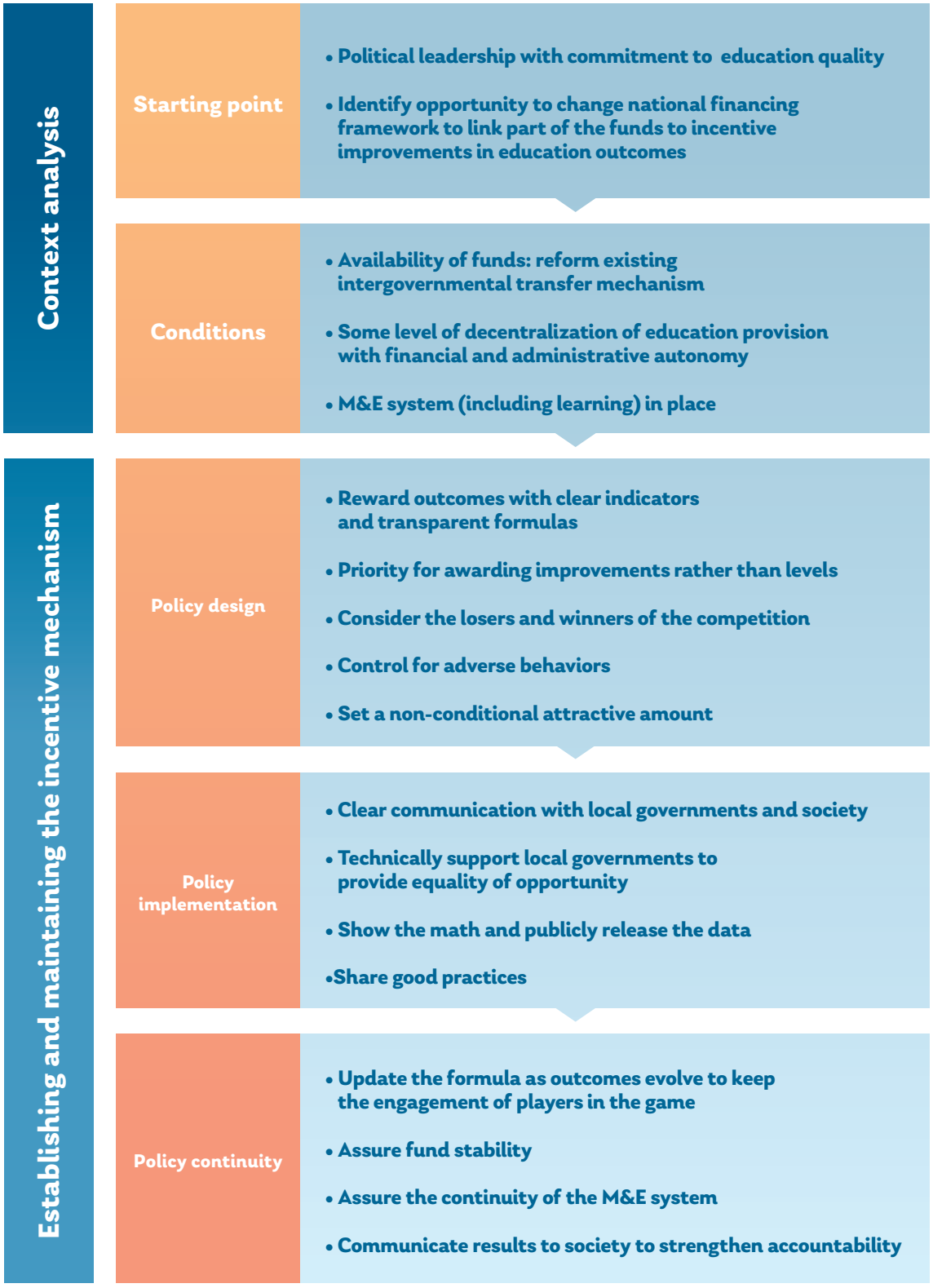


FIGURE 8 — *Framework for designing and implementing an incentive mechanism inspired by Ceará's experience*

ADDITIONAL CONSIDERATIONS FOR IMPLEMENTING A RESULTS-BASED FINANCING MECHANISM TO IMPROVE EDUCATION OUTCOMES

5 — Additional considerations for implementing a results-based financing mechanism to improve education outcomes

There is a high level of complementarity between financial incentives and technical assistance. Creating well-designed incentives for improving education outcomes without technical support can improve average education outcomes, but some municipalities can become discouraged and lag behind, with negative impacts on equity and undermining the overall benefits of the policy. Conversely, providing high-quality technical support without strong incentives for improvement can generate some gains, particularly for municipalities with low capacity and poor education outcomes. However, municipalities that are doing slightly better may engage less, or not at all, with technical teams willing to support them. Thus, any government seeking to replicate and adapt the Ceará education model should give the same level of importance to all five pillars, including a well-designed, results-based incentive mechanism and a solid technical support strategy. Setting a fair arena for competition among local governments is the key to motivating to improve education outcomes.

A crucial element of an RBF mechanism in education is that it should use general transfers that are not linked to education and provide incentives to use them to improve education. Education systems in general do not have resources that are not in use, so reallocating substantial resources without affecting the daily functioning of schools is a challenge. For that reason, a meaningful results-based mechanism in education may use general purpose transfers with incentives to improve education. By keeping the transfers general purpose, subnational governments retain the option to generate incentives associated with the improvement of education outcomes to leaders across their administrations, not just the chief of education.

Establishing and managing an effective RBF mechanism requires capable staff. Political leadership is key, but the political leader cannot make monthly visits to every school or set detailed goals with every municipality. Part of political leadership also involves developing a skilled bureaucracy to administer the program. This includes economics and finance professionals to design the RBF in a way that avoids gaming, and education professionals to provide extensive technical support.

A reform of the mechanism of transfers to subnational entities to make it results-based requires solid buy-in from the secretaries of finance or planning, and ultimately the chief of the government. Because the creation of meaningful RBF in education requires reforming general-purpose transfers to subnational governments, ministers of education willing to implement reforms need to build a solid dialogue not only with their education counterparts, but also with colleagues responsible for finance and planning, and ultimately with the chief of the government.[9]

9 This section is based on: Loureiro, Cruz, Lautharte, and Evans. The State of Ceará in Brazil is a Role Model for Reducing Learning Poverty, World Bank, 2020. https://openknowledge.worldbank.org/handle/10986/34156

ANNEX 1: THE FORMULAS OF THE CEARÁ RBF

Annex 1: The Formulas of the Ceará RBF

This section provides more details on the formulas used in the RBF mechanism in Ceará. As explained in section 3, one quarter of the ICMS transfers to municipalities are made according to outcomes in education, health, and environment, with the following weights:

$$Quota_m^{RBF} = 0.18 \cdot EQI_m + 0.05 \cdot HQI_m + 0.02 \cdot EI_m$$

where $Quota_m^{RBF}$ is the quota for each municipality m; *EQI* is the education quality index; *HQI* is the health quality index, and *EI* is the environment index, as defined below.

The environment index, *EI*, is the weighted sum of dummy variables indicating whether the municipality has an operational solid waste management system.

The *HQI* is a simple average of the levels and improvements in infant mortality rate (*IMR*). After defining the distance of *IMR* to 100 as $DMR_m = 100 - IMR_m$, HQI_m is defined as:

$$HQI_m = 0.5 \cdot \frac{DMR_m}{\sum_m DMR_m} + 0.5 \cdot \frac{\Delta DMR_m^N}{\sum_m \Delta DMR_m^N}$$

with $\Delta DMR_m^N = \frac{\Delta DMR_m - \Delta DMR_{min}}{\Delta DMR_{max} - \Delta DMR_{min}}$.

The *Education Quality Index* (*IQE*) of a municipality in a given year is the weighted sum of its *literacy quality index* (IQ_{k2}), *quality of primary school learning index* (IQ_{k5}), and *pass rate index* (*IA*)

$$IQE = w_{k2} \cdot IQ_{k2} + w_{k5} \cdot IQ_{k5} + w_A \cdot IA$$

where the *ws* are components' weights.

The *quality of primary school* learning index (IQ_{k5}) is the average of the *math* and the *language* learning indexes. The learning (math or language) and literacy quality indexes consider both levels and advances in students' learning (or literacy) as a proportion of the state performance as a whole, that is:

$$IQ = w_L \cdot \frac{L'}{\sum L'} + W_{\Delta L} \cdot \frac{\Delta L'}{\sum \Delta L'}$$

where L' is the scale normalized learning (or literacy) indicator, $\Delta L'$ is the scale normalized change inL', $\sum L'$, and $\sum \Delta L'$are the summation of all municipalities L' and $\Delta L'$, and w_L and $w_{\Delta L}$are the weights for *learning level* and *advance in learning* subcomponents, respectively.[10]

The learning (or literacy) indicator, L, is the students' average score on the annual State's Exam, $\overline{S}$, adjusted by the proportion of the enrolled pupils that took the exam, P, and by a measure of learning equality, E, that is:

$$L = \overline{S} \cdot P \cdot E$$

In the original version of the Index, the measure of learning equality was the reciprocal of half standard deviation of the learning assessment scores,$=1/(0.5\sigma_S)$. This component has changed to a weighted product formula that combines the proportions of students within different learning/literacy levels.[11]

Finally, the *pass rate index* is given by $IA = \frac{A}{\sum A}$, where A is the average pass rate from k1 to k5.

10 For a given indicator L, the scale normalized indicator is given by $L' = \frac{L - L_{min}}{L_{max} - L_{min}}$. In the original version, L_{max} was the maximum L among the Brazilian municipalities in the 2005 Prova Brasil Exam, that is, 15 (fifteen), and L_{min} was the minimum possible value for L, that is, 0 (zero).

11 After a new decree issued at the end of 2011. For *literacy indicator*, $E = (1 - s_1)^3 \cdot (1 - s_2)^1 \cdot (1 + s_3)^2$, where, s_1, s_2 and s_3 are the proportions of grade 2 students with "no literacy," "incomplete literacy," and "desirable literacy," respectively. For *primary school learning indicator*, $E = (1 - s_1)^2 \cdot (1 - s_2)^2$, where s_1 and s_2 are the proportions of grade 5 students with "very severe learning" and "adequate learning," respectively.

THE RATIONALE BEHIND THE EDUCATION QUALITY INDEX (IQE) FORMULA

The index formula is simple, clear, and explicitly focuses on the RBF objective: *improving literacy and learning outcomes*. Education managers can easily discern what components in the formula most contributed to the municipal index values, which is key information to address specific interventions.

The index encourages continuous improvements by all participants by setting a fair arena for competition. By considering both levels and evolution in learning and literacy results, the index induces all competitors to continuously enhance outcomes and incentivizes those who are doing well in maintaining good performance. Giving greater weight to the *evolution* components leverages the engagement of municipalities in the lower tail of the outcome distribution, whose advances are potentially faster, and introduces more dynamism to the competition. The index design signals to all participants that greater efforts can lead to better results.

The *IQE* incorporates implicit and explicit control mechanisms for gaming behaviors and moral hazards. Education managers might take advantage of the information asymmetry in the agent-principal relationship to game the mechanism. The formula addresses behaviors typically used to inflate learning outcomes, like using grade retention to prevent underperforming students from being assessed and discouraging struggling students from taking the exam. The index design also discourages managers from concentrating efforts and resources on selected schools or groups of students, leaving behind those that are struggling, as a shortcut to raising average scores.

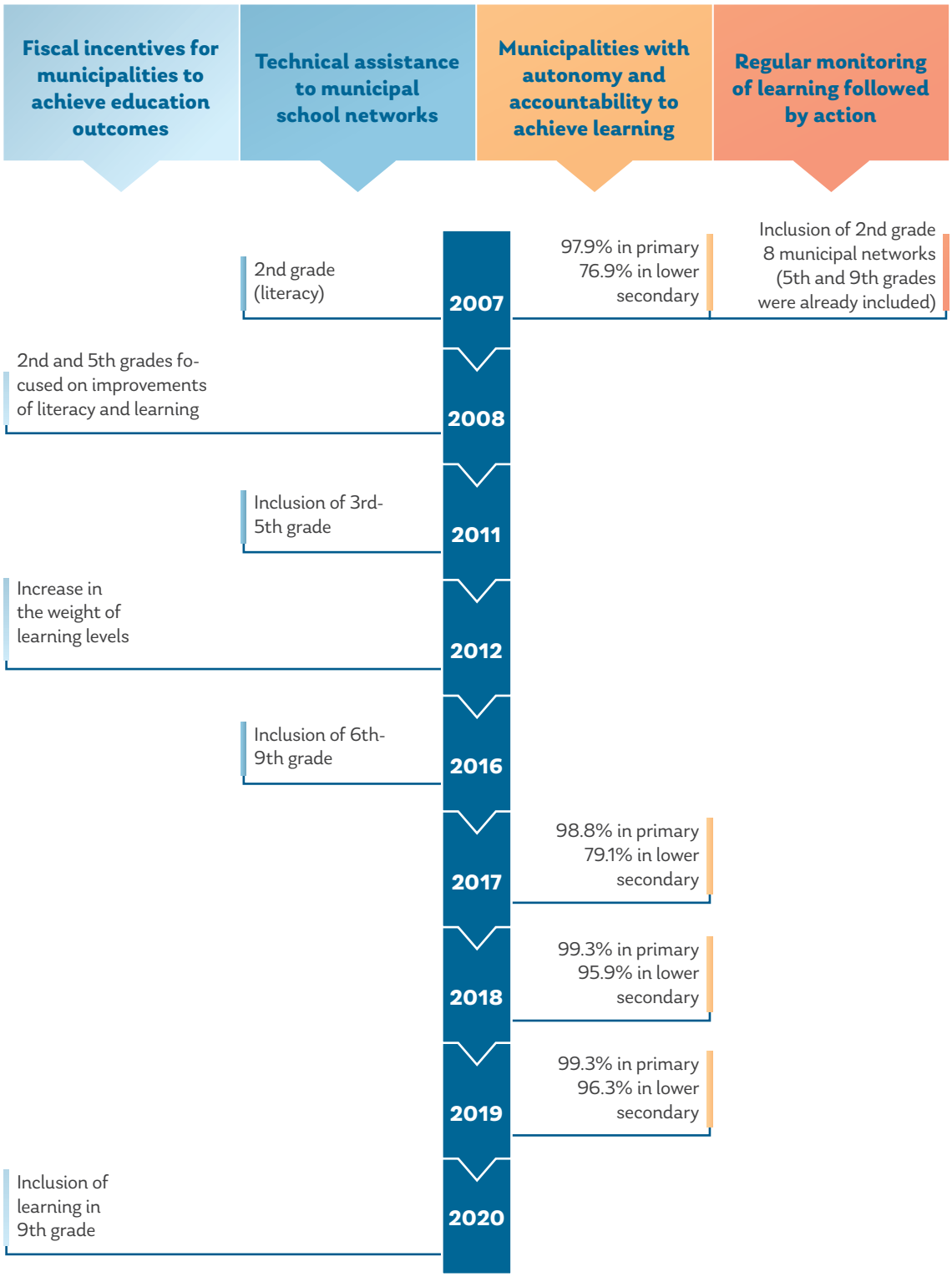
The index also induces school systems to enhance their internal efficiency and to engage actively in the State's Evaluation System.

TABLE A1 — *The rationale behind IQE components*

Component/ Subcomponent	Induces...	Penalizes...
Learning level (L')	Maintaining good results for those who are doing well	Raising student pass rates with no learning concerns
Learning advance (ΔL')	Continuously enhancing learning outcomes	Stagnated learning outcomes
The measure of learning equality (E)	Reducing inequality among students and across schools	Concentrating efforts and resources on selected schools or students and leaving behind those who struggle
Pass rates (A)	Increasing the school system's internal efficiency	Using grade retention to prevent underperforming students from being assessed on the exam
Percentage of students taking the exam (P)	Engaging actively in the State's Evaluation System	Preventing struggling students from taking the exam

ANNEX 2: TIMELINE OF THE EDUCATION REFORMS IN CEARÁ

Annex 2: Timeline of the Education Reforms in Ceará



About the Authors

ANDRE LOUREIRO is a senior economist at the World Bank's Education Global Practice. He holds a Ph.D. in Economics from the University of Edinburgh, United Kingdom, and a Bachelor's and Master's degree in Economics from the Federal University of Ceará.

LOUISEE CRUZ is a consultant at the World Bank's Education Global Practice. She holds a double MSc degree in Public Policy and Human Development from Maastricht University and the United Nations University, and a BA degree in International Relations from the University of São Paulo.

MARCOS HOLANDA is a professor of Economics at the Federal University of Ceará and Former President of Banco do Nordeste and Former General Director of IPECE (Institute of Research and Economic Strategy of Ceará). He holds a Ph.D. in Economics from the University of Illinois, and a Master's degree in Economics from the FGV-EPGE.

MARCELO PONTE BARBOSA is a professor at the Federal University of Ceará (UFC), researcher and consultant in public policies. He holds a PhD in Economics and a BA in Administration from the Federal University of Ceará (UFC). He also was Director of Economic Studies at IPECE (Institute of Research and Economic Strategy of Ceará).

Implementing a Results-Based Financing Mechanism for Subnational Governments to Improve Education Outcomes

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