CONSORTIUM FOR POLICY RESEARCH IN EDUCATION
TEACHERS COLLEGE
COLUMBIA UNIVERSITY

The Base Nacional Comum Curricular: Implementation Findings from the First Five Years

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Consortium for Policy Research in Education (CPRE)

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Executive Summary

In 2018, the Consortium for Policy Research in Education (CPRE) at Teachers College, Columbia University, launched a five-year study of the implementation of the Base Nacional Comum Curricular (National Common Curricular Base; BNCC), Brazil's first mandatory national curriculum standards. The broad aim of the study was to examine and document the complicated landscape of BNCC implementation, with the narrower goal of identifying factors that supported or undermined coherent implementation. Over the past five years, our team conducted 350 interviews with federal, state, local, and third-sector stakeholders; evaluated thousands of individual BNCC state standards; examined hundreds of documents and publications from federal, state, municipal, and other non-profit organizations; and, most recently, assessed newly created BNCC-aligned textbooks.

In this final report, we discuss the BNCC implementation from the perspective of the four implementation pillars: curriculum development; teacher professional development; textbook alignment; and the development of new BNCC-aligned standardized assessments. We also highlight similarities between the U.S. Common Core and the BNCC. We focus especially on a central challenge experienced within both contexts—the difficulty of translating standards into high-quality instructional materials that are informed by what we know about how students learn; that are coherent and logically sequential; and that can guide teacher instruction. A key learning from the U.S. is that teachers do not implement *standards*. Rather, they implement specific sets of classroom materials that are ideally *aligned* to those standards, and are provided sustained professional development that assists them in that work.

State and Municipal Curriculum Development

In the first pillar of BNCC implementation—curriculum development—collaboration regimes involving municipal and state networks partnered to create curricula that reflected the diversity of their schools and communities. We heard of strong stakeholder support for the collaboration regimes, which forced municipal and state leaders into relationships that required joint decision-making and frequent negotiation and that cultivated the cross-pollination of ideas between state and municipal governments. These regimes also encouraged important public debate about what students should know and be able to do. By late 2019, all states and the Federal District had developed BNCC-aligned curricula approved by their respective Education Councils. These efforts represent a major political accomplishment for those supporting the BNCC design and implementation.

The preliminary sections of these curriculum documents outline the legislative underpinnings of the BNCC, provide detailed descriptions of the processes through which the curricula were created, and offer broad statements of values and beliefs regarding child development and teacher training, the types of citizens the state hopes to create, and political and sociological proclamations regarding the ideal role of schools in society. The second major component of these documents includes academic content standards, which were generally reproduced directly from the BNCC, with some tailoring to local contexts. Importantly, these documents would not be viewed as "curricula" as we understand the term in the U.S., as they provide no instructional guidance, nor do they indicate how or in what progression during the academic year each standard should be introduced—what U.S. educators would refer to as a "scope and sequence." As we discuss throughout the report, we remain unsure about the extent to which teachers are being provided with high-quality instructional materials that are aligned to the state standards. Addressing this question should be a central focus of BNCC research moving forward.

Professional Development

The second pillar of BNCC implementation is focused on teacher professional development around the BNCC. Although the BNCC documentation clearly states that pre-service programs must be adjusted to reflect the BNCC, there is little evidence that universities have meaningfully realigned their curricula. This is understandable, given the limited incentives or sanctions associated with compliance, and the fact that universities—particularly schools of education—have remained among the strongest opponents of the BNCC. Moreover, a substantial proportion of pre-service teachers enroll in for-profit programs, many of which are exclusively online with few clinical experiences. Regardless of the extent to which for-profit programs have shifted their curricula toward the BNCC, the quality of training they provide remains dubious.

In terms of teacher in-service training, we found considerable variation in the nature and content of what teachers were being

provided, both within and between states. Given this variation, a detailed accounting of BNCC-aligned professional development nationally is not possible. However, our general sense is that professional development rarely provides teachers clear guidance on how to employ high-quality instructional materials in the classroom, in part because such materials are in short supply. Rather, trainings often entail high-level discussions of the standards with few opportunities for teachers to develop instructional skills or demonstrate their learning. One important lesson from the U.S. experience with the Common Core is that professional development is most effective when tied to grade- and subject-specific, standards-aligned content. Training on the standards themselves is unlikely to transform instruction.

Instructional Materials and Textbooks

The third pillar of BNCC implementation involves efforts to align classroom materials to the BNCC. One obvious route is the Programa Nacional do Livro Didático (PNLD), which provides approved textbooks free of charge to schools. We analyzed two widely used third-grade PNLD-approved math textbooks that claim to be BNCC-aligned. Although the textbooks technically reflect the BNCC standards—teacher guidance for each lesson and activity makes explicit references to the BNCC—the student materials themselves often represent only a shallow or incomplete interpretation of the standard. This suggests that moving forward, publishers and the Ministry of Education might require assistance in moving beyond the simple goal of standards alignment toward a focus on the creation and identification of high-quality instructional materials (HQIM). A model for this in the U.S. is EdReports, which evaluates the quality of published curricula across multiple criteria such as focus and coherence, text quality and complexity, usability, and alignment to standards. The development of such an organization in Brazil could be jointly supported by government and third-sector forces.

Another salient finding from the U.S. is that teachers in Brazil might require convincing of the value of high-quality textbooks, as we heard from many that they do not find them useful. Indeed, as they do in the U.S., teachers in Brazil obtain instructional materials from hundreds of sources—blogs, websites, and Whatsapp, Pinterest, Instagram, and Telegram teacher groups. The concern is that this approach can produce incoherent sets of instructional materials that are not always high-quality and that might not accurately reflect the standards. More broadly, there might be pushback among teachers to the very notion of HQIM, given the long tradition of teacher autonomy in Brazil. But U.S. teachers are realizing that the use of HQIM saves valuable time and effort that would otherwise be spent searching for, adapting, or creating instructional materials. Teachers can certainly maintain a sense of autonomy, but they make instructional choices within a coherent curricular framework. Again, the BNCC standards represent an excellent starting point for the development of HQIM and professional development focused on those aligned materials.

Assessment and Accountability

The fourth pillar of BNCC implementation calls for updating the Sistema de Avaliação da Educação Básica (SAEB)—Brazil's large-scale assessment system—to reflect the BNCC skills and competencies. These updates have not yet occurred, and it is unclear when Brazil will create BNCC-aligned assessments. The lack of progress in this domain suggests a sharp divergence between the Common Core and BNCC implementations. With the support of well-funded private consortia, including those associated with PARCC and Smarter Balanced, the U.S. developed high-quality Common Core-aligned assessments early on. The use of these assessments within high-stakes accountability systems may have motivated schools and districts to implement the Common Core with greater fidelity. However, one unintended (though arguably foreseeable) consequence was that instruction often focused narrowly—or even exclusively—on tested grades and academic subjects. As a result, the content of the assessments essentially became the curriculum. This realization was a primary impetus behind the development of standards-aligned, high-quality instructional materials.

Brazil will likely avoid many of the challenges associated with standards-based assessments experienced by the U.S., largely because Brazil does not have the same history of public accountability for schools and systems. Brazil has an opportunity to rethink how it will use high-quality assessments to push the BNCC implementation forward. Most notably, Brazil can interpret the BNCC assessments as tools to guide instructional support, rather than as punitive instruments of accountability. In this framing, the effectiveness of specific forms of high-quality instructional materials, teacher practice, and teacher professional development can be monitored and evaluated with a clear eye toward improving teaching and learning.

Implications

The U.S. has sought to understand why the Common Core has had somewhat limited success in improving teaching and learning. Many advocates now recognize that the standards were too vague and high-level to guide teacher instruction and professional development. There is a growing consensus that the missing link is HQIM, which translate standards into a coherent and well-structured progression of content for each subject and grade; are based on empirical evidence about how students learn; provide road maps for teachers on how to plan, teach, and assess student learning; and include one full year of coherent and standards-aligned teacher and student materials. Standards are not synonymous with HQIM—they are simply the first step. Fortunately, the BNCC represents a solid framework around which such materials and teacher supports might be built.

The BNCC must find its way into classrooms to meaningfully influence teaching and learning. Conversations in Brazil should arguably shift from a focus on standards toward the development of high-quality instructional materials that guide teacher practice, accompanied by teacher professional development focused on those materials. But creating and adopting good materials is only half of the process. Teachers will need to be convinced of the power of HQIM and how the related materials might improve their working conditions and effectiveness. Communications around this goal will be key, with the third sector playing an important role in disseminating this message.

The U.S. Common Core experience over the past two decades also suggests that realizing the full potential of the BNCC will take years, if not decades. As did the Common Core, the BNCC highlights the importance of systemic alignment across standards, instructional materials, teacher professional development, and assessments. This will require continued coordination across multiple sectors and stakeholder groups. Creating a more coherent system that serves the needs of all Brazilian students will also necessitate a recommitment on the part of BNCC supporters, particularly government and third-sector organizations. Much work remains, but the value of these efforts is clear.

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Introduction

In 2018, the Consortium for Policy Research in Education (CPRE) at Teachers College, Columbia University launched a five-year study of the implementation of the Base Nacional Comum Curricular (National Common Curricular Base; BNCC), Brazil's first mandatory national curriculum standards.[1] The broad aim of the study was to examine and document the complicated landscape of BNCC implementation, with the narrower goal of identifying factors that supported or undermined coherent implementation. Over the past five years our team conducted 350 interviews with federal, state, local, and third-sector stakeholders; evaluated thousands of individual BNCC state standards; examined hundreds of documents and publications from federal, state, municipal, and other non-profit organizations; and, most recently, assessed newly created BNCC-aligned textbooks.

In this final report, we discuss the BNCC implementation from the perspective of the four implementation pillars: curriculum development; teacher professional development; textbook alignment; and the development of new BNCC-aligned standardized assessments. While not an explicit research question, the COVID-19 pandemic has had obvious repercussions for BNCC implementation generally and the processes related to teacher professional development in particular. When possible, we explored these implications in our fieldwork. We provide a full discussion of our data and methods, and describe our case study states and municipalities, in Appendix A.

Throughout the report, we highlight similarities between the U.S. Common Core and the BNCC. We focus especially on a central challenge experienced within both contexts—the difficulty of translating standards into high-quality instructional materials that are informed by what we know about how students learn; that are coherent and logically sequential; and that can guide teacher instruction. A key learning from the U.S. is that teachers do not implement *standards*. Rather, they implement specific sets of classroom materials that are ideally *aligned* to those standards, and are provided sustained professional development that assists them in that work.

[1] For a discussion of the history and development of the BNCC, see: Costin, C., & Pontual, T. (2020). Curriculum reform in Brazil to develop skills for the Twenty-First Century. In Reimers, F.M. (ed.) *Audacious Education Purposes* (pp. 47-64). Springer. For a critique of the BNCC adoption process, see Tarlau, R., & Moeller, K. (2018). "Philanthropizing" consent: How a private foundation in pushed through national learning standards in Brazil. *Journal of Education Policy*, 35, 337-366. See also, Avelar, M., & Ball, S.J. (2019). Mapping new philanthropy and the heterarchical state: The mobilization for the National Learning Standards in Brazil. *International Journal of Educational Development*, 64, 65-73.

Implementation Pillar I: Curriculum Development

The first pillar of BNCC implementation—curriculum development—created collaboration regimes through which municipal and state networks partnered to create curricula that reflected the diversity of their schools and communities. We heard strong stakeholder support for the collaboration regimes, which forced municipal and state leaders into relationships that required joint decision-making and frequent negotiation and that often cultivated the cross-pollination of ideas between state and municipal governments. These regimes also encouraged important public debate about what students should know and be able to do. Unsurprisingly, study participants believed that the collaboration regimes worked better in states that had strong pre-existing relationships with municipalities and other governing bodies. In the state of Ceará, for example, officials reported that the collaboration process went smoothly due to an existing partnership between the state and municipalities for the literacy project, Programa de Alfabetização na Idade Certa (Program for Literacy at Proper Age - PAIC). As the municipalities in Ceará are highly dependent on the state for instructional materials (e.g., non-PNLD textbooks) and funds for teacher training, there was already a strong level of collaboration and agreement on a uniform state curriculum.

These partnerships have the potential to extend beyond the BNCC to the broader education policy landscape. Before the revival of the collaboration regimes, UNDIME, CONSED, and other local governmental actors worked in isolation. A high-ranking CONSED official shared that their state had previously partnered with municipalities to create curricula, but the governing bodies of UNDIME and the state secretary of education operated separately. The BNCC changed this relationship fundamentally by forcing these organizations to meet more frequently around a collective goal. This is a positive externality produced by the BNCC that could facilitate smoother policy implementations in the future. From both municipal and state leader perspectives, the collaboration regimes produced both a cultural and structural change to the way they thought about and executed their work. However, as we discuss below, the practical and substantive importance of these collaborations in terms of the BNCC is less clear.

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By late 2019, all states and the Federal District had developed BNCC-aligned curricula approved by their respective Education Councils. These efforts represent a major political accomplishment for those supporting the BNCC design and implementation. The preliminary sections of these curriculum documents outline the legislative underpinnings of the BNCC, provide detailed descriptions of the processes through which the curricula were created, and offer broad statements of values and beliefs regarding child development and teacher training, the types of citizens the state hopes to create, and political and sociological proclamations regarding the ideal role of schools in society. For example, Ceará's curriculum begins with a lyric from the Brazilian singer and composer Gonzaguinha, while Espírito Santo's document starts with a quote from Hannah Arendt. Perhaps unsurprisingly, much of the feedback obtained during the public consultation period focused on these preambles rather than on the standards themselves; citizens had more to say about their histories and aspirations and less to say about the best approaches to teaching fraction multiplication.

The second major component of these documents includes academic content standards, which were generally reproduced directly from the BNCC, with some tailoring to local contexts. Importantly, these documents would not be viewed as "curricula" as we understand the term in the U.S., as they neither provide instructional guidance nor indicate how or in what progression during the academic year each standard should be introduced—what U.S. educators would refer to as a "scope and sequence." Rather, they are best interpreted simply as state curricular standards. However, to maintain consistency, throughout this report we use the term "curriculum" in the Brazilian rather than the U.S. sense.

Standards Alignment

During the early years of our study, a central question was the extent to which the new state curricula would actually reflect the BNCC. We conducted a comparative analysis of the third and fifth grade math and history standards in all 27 states, which provided an analytic sample of 2,462 unique state standards (see Appendix B for the full analyses). We first categorized each state standard according to its similarity to the same BNCC standard. If there was no substantive difference between it and the parallel BNCC standard, we considered it to be the "Same Standard." Other state standards were simplified or reduced in comparison to the parallel BNCC standard, which we refer to as "Reduced Content." Conversely, some state standards provided more content or information than the corresponding BNCC standard, resulting in our category "Additional Content."

The vast majority of state standards (75%) came directly from the BNCC.

Our analyses suggest that overall, the vast majority of state standards (75%) came directly from the BNCC, while roughly one-quarter incorporated additional content to the parallel BNCC standard. Importantly, virtually no BNCC standards were deleted from any state's curriculum. There is, however, considerable difference between math and history in the degree of correspondence between the BNCC and the state standards: 61% of history state standards were identical to the BNCC standards compared to 82% of math state standards. In addition to differences across subjects, we also found considerable variation across states in the extent to which they reproduced the BNCC standards in their own curricula. Nine states copied 100% of their standards in these grades and subjects verbatim from the BNCC, while five states copied fewer than 40% of their standards from the BNCC; however, even those states that deviated from the BNCC standards largely added content to the existing standards, rather than incorporating new or different standards. Distrito Federal, Acre, Goiás and Rio Grande do Sul deviated most in their curriculum design and content, both in terms of inserting new standards, splitting BNCC standards into several other standards, or restructuring/renaming the standards.

In total, 12 of 27 states included some kind of supplemental information within their curricular framework, generally by adding an extra column to their table of standards. We find slight variation across states in the type of additional information provided. Some states, such as Mato Grosso do Sul, added a detailed comment for each standard; others included broader information for a group of standards, as Acre did; and some states added supplemental information for one subject but not for the other, such as Paraíba, which included supplemental information only for math, and Santa Catarina, which provided additional content only for history. For most states, this supplemental information included suggestions for pedagogical activities or instructional materials. A small number of states also included supplemental guidance on how to implement an interdisciplinary approach by connecting standards across subjects. We also saw a small number of examples of states providing guidance on assessment or how to connect specific standards to the competencies.

Overall, we saw some tailoring to local context in history and virtually none in math. More specifically, only 14 out of the 1,688 Math standards we analyzed were contextualized. In contrast, roughly 27.5% of History standards were contextualized, with almost all states contextualizing at least some of their history standards. This is understandable, given the quite different histories of Brazilian states. Indeed, contextualization included the incorporation of specific state historical events into a given standard, as well suggested activities such as students conducting research about their local communities.

Numerous factors might explain why states largely duplicated the BNCC standards in their curricula, particularly in math. One possible explanation is that state leaders and curriculum developers did not believe that they were entitled to create their own standards given guidance and messaging from the Ministry of Education (MEC). Nearly all stakeholders we interviewed saw the need to increase educational equity as the main justification for the BNCC, and that its central purpose was to "guarantee a minimum level for all Brazilian students," as one state secretary put it. In Mato Grosso do Sul, which copied 100% of the third and fifth grade math and history BNCC standards into its own curriculum, several respondents expressed the belief that modifying the BNCC was actually forbidden. One interviewee interpreted a National Council of

Education resolution as prohibiting the removal of any standard from the BNCC and claimed that this was also the understanding of the State Council of Education, which was responsible for approving the state curriculum:

> Resolution number 2, of December 22nd 2017, which is the one from the CNE that establishes the BNCC, determines the BNCC as it is. It's up to the state to build their document beyond what it proposes. So, altering skills, according to our understanding, was not possible. In fact, it was the National Council of Education's own understanding that we couldn't take one of the BNCC's determinations and change it or adapt it. What we should do was add abilities that we felt were needed but lacking in the BNCC.

The Maranhão curriculum replicated 98% of the third and fifth grade BNCC math standards and 91% of third and fifth grade history standards. Similar to what we heard from our other case study states, the majority of interviewees understood MEC's guidance to mean that they should keep all the BNCC standards, but that they were free to add standards. Reportedly, these guidelines were conveyed during the three initial sessions conducted by MEC in Brasilia. As one Maranhão respondent recalled,

> In fact, we were instructed not to change the abilities. Why did everyone copy the BNCC's abilities? Because our instructions in Brasília were, "You can't [change anything]. All of the BNCC abilities should be in the curriculum. It is mandatory. Now, if you'd like to add other abilities, do it." If it were up to us, we'd have abilities we wished we could split into two, some others we wanted to add, but the list of abilities was already humongous.

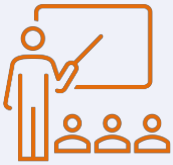
States might also simply have lacked the human and fiscal resources necessary for the complicated task of creating new standards for all subjects, across all grades, within a relatively short time frame, despite the assistance from MEC and other partners. Regardless of why states largely reproduced the BNCC standards in their curricula, similarities between the BNCC and the state standards might be considered a positive outcome if the BNCC standards are viewed as rigorous and high quality.

"Why did everyone copy the BNCC's abilities? Because our instructions in Brasília were, 'You can't [change anything]. All of the BNCC abilities should be in the curriculum. It is mandatory."

Summary

The replication of the BNCC standards in the new state curricula makes perfect sense if the purpose of the BNCC was uniformity, and the assurance that all students would (theoretically) have access to the same skills and competencies. However, if the goal of the BNCC was to have uniform standards across states and municipalities, it is not wholly clear what purpose the collaboration regimes and public consultations served. As we note, some states did indeed contextualize some of their standards to fit their local contexts and histories. But there is an argument to be made that the considerable fiscal and human resources spent on state-level efforts around the standards themselves might have been better allocated to helping states and municipalities develop high-quality instructional materials and assisting teachers in their efforts to implement these materials in their classrooms.

Of course, the collaboration regimes and public consultation processes likely provided important political cover for the BNCC standards and afforded the impression that states had developed their own standards rather than adopting standards forced upon them by bureaucrats in Brasilia. In terms of the local practitioners responsible for actually implementing the new standards, the symbolic processes of stakeholder involvement might have also increased buy-in to the reasoning behind the BNCC as well as its academic content. Moreover, these symbolic processes might have been necessary nationally considering the unprecedented nature of the initiative.



Implementation Pillar II: Teacher Professional Development

The second pillar of implementation is focused on teacher professional development around the BNCC. In contrast to curriculum development, where we saw similar processes and to a large extent similar content in the curricula that states produced, we observed considerably more variation across and within states in terms of BNCC-aligned teacher development. Given this variation, a detailed accounting of BNCC-aligned professional development nationally is not possible. However, our general sense is that professional development rarely provides teachers clear guidance on how to employ high-quality instructional materials in the classroom, in part because such materials are in short supply. In the sections below we discuss the broad state of both pre-service teacher education programs and in-service teacher professional development, and share our sense of the extent to which they are preparing teachers to implement the BNCC in their classrooms.

Pre-Service Teacher Training

Most participants recognized that the long-term success of the BNCC depends on training *future* teachers to understand and apply the new curriculum during their pre-service training. Respondents, however, suggested two broad issues that might influence implementation. First, many expressed the ongoing concern that university-based pre-service training in Brazil is too theoretical and not focused on providing teachers the pedagogical skills and practical classroom experiences that student success demands. An advisor to the Secretary of Higher Education asserted that universities train pre-service students to "think about the themes of philosophy, sociology, and more theoretical problems concerning education" rather than "how to be a good teacher." Another MEC official suggested that many public universities are resistant to replacing philosophical and sociological coursework with more technical or practical training because of their commitment to developing teachers' critical thinking skills. Overall, participants reflected that those who run universities are quite removed from the realities of the classroom. In the words of one state secretary of education, universities are "close in terms of geography, but they are so far from the school."

> **"[Universities train pre-service students to] think about the themes of philosophy, sociology, and more theoretical problems concerning education, [rather than] how to be a good teacher."**

The second broad concern is that philosophical and political disagreements might limit the extent to which teacher training programs are aligning their curricula and coursework to the BNCC.[2] Several university professors we spoke with—all from schools of education—opposed the BNCC because they claimed that standardized curricula are inherently undemocratic and used as a means to "control students" and "erase their differences." Again, this critique extended beyond the BNCC itself. These professors believed that standards of any kind limited teacher freedom in the classroom, and that curricula should be co-created with students, affirming all cultures. One professor explained how flexibility is needed to best meet the needs of students: "I don't believe that there's an order that first you must teach this and then this and then this. Why do I believe that? When teachers are well-trained, they're able to understand what is in the interest of children." We spoke with the head of the school of education at a prestigious public university, who told us that they were against any kind of standardized curriculum. Instead, they supported the notion of better teacher training to empower teachers to be autonomous and competent so that they would know how to teach in their own contexts. We should stress that we did not conduct a systematic review of university pre-service curriculum. Future work should examine representative program materials to establish the extent to which pre-service training is now aligned to the BNCC.

[2] The initial BNCC document approved by the National Council of Education (CNE) states that both pre-service and in-service teacher training curricula and programs must be adjusted to BNCC (Resolution 2/2017, Article 17). However, neither the BNCC Implementation Guide nor the BNCC website mentions pre-service training.

When we speak of pre-service teacher training in Brazil, one should also bear in mind that three-quarters of pre-service teachers are enrolled in for-profit programs owned by large education services corporations. Importantly, the vast majority of these students are enrolled in online programs. Given Brazil's vast size and limited economic resources, this is understandable. However, our knowledge about global best-practices suggests that the lack of supervised clinical experiences provided by such organizations is a limiting factor, in terms of both general teacher preparation and the specific pedagogical demands of the BNCC.

In-Service Teacher Training

States generally developed "train-the-trainer" models to prepare current teachers to implement the BNCC. In the first two years of our study, plans for teacher professional development represented a continuation of the state/municipal collaboration regimes, through which a central team of trainers would train regional teams from state and municipal school systems, who then would train pedagogical coordinators (PCs) in their respective systems. These state/municipal partnerships had some potential to increase coherence around BNCC teacher professional development. However, these training initiatives were halted in 2020 as state and municipal secretaries were forced to address the COVID-19 pandemic and related school closures. After 2022, with schools reopening, the professional development (PD) focused partnerships seemed to have lost steam, and the responsibility for training has fallen largely on municipalities, sometimes with the support of external PD providers.

The vast range of academic content included in the BNCC meant that professional development on virtually any topic—socioemotional issues, active methodologies, indigenous cultures, diversity, the use of technology—was, in their minds, "BNCC-aligned."

School- and municipal-level stakeholders reported a remarkably wide array of training opportunities, to the point that many struggled to even recall all the trainings available. Some respondents argued that the vast range of academic content included in the BNCC meant that professional development on virtually any topic—socioemotional issues, active methodologies, indigenous cultures, diversity, the use of technology—was, in their minds, "BNCC-aligned." This diversity of content poses a challenge in establishing the extent to which teachers are receiving the skills needed to implement the BNCC. This wide range of PD content is further exacerbated by the large number of private and third-sector professional development providers. We spoke with representatives from twelve such organizations to identify the extent to which the content they offered was related to the BNCC. Here again, we found tremendous variability, with some sharing descriptions of high-quality, instructionally focused trainings, while others outlined activities that seem wholly unrelated to helping teachers develop instructional proficiency. For example, one provider reported that their ostensibly BNCC-aligned work focused broadly on how PCs interact with teachers. Although clearly important, it seems unlikely that such trainings will have a meaningful influence on teacher instructional skills around the BNCC.

Beyond the diversity of content, respondents also cited logistical and organizational challenges to conducting high-quality PD. Many asserted that their municipalities cannot require teachers to attend professional development sessions. At the school level, PCs reported difficulties scheduling regular follow-ups with teachers focused on classroom practice, given the large number of teachers they were expected to serve, and conflicting and varied teacher schedules. PCs also expressed frustration that, sometimes as a result of these logistical challenges, they met with teachers in groups, rather than individually, and these groups often involved teachers from multiple grades and subjects, making it difficult to focus on specific instructional strategies.

Another common set of frustrations involved challenges associated with online professional development. Some respondents questioned the value of asynchronous PD that teachers could log into at their leisure, given that it was (by definition) not participatory and often focused on theoretical or abstract content. Reflecting on such trainings, one municipal secretary observed, "One recurrent question we get [from teachers] is, 'How does that curriculum work in real life?'" Both PCs and other PD providers also mentioned that, even during synchronous online sessions, teachers were not particularly engaged. According to one municipal trainer, "One of the disadvantages we are noticing is the engagement of the

teachers. Some join the session, they're online, they're in their cars, in the supermarket. They're doing other things."

COVID-19

As noted above, much of the teacher professional development scheduled for 2020 was interrupted by the COVID-19 pandemic. States and municipalities with greater resources were able to continue to move forward with some virtual PD, while those with fewer resources could not. As one municipal-level actor shared, "I can't speak for the others, but my city's administration abandoned the training for BNCC and focused on qualifying teachers to work with technology because this became a more urgent need for us—how to record the lessons, edit them, and upload them to the platforms."

While most stakeholders highlighted how the COVID-19 pandemic (understandably) negatively impacted teacher professional development, a few shared some potential silver linings. For example, one school-level actor from São Paulo asserted that the COVID-19 pandemic not only changed what and when teachers received training but also how they received training. In particular, this person highlighted the promise of online training and said that they planned to continue a mixed form of training moving forward: "For next year [2021], the training will be in a mixed form. We'll have online sessions—because we want to enhance digital competency—and face-to-face training sessions too." Another municipal-level participant also reflected that COVID-19 had forced teachers and schools to make real changes in their classroom practice, particularly by increasing the use of technology, in ways that support BNCC implementation:

> Also, in some ways, the new curriculum has brought about new demands for the Education Office. So we also had to adapt. We had to insert technology into classrooms, so every classroom now has a computer, a projector, a big screen… I mean… we can't have the traditional lessons anymore.… I think that the curriculum was already bringing changes, but now, after this pandemic, I believe that there will be even greater interest in learning different ways to teach. We'll not use the blackboard anymore. Instead, we'll use the computer, the screen… students will get tablets… so we need to use these new devices to improve education.

Despite this possibility that the pandemic forced teachers to alter their practice somewhat, our sense is that since schools reopened, professional development has focused even less explicitly on the BNCC. For example, São Paulo City publishes a list of all the professional development trainings offered in a given year: of the 2,878 entries for 2022,[3] only *one* entry explicitly mentions the BNCC—"BNCC and the City Curriculum: Reflections on Educational Policies." Although we are uncertain about the specific content of this training, it seems unlikely that even this sole entry focused heavily on classroom instructional strategies. In sum, our data suggest that professional development rarely focuses on the specific materials and content teachers were expected to employ in their instruction.

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Ultimately, while the effects of the COVID-19 pandemic imposed serious threats to the BNCC implementation, it is important to recognize that a number of the challenges were clearly present prior to COVID-19. In particular, it is not clear that even if professional development had happened as planned, it would have reflected the effective professional development practices recommended in the BNCC Implementation Guide. Therefore, while understanding COVID-19's impact on BNCC implementation will continue to be important, we must resist the temptation to allow it to become a scapegoat for current and future challenges to implementation.

[3]https://educacao.sme.prefeitura.sp.gov.br/coped/ntf/acompanhe-o-status-das-formacoes/

Summary

Of all the potential barriers to implementation, none were mentioned as often as the ability of Brazilian teachers to execute the academic and pedagogical demands of the BNCC. This apprehension was shared by both BNCC proponents and opponents, as well as by those across the political and ideological spectrum. We found considerable variation in the content, quality, focus, and frequency of the in-service professional development being offered, both within and between states. Nevertheless, a common feature is a lack of training focused on improving teacher practice. While a wide range of trainings are available, covering many different topics, there is a lack of training that dives deeply into teacher content knowledge, that requires teachers' active engagement, that assesses their learning experience, and that employs robust, BNCC-aligned instructional materials. The content of trainings, particularly those at the school level during the collective time, appear to rarely include specific goals focused on instructional support, but rather are characterized by broad conversations about general topics. One important lesson from the U.S. experience with the Common Core is that professional development is most effective when tied to specific grade-level, standards-aligned content. Training on the standards themselves is unlikely to transform instruction.

Implementation Pillar III: Development of Instructional Materials

The third pillar of implementation involves efforts to create instructional materials aligned to the BNCC. We spoke with stakeholders across implementation levels to understand how textbooks and other materials would be used to incorporate the BNCC into classroom instruction. We also conducted an analysis of two newly created third-grade math textbooks to explore the extent to which they reflect the BNCC. Throughout this section, we define instructional materials as any resource that supports the process of lesson planning and delivery, including curricula, textbooks, other materials offered by the municipal or state secretary of education (e.g., ready-to-use lesson plans, learning recovery activities), as well as teacher-created activities and materials or those found on the internet.

Our understanding is that few teachers have access to BNCC-aligned high-quality instructional materials—that is, teachers lack access to curricula that translate the BNCC standards into a coherent and well-structured progression of content based on empirical evidence about how students learn; provide road maps for teachers on how to plan, teach, and assess student learning; and include one full year of coherent and standards-aligned teacher and student materials. One respondent from a Brazilian research institute asserted, "What we like to say in Brazil is, 'There is no curriculum, there is just a textbook.'"

The PNLD represents a key opportunity to provide BNCC-aligned materials at scale.

Schools in Brazil have the option of receiving textbooks through the national Programa Nacional do Livro Didático (PNLD). Private publishers first develop textbooks, which are then reviewed by content experts, often from the federal universities. The federal government then publishes a list of approved textbooks from which schools can choose. States and municipalities have a strong incentive to adopt the PNLD textbooks, which are provided at no cost. Importantly, MEC has stated that all PNLD textbooks must be aligned to the BNCC. As such, the PNLD represents a key opportunity to provide BNCC-aligned materials at scale. Despite the incentive, PNLD adoption varies considerably across states. For example, 98% of municipal schools in Sergipe participate in PNLD, compared to only 58% of municipal schools in Amazonas. The State of São Paulo is more typical, with 77% of its municipal schools participating in PNLD.[4]

Teacher Use of Instructional Materials

Counter to our initial assumption that textbooks would be a key driver of BNCC implementation, we heard no consensus on the extent to which teachers even used textbooks in their classrooms. Disagreement on the matter seems to be explained in part by stakeholder proximity to actual instruction. Many high-level government officials and third sector leaders claimed that teachers rely heavily on textbooks. A former CNE member argued that Brazil has historically navigated federalist constraints by delivering education reforms through textbooks: "The policy for education in Brazil usually has been the policy made by books." As a result, one state government official asserted, "Teachers just open the textbook and do whatever it tells them to do."

This is not at all what we heard from teachers. Although a small number claimed that they relied heavily on textbooks, the vast majority of teachers reported that textbooks were not their primary source of instructional materials or guidance and that they used other resources to assist with lesson planning and delivery. Several teachers argued that the textbooks were only marginally helpful and often had to be used in collaboration with other tools:

> I rarely use the textbook because…In fact, I've never been a fan of the textbooks we get. And now I feel like they're getting worse; with each passing year

[4] See http://simec.mec.gov.br/livros/publico/index_escolha.php

> we have less and less resources to offer the students. So, my planning is very loosely based on the textbook.
>
> Honestly speaking, I almost don't use the textbook. I usually use the Nova Escola magazine. When I plan these lessons, I check the skills I will work with and then I check to see if the textbook contains content that I can use in the lesson.

Some teachers claimed that the textbooks lacked relevance to their students' lives; others asserted that textbook content was simply beyond their students' academic skill levels and understanding, a situation exacerbated by the learning loss associated with the COVID-19 disruptions. Other teachers argued that the official textbooks were not sufficiently aligned with the local curriculum and contexts. As one teacher claimed,

> There are different regions in Brazil and sometimes we get a textbook with texts that have nothing to do with what students experience in their lives. That's where the BNCC fails for me. Don't we have to work based on students' reality? How are we going to do that based on these texts? As a teacher, I sometimes choose to ignore that text and bring something different to work with in class. I myself am not a big fan of using textbooks in class. I like selecting materials and texts that fit the students' reality.

If not textbooks, then what instructional materials do teachers use in their classrooms? A consistent finding is that teachers are provided—and find on their own—extensive amounts of disparate instructional resources and content. This has certainly been the case with the U.S. and the Common Core.[5] Teachers in Brazil obtain instructional materials from dozens of sources beyond textbooks—blogs, websites (e.g. Passatempo Educativo, Nova Escola, Mundo Educação), and Whatsapp, Pinterest, Instagram, and Telegram teacher groups. As one teacher asserted, "I have to teach the skills. How I do it and with what materials, it's up to me." Another teacher offered perhaps the most accurate description of instructional material use in Brazil: "Some teachers use only textbooks. Some teachers use only the support materials. Some teachers mix and match and do their own thing." Given the varied instructional content in use, it is difficult to determine the rigor of these materials, the extent to which they are BNCC-aligned, or whether they are instructionally coherent—in short, whether they reflect high-quality instructional materials.

"I rarely use the textbook because…In fact, I've never been a fan of the textbooks we get. And now I feel like they're getting worse."

PNLD Textbook Analysis

We analyzed two third grade PNLD textbooks that purport to be aligned with the BNCC (Apis & Buriti Mais).[6] We chose textbooks that were from the publishers with the largest market share and were included on the PNLD 2018 list of mathematics textbooks. We examined a chapter from each textbook to determine the extent to which they reflect the BNCC and whether they provide teachers the necessary instructional guidance to enact the BNCC in their classrooms. For each textbook, we analyzed chapters focused on addition and subtraction.

The units we examined show clear influence of the BNCC. The teacher guidance for each lesson and activity makes explicit, useful references to the BNCC standards. However, there are significant limitations in terms of how addition and subtraction are extended to more complex situations. Coherence and progression are also irregular in both textbooks, indicating a need for more attention in future revisions. The APIS textbook shows a better coherence with past learning than with future learning. Coherence, however, must connect past to future. A pattern emerges across skills in the APIS book. Either in choice of skills or treatment within skill, APIS leans backwards toward prior grades and easier topics and avoids leaning forward toward developing skills needed for future work.

Addition and subtraction have already received priority attention in first and second grade. In third grade, the BNCC asks for more forward-facing priorities: extending addition and

[5] See Polikoff, M. (2018). The challenge of curriculum materials as a reform lever. *Evidence Speaks Reports*, *2*(28). Brookings Institution.

[6] We thank Dr. Phillip Daro for leading these analyses. See Appendix D for a summary of thus work. Please contact the authors for the full report.

subtraction forward toward more mature concepts related to operations on the number line; number equations and application of addition and subtraction to different meanings specified in the BNCC and the correspondence between length and number that forms the basis of number lines; and, later, coordinate planes. The text does not reflect these BNCC priorities. This is something that could be fixed in the next edition without dismantling the coherence of the book. In the Buriti textbook, coherence and progression are weaker, with lessons jumping from topic to topic and new concepts introduced with difficult numbers that could be a barrier to seeing the concept. Moreover, there is often an abrupt arrival of an advanced problem involving new concepts without any progression up to the problem.

Another concern found with both textbooks is the degree to which problems and activities are scaffolded. Too often, students are put in a passive role where steps are laid out for them so they can get to the end of the problem, or activity even, without having learned the mathematics. The BNCC paints a clear and vivid picture of active students learning to think with mathematics in real life contexts. Neither book lives up to this aspiration. While many of the activities are engaging and lively, the student role in thinking mathematically is minimal. We also examined the priorities at the skill level and at the thematic level. Overall, we found that some topics are well developed, while some receive very shallow treatment. The findings for thematic expectations are more uniformly disappointing and put us on alert for a possible weakness in the translation of BNCC into tools for teachers and students.

The limitations found within these two textbooks highlight that curriculum alignment does not necessarily equate with high-quality instructional materials. In the design, development and evaluation of texts, public and private institutions should pay particular attention to areas most vulnerable to being overlooked or treated weakly, including coherence with future grade level work; progression from earlier grade level work; progression within grade level; real-life social, cultural, and economic uses of mathematics; the active role of students in learning and using the mathematics, and formulating expression of their thinking when solving problems; and the systematic balancing of priorities, especially of higher-level learning. These areas for focus all suggest that moving forward, publishers and the Ministry of Education might need assistance in moving beyond the simple goal of standards alignment toward a focus on the creation and identification of HQIM.

The BNCC represents a solid framework around which HQIM and teacher supports might be built.

Summary

The U.S. has sought to understand why the Common Core has had somewhat limited success in improving teaching and learning. Many advocates now recognize that the standards were too vague and high-level to guide teacher instruction and professional development.[7] There is a growing consensus that the missing link is high-quality instructional materials (HQIM), which translate standards into a coherent and well-structured progression of content for each subject and grade; are based on empirical evidence about how students learn; provide road maps for teachers on how to plan, teach, and assess student learning; and include one full year of coherent and standards-aligned teacher and student materials.[8] Standards are not synonymous with HQIM—they are simply the first step. Fortunately, the BNCC represents a solid framework around which such materials and teacher supports might be built. We would argue that the success of the BNCC ultimately depends on the extent to which such materials reach Brazilian classrooms.

[7] Kaufman, J.H., Doan, S., & and Fernandez, M-P. (2021). The rise of standards-aligned instructional materials for U.S. k–12 mathematics and English language arts instruction: Findings from the 2021 American Instructional Resources Survey. Santa Monica, CA: RAND Corporation. https://www.rand.org/pubs/research_reports/RRA134-11.html.

[8] CCSSO (2022). *High quality instructional materials & professional development network case study: Impact of the CCSSO IMPD Network*. Available at: https://753a0706.flowpaper.com/CCSSOIMPDCaseStudyImpact/#page=1

Implementation Pillar IV: Assessment and Accountability

The fourth pillar of BNCC implementation calls for updating the Sistema de Avaliação da Educação Básica (SAEB)—Brazil's large-scale assessment system—to reflect the BNCC skills and competencies. The lack of progress related to this implementation pillar suggests a sharp divergence between the Common Core and BNCC implementations. With the support of well-funded private consortia, including those associated with PARCC and Smarter Balanced, the U.S. developed high-quality Common Core-aligned assessments early on. The use of these assessments within high-stakes accountability systems may have motivated schools and districts to implement the Common Core with greater fidelity. However, as we discuss below, one unintended (though arguably foreseeable) consequence was that instruction often focused narrowly—or even exclusively—on tested grades and academic subjects. We conclude this section with suggestions for how Brazil might avoid the manner in which assessments ultimately hampered the Common Core implementation.

Status of BNCC Assessments

The call to create BNCC-aligned assessments is more than one component of the BNCC implementation plan; rather, it reflects a federal legislative mandate. Following the approval of the BNCC in December 2017, the National Council of Education (CNE) released an official notice stating that "Basic Education, large-scale assessment rubrics must be aligned to the BNCC within one year after its publication" (Conselho Nacional de Educação & Ministério da Educação, 2017). These updates have not yet occurred, and it is unclear when Brazil will create BNCC-aligned assessments. The previous government of Jair Bolsonaro did not update the assessments that were in place in 2018. New second grade assessments were launched in 2019 that were deemed to be aligned by INEP (Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira), the technical department within MEC responsible for large-scale assessments. However, experts close to the process have since questioned whether the second-grade assessment adequately reflects the BNCC. The current government of Luis Inácio Lula da Silva has not released a specific working plan or timeline for if and how SAEB would be aligned. Given this, a major tenet of the BNCC theory of action—that accountability tools would promote and guide implementation—remains largely absent.

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Outside of large-scale assessments, MEC created a platform that includes voluntary diagnostic and formative assessments for elementary schools, with the aim of measuring student performance as they returned to classrooms in 2022 after almost two years of COVID-19 school closures. MEC launched the platform in October 2021. Unfortunately, there is no available information yet on how many schools are using the assessments or how those assessments are aligned to the BNCC.

The Culture of Informality

Even absent concerns regarding the future of SAEB and its capacity to properly reflect student performance related to the BNCC, it is unclear the extent to which assessments could play a meaningful role for BNCC implementation at the subnational and school levels. This is largely because Brazil's decentralized policy environment allows for neither rewards nor consequences associated with SAEB results. One consequence of decentralization is what one MEC official referred to as a "culture of informality," in which many public servants—teachers included—became unaccustomed to rigid standards or strict adherence to formal documents. It was one of the primary explanations for why the BNCC was framed as a policy on "what to teach" versus "how to teach"—to avoid the political dissent that could come from encroaching on teacher pedagogical autonomy.

During interviews, it became clear that the culture of informality prevails. Although some school systems are providing supporting materials such as a list of skills to be taught in a certain period, it is apparent that this does not necessarily translate into teachers using them, as they are

framed more as suggestions. In reality, as noted in the previous section, teachers maintain a high degree of autonomy over which skills they will teach, when they will teach them, and with what materials. One could argue that this autonomy enables a more contextualized approach. However, given the general lack of teacher training and instructional guidance, this autonomy might act as a barrier to the BNCC's full implementation.

If schools and teachers cannot be held accountable for implementing the BNCC, one alternative would be strengthening school-level structures and empowering principals and PCs to follow and support teachers' work closely—an interpretation of accountability focused more on instructional support and improvement rather than enforcement. In this interpretation, PCs would have greater responsibility for reviewing and providing feedback on teacher lesson plans, with the aim of monitoring the extent to which teachers are designing learning experiences that are aligned with the BNCC. Respondents noted that PCs often do conduct classroom observations and check student notebooks to monitor instruction. However, it was clear from the interviews that these strategies are used less frequently compared to lesson plan reviews, and when they happen, they tend to be weak in structure, and without clear criteria to guide observation. When asked about how often they conduct classroom observations, one PC reported, "Well, as we don't have that much time—there are many demands to cater to—and we lack the necessary amount of personnel, I'd say we do it once every two months." A PC in a different state echoed the same sentiment: "We do [classroom observation] sometimes. We have too many things to do, mainly bureaucratic ones. So there's not much time left for that. If we could just work with teachers it would be great."

In addition to these logistical constraints, a barrier to this notion of instructional improvement is that Brazil has not developed a strong sense of open practice, in which teachers are accustomed to having "friendly observers" and instructional coaches in their classrooms. As one PC expressed, "No [we do not do classroom observation], because we don't think this is effective. It has been done before, and teachers were very uncomfortable with that." This discomfort might be rooted in the general preference for teacher autonomy, since classroom observations might raise concerns that such observations limit teacher control rather than simply providing support for professional development. These entrenched misunderstandings on the role of accountability and the concept of autonomy pose a challenge worthy of investment on the part of the third sector as the BNCC implementation continues over time.

"We do [classroom observation] sometimes. We have too many things to do, mainly bureaucratic ones. So there's not much time left for that. If we could just work with teachers it would be great."

Alternately, São Paulo City and Mato Grosso do Sul State support an online system that works as a class diary, where teachers are expected to upload daily lesson plans. When doing so, teachers are provided a drop-down list of suggested skills to work on with their students. These online platforms not only encourage teachers to focus on specific instructional content, the platforms produce automatic reports for network monitoring. Furthermore, because use of these systems is a part of teachers' job descriptions, they can act as incentives to use the curriculum more intentionally, supporting teachers in familiarizing themselves with the skills and the curriculum. One São Paulo City principal reported, "Many teachers weren't familiar with the skills, and the diary forced them to be more in touch with them. It's easier for teachers to understand what they have to teach and when." The pedagogical potential of these systems is somewhat unclear, however, as no one is responsible for analyzing the content uploaded by the teachers and offering feedback. Nevertheless, these systems might represent the beginning of greater insight into teacher instructional practice.

Summary

Assuming that SAEB is updated in coming years, Brazil has the opportunity to avoid a series of policy mistakes that damaged the Common Core implementation both substantively and politically. Rooted in requirements associated with the federal No Child Left Behind legislation from the early 2000s, many U.S. states and school districts used the new Common Core assessments as central components in high-stakes accountability systems, whereby low student test scores could result in state takeover of school districts, the closure of individual schools, teacher dismissal, and student grade retention. As measured by proficiency levels, student performance on the new assessments declined in most states

during the initial test administrations, a result of both the more-demanding standards and the fact that administrations of new assessments are generally accompanied by falling test scores, even when the rigor of new assessments matches that of prior assessments. This resulted in a backlash among both teachers and parents to the new assessments, and reduced support for the Common Core more broadly. Many states had for years allowed families to opt out of standardized testing on behalf of their students, a choice historically made by relatively few families. But as the results of the Common Core assessments became more public (and more meaningful), the number of families opting out grew exponentially, raising questions about the assessments' ability to fulfill their monitoring and accountability roles.

These accountability regimes influenced stakeholder behavior in numerous ways. The media focused extensively on a series of cheating scandals in which principals and teachers either changed students answers after tests were administered or coached students on the correct answers during testing. But a more widespread phenomenon was that the professional importance of assessment outcomes led many teachers and schools to focus heavily on tested grades and subjects—typically mathematics and English in grades 3-8—in some cases to the virtual exclusion of other academic subjects. As a result, the content of the assessments essentially became the curriculum. This narrowing of the instructional focus was clearly not the intended outcome of the Common Core, but it was in many ways a quite predictable result. The realization of the extent to which assessments were driving curricula was a primary impetus behind the development of high-quality instructional materials.

Brazil has an opportunity to rethink how it will use high-quality assessments to push the BNCC implementation forward.

Brazil will likely avoid many of the challenges associated with standards-based assessments experienced by the U.S., largely because Brazil does not have the same history of public accountability for schools and systems. As such, Brazil has an opportunity to rethink how it will use high-quality assessments to push the BNCC implementation forward. Brazil can interpret the BNCC assessments as tools to guide instructional support, rather than as punitive instruments of accountability. In this framing, the effectiveness of specific forms of high-quality instructional materials, teacher practice, and teacher professional development can be monitored and evaluated with a clear eye toward improving the processes of teaching and learning.

Conclusions and Discussion

The U.S. has sought to understand the Common Core's somewhat limited success in improving teaching and learning. Many advocates now recognize that the standards were too vague and high-level to guide teacher instruction and professional development. There is a growing consensus that the missing link was high-quality instructional materials, which translate standards into a coherent and well-structured progression of content for each subject and grade; are based on empirical evidence about how students learn; provide road maps for teachers on how to plan, teach, and assess student learning; and include one full year of coherent and standards-aligned teacher and student materials. Standards are not synonymous with HQIM—they are simply the first step. Fortunately, the BNCC represents a solid framework around which such materials and teacher supports might be built.

As we stress throughout this report, the BNCC must meaningfully influence classroom instruction for it to fulfill its ambitious aims. Conversations in Brazil should arguably now shift from a focus on standards toward the development of high-quality instructional materials that guide teacher practice and are accompanied by teacher professional development focused on those materials. But creating and adopting good materials is only half of the process. As they often do in the U.S., Brazilian teachers obtain instructional guidance from multiple often incoherent and unrelated sources. Teachers and schools will need to be convinced of the power of HQIM and how the related materials might improve their working conditions and effectiveness. One approach that was employed successfully in several U.S. states was the creation of pilot programs whereby school districts implemented high-quality instructional materials aligned to the Common Core. These initiatives were supported by both financial incentives and capacity-building teacher professional development. The success of these efforts served as proof points for other teachers, school districts, and states, many of whom recognized the value of materials that were organized, standards-aligned, and reflected student diversity. As the BNCC implementation progresses, research should explore the availability and use of HQIM at the school and teacher levels.

In terms of teacher readiness, new graduates of teacher training programs have likely had limited exposure to the BNCC and its instructional expectations. Reports of in-service professional development suggest that trainings rarely reflect research-based best practices and often focus on exposure or introductions to the BNCC, rather than instructional guidance tied to specific grades and subject matter. Assisting teachers as they transform their practice to meet the demands of these new materials will require substantial capacity building. This work will extend across multiple levels and sectors, including principals and PCs, pre-service programs and in-service professional development providers, municipal and state leaders, textbook publishers and organizations that create instructional materials, and third sector groups, among many others.

Tremendous progress has been made in the design and implementation of key structures of the BNCC, particularly in terms of standards development, state/municipal collaboration regimes, and growth in third sector efforts focused on improving teacher instructional practice.

In summary, tremendous progress has been made in the design and implementation of key structures of the BNCC, particularly in terms of standards development, state/municipal collaboration regimes, and growth in third sector efforts focused on improving teacher instructional practice. The U.S. Common Core experience over the past two decades suggests that realizing the full potential of the BNCC will take years, if not decades. As did the Common Core, the BNCC highlights the importance of systemic alignment across standards, instructional materials, teacher professional development, and assessments. This will require continued coordination across multiple sectors and stakeholder groups. Creating a more coherent system that serves the needs of all Brazilian students will also necessitate a recommitment on the part of BNCC supporters, particularly government and third-sector organizations. Much work remains, but the value of these efforts is clear.

Appendix A: Data and Methods

Our study employed qualitative research methods and document analyses to understand the BNCC's implementation successes and challenges. We primarily collected data through semi-structured interviews with almost 350 national, state, and municipal stakeholders. We also spoke with many individuals from the third sector and the media. Table 1 presents specifics about our interviewees and their professional roles.

Table 1. Interviews Completed by Stakeholder Group

Stakeholder Group	Total Interviews
Federal Government	32
State Government	38
Municipal Government	45
School-Level	123
Third Sector	40
University	23
Textbook/PD Provider	18
Others	23
Total	342

While not an explicit research question, the COVID-19 pandemic had obvious implications for BNCC implementation generally, and the processes related to teacher professional development more specifically. When possible, we explored these implications in our fieldwork. The pandemic, and related school closures and travel restrictions, also influenced our research in terms of the data we were able to collect and the questions we were able to address. Most notably, our inability to conduct in-person fieldwork forced us to conduct our interviews and fieldwork virtually in 2020 and 2021.

Case Study State and Municipality Selection

We chose a comparative case study methodology that maximized variation across important state and municipal characteristics that are potentially associated with BNCC implementation (Merriam & Tisdell, 2015). To select our case study states, we considered state geographic region, size, and IDEB scores. Geographic region was important given the considerable political, demographic, and financial differences across regions. Similarly, we considered state population size, which arguably influences implementation capacity and access to human and fiscal resources, and IDEB scores, potential indicators of both municipal capacity and student socio-demographic characteristics. Our aim was to avoid selecting a sample of states that was biased or unrepresentative. Based on these criteria, we ultimately selected São Paulo, Mato Grosso do Sul, and Maranhão.

Next, in addition to the capital of each case study state, we selected two municipalities within each focal state. Using data from the 2018 Education Census and the 2017 SAEB, we identified these municipalities based on student enrollment and IDEB scores, with the goal of maximizing variability in municipality characteristics. We placed municipalities into one of three categories (more than 10K students, 2K-10K students, and less than 2K students) and ensured that our sample included one municipality from each category. We also considered IDEB scores and sought to include a municipality that represented the average IDEB score for that state, a municipality that was below the state's average, and a municipality that was above the state's average.

Table 2 below presents the characteristics of our selected case study states and municipalities. The states represent different geographic regions (the Southeast, Northeast, and Midwest), and differ greatly in size with São Paulo representing a large state, Mato Grosso do Sul a medium-sized state, and Maranhão, a small state. As noted above, each case study state has at least one municipality with average, below-average, and above-average IDEB scores. Mato Grosso do Sul and Maranhão also have one municipality that falls into each of our student enrollment groups: 10K students, 2K-10K students, and less than 2K students. Initially, we did not include a São Paulo municipality with fewer than 2K students. However, we made some adjustments during the pandemic that were associated with municipality's inability or unwillingness to continue with our study given the pandemic. Namely, we added two municipalities to the São Paulo sample and one in Maranhão.

Table 2: Characteristics of Selected Case Study States and Municipalities

State & Municipality	Geo. Region	Pop.[a]	IDEB[b]	Primary School Enrollment[c]
São Paulo	*Southeast*	*45,919,049*	*6.5*	*631,860*
São Paulo City		12,252,023	6	223,304
SP-Small		90,799	5.8	5,482
SP-Medium		679,378	6.7	29,066
SP-Small 2		52,405	6.9	2,857
SP-Medium 2		711,825	6.1	28,580
Maranhão	*Northeast*	*7,075,181*	*4.1*	*7,233*
São Luís		1,101,884	4.6	40,398
MA-Small		16,745	5.5	1,012
MA-Medium		177,687	5.3	11,760
MA-Small 2		113,783	5.0	7,494
Mato Grosso do Sul	*Midwest*	*2,778,986*	*5.6*	*38,955*
Campo Grande		895,982	5.7	45,612
MS-Small		11,385	4.8	767
MS-Medium		121,388	6.2	8,241

[a] Source: Brazilian Institute for Geography and Statistics (IBGE) 2019 population estimates
[b] IDEB 2017 for state schools (states) and municipal schools (municipalities)
[c] Enrollments for state schools (states) and municipal schools (municipalities), Education Census 2019, tabulated by Qedu

To analyze the qualitative data, we developed a coding scheme guided by our research questions. Supported by Dedoose qualitative statistical software, the research team conducted multiple rounds of interrater reliability tests ensuring consistent application of our coding scheme across research team members. We then coded our data and generated a series of analytic memos organized by institution and research question. In these memos and our weekly team meetings, we documented our emerging findings, tying together our coded data with recurring trends (Miles et al., 2014).

In addition to the interviews, we also conducted two major sets of curricular analyses. In the first we compared the newly created state standards to the BNCC standards. We examined the third and fifth grade Math and History standards for all 27 states, which provided an analytic sample of 2,462 unique state standards. In addition to the fact that our broader study is focused on the early grades, we selected these grades and subjects because they differ across several dimensions, leading states to potentially take different approaches as they created their own standards. We organized each sate standard into one of seven categories: 1) same standard; 2) reduced content of a BNCC standard; 3) added content to a BNCC standard; 4) deleted a standard included in the BNCC; 5) split a BNCC standard into two or more standards; 6) contextualized a BNCC standard to reflect local conditions; 7) added supplemental information to a BNCC standard. We reported the majority of our findings related to this set of analyses in an earlier study, and provide only brief summary in the relevant sections below.

In our second set of curricular analyses we sought to understand the extent to which the new textbooks reflect the BNCC standards, as they claim to do. We identified two mathematics books from the publishers with the greatest share of books selected by schools in the 2019 PNLD call for elementary schools[9], Editora Moderna and Editora Ática S.A. From these publishers, Buriti Mais-Matemática and Ápis-Matemática accounted for the largest number of sales, respectively. We downloaded these books for third grade, translated the content to English, and centered our analyses on chapters and lessons where adding and subtracting were the learning focus.[10] In addition to establishing their alignment to the BNCC, we also sought to identify the extent they provide teachers with the necessary instructional guidance.

[9] According to the data available at the FNDE website: https://www.gov.br/fnde/pt-br/acesso-a-informacao/acoes-e-programas/programas/programas-do-livro/pnld/dados-estatisticos

[10] We thank Dr. Phillip Daro for leading this analytic phase.

Appendix B:
Curriculum Development Case Studies

Our three case study states started the curriculum design process by establishing collaboration regimes at the end of 2017 or early 2018, consisting of state and municipal actors such as Secretaries of Education, Council of Education members, municipal representatives from Undime, state representatives from Consed, and representatives from Uncme. Although the participants in these collaborations were relatively similar across states, there were also some differences. For example, Maranhão hired Fundação Getúlio Vargas - Rio de Janeiro (FGV-RJ), specifically, Centro de Desenvolvimento da Gestão Pública e Políticas Educacionais, to help coordinate their collaborative processes and review their curriculum. FGV-RJ's involvement not only represents an important difference between Maranhão and our other two case study states, but it also deviates from the processes outlined in the BNCC Implementation Guide, which does not include public or private universities as key actors in the development of the curriculum. Overall, stakeholders generally shared positive opinions of the collaboration regimes. One municipal-level interviewee from Maranhão described the collaboration regime as "a very well built and very solid association." In Mato Grosso do Sul, this collaboration between the state and the municipalities was identified by several of our interviewees as a key to the development of their new curriculum:

> What makes our state stand out in terms of implementation of policies is the fact that we were able to create strong relationships between state and municipal networks…The collaborative relationship between state and city really works here…We are aware, however, that there are state administrations that don't have a good relationship with their city administrations. This is another factor that causes delay or prevents the whole process from happening as it should have. And again, this is where Mato Grosso do Sul stands out. It was not just the relationship between Undime and Consed but also between all the necessary agents of the process - Uncme, SINEPE [Sindicato Dos Estabelecimentos De Ensino do MS], the State Education Council... All of them were involved right from the beginning, and this was really helpful.

The Contexts of BNCC Design and Implementation

The BNCC Implementation Guide emphasizes that "it is necessary to study and understand the BNCC proposal, the local curriculum's history, the pluralities and diversity of the various documents that already exist, including the curricula of the municipalities" as an important first step in developing state curriculum in light of the BNCC. Two of our case study states, São Paulo and Mato Grosso do Sul, clearly engaged in such efforts, with the aim of better understanding the BNCC and local curricula, but as a means to identify strong curricula and curriculum writers from municipalities to include in the development of the state curriculum, and to increase buy-in from municipalities.

In São Paulo, the collaboration regime established a committee to coordinate the state curriculum design. This committee spent the first few months studying the curriculum references by examining the BNCC, comparing the BNCC with the curriculum the State had been using since 2008, and examining several different municipal curricula and comparing them with the BNCC. Importantly, these efforts afforded committee members the opportunity to identify which municipalities had strong curriculum teams that could eventually work with them on designing the state curriculum. To further understand municipality curriculum policies, the committee also sent a survey to all São Paulo municipalities to determine which municipalities did or did not have their own curricula and what materials they used to guide instruction. Overall, approximately 45% of São Paulo municipalities replied and 65% of those municipalities reported having at least some kind of curriculum or curriculum guidelines.[11] Of those municipal respondents who reported having at least curriculum guidelines, they reported that the main inspiration for their local curriculum decisions were national curriculum guidelines (49%), state guidelines (23%), textbooks (9%) or other sources (19%). Importantly, 95% of municipal respondents expressed their interest in co-building a state curriculum. One of our participants reflected, "It wouldn't be the state Secretary's curriculum anymore, but rather the state's Curriculum." Up until this point, state and local curricula had been separate from one another, except for very small municipalities that did not have their own school systems, and have historically adopted

[11] Available at http://www.undime-sp.org.br/wp-content/uploads/2018/reuniao2006/reuniao2006_bncc.pdf

the state curriculum. As such, this collaboration within São Paulo represented a potential shift in how the state and municipalities approached curriculum development.

(Re)Designing State Curriculum

As outlined in the BNCC Implementation Guide, all three states hired a group of writers representing the state and municipalities to design their state curriculum. In São Paulo, Undime appointed a person to coordinate the Pre-Kindergarten curriculum, while the state appointed individuals to coordinate the elementary (Anos Iniciais do Ensino Fundamental) and middle grade (Anos Finais do Ensino Fundamental) curricula. Composition of the writing teams varied in size and background. Some subject teams had up to five writers, while others only had two, where one would be appointed by the state and the others by the municipal representatives from Undime. Some members had previously worked on the state curriculum team; others were teachers who were also working at the pedagogical advisory ("núcleo pedagógico") of regional departments of education. From municipal systems, some were classroom teachers and others were staff working at local secretaries of education.

In Mato Grosso do Sul, the team responsible for designing the state curriculum was composed of 22 writers. Each municipality was required to propose one candidate per knowledge area (Language, Math, Science and Humanities). The State Commission for Curriculum Design selected writers from those candidates following ProBNCC selection criteria (e.g., a government employee), aiming to include teachers in addition to curricular specialists, with equal representation between the state and the municipalities. However, given an uneven distribution of skills and capacity across the state, it proved especially challenging to find teachers from municipalities who had the skills and interest to participate in the endeavor. As a result, the majority of the candidates selected were from the state and Campo Grande, while only a few were from smaller municipalities.

In Maranhão, the state division of Undime selected curriculum writers to participate in the writing process. The team consisted of 22 writers, all educators in the Maranhão State school system, with three focusing on preschool and 19 on elementary school. There were also three coordinators, one for preschool, one for elementary, and one for middle school. Math curriculum writers from Maranhão explained that they conducted a coordinated writing process without splitting up the elementary and middle grade writers, in an effort to improve coherence across groups. Justifying this decision, one writer stated, "We thought it'd be best not to separate these. We thought it'd be best to write a common curriculum, organizing it by the curricular topics".

Across all three states, teams generally worked for 8 to 11 months until their curriculum was submitted to their respective State Councils in November-December 2018. During those months, all writing teams conducted at least two public consultations to receive feedback on the different versions of their state curriculum. The BNCC Implementation Guide recommends these public consultations to "ensure a participatory process that includes the diverse realities of the state." In São Paulo and Mato Grosso do Sul, the first set of public consultations were primarily online, while the last set was facilitated through in-person seminars across the state. More specifically, in São Paulo, the first public consultation on the first version of the state curriculum was mainly online and resulted in feedback from 44,443 constituents. The second public consultation on the second version involved 82 in-person seminars across the state. In Mato Grosso do Sul, the first two public consultations, on the first and second version of the curriculum respectively, were completed online through a survey distributed through the Regional Offices. More than 120,000 teachers, principals, and school staff filled out the survey in this first administration. The next round of public consultations was conducted through regional seminars and focused on obtaining input from academic experts. One in-person seminar in each Regional Office targeted municipal secretary staff, school directors and teachers. Additionally, the Commission reached out to some academics, who were invited to read the curriculum document and provide feedback. Importantly, in Mato Grosso do Sul, universities were not involved in the process of writing the curriculum, because, generally speaking, they were highly critical of the BNCC. Instead, certain academics agreed to provide feedback on the curriculum as individuals, rather than as representatives of their universities. Based on the feedback obtained from the consultations with academics and the regional seminars, the team of writers crafted the fourth version of the Mato Grosso do Sul curriculum, which was discussed in a state seminar, with all the participants who previously attended the regional seminars.

In Maranhão, all public consultation was conducted in-person, with local communities engaged through two main public consultation activities. The first involved two state seminars

with more than 1,000 constituents attending each. The second activity involved six regional seminars, facilitated by FGV-RJ, across six cities. These seminars aimed at engaging all 19 Maranhão regions. One interviewee spoke about the representation of local communities through these seminars, reporting, "Even the secretaries of education took part in them. In the big seminar we had in São Luiz, the state and municipal secretaries of education joined us."

While our case study states all engaged in public consultations, there were differing opinions on whether that engagement was merely symbolic or actually embodied democratic processes as intended. In Maranhão, these seminars appeared to be a source of pride. As one supporter of the process asserted, "You could say the curriculum was built by thousands of hands because it was submitted to public consultation at every stage, with every adjustment. With the public consultation we had suggestions from municipal secretary staff, teachers, the whole state was involved, and these people made their contributions." Another interviewee who had interpreted the consultations in a positive light explained that the seminars presented opportunities to hear teachers' ideas, suggesting that, "The state's curriculum today is pretty much built according to Maranhão's teachers, what they came up with. We just kick-started the writing, and then compiled the teachers' demands."

However, others criticized the design process as rushed, arguing that they did not have adequate time. In particular, one of our interviewees from São Paulo expressed concern that the rushed timeline conflicted with the intended participatory and democratic process of curriculum (re)elaboration, which was meant to contribute to the legitimacy and to the implementation of the new document: "Perhaps that democratic principle wasn't observed as it should, but we did what was possible under those circumstances to collect information from the teachers who participated and were able to make suggestions on the abilities, the content that was selected to compose the curricular components."

In the end, all three case study states submitted their state curriculum to their respective State Councils for approval in November or December 2018. There were differences, however, in when those curricula were approved and ultimately released to schools. São Paulo submitted its curriculum for approval in December 2018, but did not receive approval and release its curriculum until August 2019. Mato Grosso do Sul, the first to submit its curriculum for approval, did so in November 2018 and it was approved in December 2018; however, the curriculum was not formally released until October 2019. Finally, in Maranhão, the curriculum was submitted, approved, and made available in December 2018.

Our three case study states largely replicated the BNCC standards in their state curriculum. This result flowed in part from direct guidance from MEC that the new curricula stay close to the BNCC standards. Many interviewees also shared that BNCC had an important role in defining "students' rights to learn" and ensuring consistent learning objectives across state and municipalities, thereby remedying regional inequities and promoting equal learning opportunities. For example, one municipal leader from Mato Grosso do Sul explained, "[The BNCC is] a guiding document and we should follow it because if we didn't, each school, city or state would do things their own way and we wouldn't be able to ensure that every single student in the country had access to their learning rights."

With the São Paulo curriculum, 93% of third and fifth grade math standards were identical to those in the BNCC, as were 77% of third and fifth grade history standards. However, more so than the other case study states, São Paulo's standards included additional content. This was particularly evident in History, where 23% of standards provided more content and information than the corresponding BNCC standard. São Paulo asserted that they had received clear instructions from MEC that they were only allowed to add standards or break down BNCC standards into multiple abilities, and that they were not allowed to exclude content or shift content from one grade to another.

States Supplemented and Contextualized the BNCC Standards

São Paulo did not add supplemental information for their standards in their state curriculum document; however, they contextualized approximately 15% of their history standards. One interviewee shared that contextualization of the curriculum can be done in different ways, asserting that "these adaptations or contextualization can become much more evident when you look at documents that go beyond the curriculum. I mean, if you look at the documents that talk about providing teachers the necessary qualifications, or the pedagogic guidelines, you'll see that they are more clearly in tune with the reality of each place."

Mato Grosso do Sul added supplemental information to their standards in the form of Ações Didáticas (Teaching Actions),

which provide examples of classroom activities meant to facilitate teacher understandings of how to implement the standards in their classrooms. Further, Mato Grosso do Sul "localized" their curriculum by contextualizing 59% of their third and fifth grade history standards, and incorporating an extensive introduction that referenced state contexts (e.g., the existence of diverse quilombola, rural and indigenous communities). Mato Grosso do Sul also added subjects (e.g., Spanish) relevant to their geographic location, given the state's border with Paraguay, and elevated contemporary topics considered relevant (e.g., human rights, environmental education, food and nutrition education, finance education, etc.).

Maranhão contextualized 9% of its third and fifth grade history standards. While we analyzed only the history and math standards, we heard that science and geography were also contextualized. Maranhão also included supplemental information in the form of "suggested activities." Interviewees in this state explained that the suggested activities were included, generally, as a way of supporting teachers. One state-level stakeholder summed this up, stating, "So, the teacher has the learning objective, the competency, the ability, and what should be done. [The activities] are a way of helping him with planning. It has helped them a lot. They've loved it because with its suggestions it helps teacher practice. It was meant to help them with exactly that." Similarly, another interviewee explained that the addition of suggested activities was "really about helping teachers from the initial years, because these abilities in Math are really on a mathematician's level of comprehension, not a pedagogue's." When asked to describe the suggested activities, one curriculum writer in Maranhão stated that they were most often about games or software, but not an explanation of the standard. Respondents asserted that the idea to include the suggested activities arose from teachers during the regional seminars. One former teacher and pedagogical coordinator, who purportedly suggested including the additional activities, explained this process:

> During the seminars we would encourage participants to give their opinions and make suggestions. So we would help them look into the respective units for the year they were teaching, study the learning objectives and skills, and then think of activities that could be used to address them and that were in tune with their local needs and possibilities. These suggested activities are what make our curriculum so rich.

This individual recalled that during their time in their former instructional role, "I could observe that the biggest difficulty teachers had was elaborating educational strategies." Notably, this respondent praised the involvement of FGV-RJ in helping to create the additional suggested activities.

ProBNCC Funding Incentivized Similarities

ProBNCC funding provided direct incentives for states to follow the processes outlined in the BNCC Implementation Guide. The first ProBNCC cycle was approved in April 2018 and consisted of R$100,000,000 meant to support states in financing the development of their curriculum. To receive this funding, states were required to take a number of steps such as signing an agreement with the federal government and presenting a work plan co-designed with the local Undime. While these bureaucratic steps led to delays for some states in receiving that funding, most states were ultimately able to take advantage of these funds.

Two of our case study states, Mato Grosso do Sul and São Paulo, had the resources and capacity to start the curriculum development process without waiting for the ProBNCC funding. As one of our state-level Mato Grosso do Sul interviewees shared, "The state's administration didn't want to delay the process just because of financial reasons…And also because of how we would be allowed to use the resources. We wouldn't be able to use them to pay for travel for the drafters to Campo Grande. But as this was the way we wanted to work, the state and the municipal administrators reached an agreement to pay for them."

Mato Grosso do Sul and São Paulo's experience greatly differs from Maranhão's, which reportedly used no state funds for the curriculum development process. In particular, ProBNCC funding enabled Maranhão to hire FGV-RJ to facilitate critical tasks such as managing the logistics for curriculum development related events (e.g., public consultations). Although Maranhão was able to use this funding and ultimately developed their curriculum on time, the influence of relying solely on federal funding may have been most felt by the curriculum writers themselves. The Maranhão curriculum writers we interviewed generally felt that the funding available to them was fairly meager. The funding included money for food, accommodation and travel expenses, but the writers were not paid for their work or time. While some respondents seemed satisfied with this arrangement, another respondent

argued that the funds did not cover the cost of hotels for each meeting. Based on the three case study states, it appears that having more financial resources at the local level did not have major consequences for the curriculum, since all states designed and submitted for approval the curriculum within the expected timeline and with a similar format and content.

Municipal Curriculum Development

Municipalities were permitted to choose one of three directions in their curriculum development processes: 1) simply adopt their state's curriculum; 2) adapt their state's curriculum to their local contexts, or; 3) create their own curriculum independently. Among our case study municipalities, five adopted their state's curriculum, two adapted the state curriculum, and five created their own curricula. We conducted a comparative analysis of seven of these municipal curricula. In 2021, before many of the municipal curricula had been finished and approved, we analyzed curricula from three of our municipalities—two from São Paulo and one from Mato Grosso do Sul. Although we had planned to replicate the approach we used in analyzing the state curriculum, we found that our previous approach was not applicable to the municipal curriculum given the considerable variation in their curricular frameworks. Therefore, we carried out a more qualitative analysis that involved describing the structure and content of each curriculum, establishing the extent to which curricula mirrored the state curriculum, and, ultimately, how the BNCC standards and competencies are presented. Later, in 2022, we carried out a second round of analysis of four additional municipal curricula—one from São Paulo, one from Mato Grosso do Sul and two from Maranhão. Again, we adopted a qualitative strategy, focusing on the structure of the curricula and the extent to which the municipal curricula relate to state curricula.

Municipalities adopting the state curriculum

A common expectation throughout the BNCC implementation process was that many municipalities would adopt their state's curriculum rather than creating their own. Given that the states and municipalities collaborated to create the state curricula, one might expect that the municipal perspective was already reflected in the state's document. For example, according to a survey administered by Undime in 2018, the vast majority of São Paulo municipalities (~94%) expressed their interest in working with the State Secretary of Education to create the state curriculum.[12] Furthermore, those that chose to adopt it were purportedly eligible to receive a "package" of benefits including textbooks (paid by the state government), training, and assessment (Sistema de Avaliação do Rendimento Escolar do Estado de São Paulo, SARESP). Additionally, small municipalities without their own "education system" that do not have the structures or resources to establish their own curriculum, must follow the state's curriculum.[13] It is also unsurprising that smaller municipalities lacking resources and expertise to create their own curriculum would be more incentivized to adopt their state's curriculum. All of the municipalities we collected data from in Maranhão, including São Luis, had adopted the state curriculum. Two of the municipal curricula that we analyzed—those from São Luis and Açailândia—appear to include standards directly copied from the state curriculum, although the São Luis curriculum appears to have omitted some standards, making it simply a reduced version of the state curriculum.

Municipalities adapting the state curriculum

Despite the possible benefits of simply adopting the state's curriculum, many municipalities opted to create an adapted version of the state curriculum. Municipalities that did so shared different rationales for their decision. However, all municipalities expressed the desire to either add content that they felt had been left out of the state curriculum, and/or they sought to further contextualize the state curriculum. For two of our São Paulo municipalities, interviewees emphasized that the size of their school system and their vast experience with curriculum writing made it a natural choice to have their own curriculum. In particular, they wanted to include aspects that were not present within the BNCC: Unesco's SDG (Sustainable Development Goals); content related to racial/ethnic and gender diversity; the introduction of English language instruction at the start of elementary school; and skills associated with computer technology and programming. SP-Small representatives mentioned that the municipality has several geographical and cultural idiosyncrasies (linked to the Caiçara culture, Quilombolas and indigenous communities)

[12] Available at http://www.undime-sp.org.br/wp-content/uploads/2018/reuniao2006/reuniao2006_bncc.pdf

[13] The specific requirements for municipalities to have an education system can vary by state, but in general, municipalities must pass a law to establish their education system, and also create a local council of education. Movimento Pela Base conducted a survey with Uncme and found that 51% of municipalities do not have their own education system, including 59% of São Paulo's municipalities and 51% of Mato Grosso do Sul's municipalities.

that were not present in the state curriculum, which they felt justified the creation of an adapted curriculum. Overall, they were satisfied with the state curriculum and participated in its construction, and did not feel the need to start from scratch. However, they wanted their curriculum to reflect their own specific history and context. Similar to the state's process, they created working groups for each level and subject (e.g., Elementary math) composed of pedagogical coordinators, principals, teachers, and a supervisor. The pandemic delayed the development of their local curriculum, but it was approved in December 2020. Ultimately, this document appears to replicate the state's document, with the addition of sections that explain the city's perspectives about education, provides contextual elements about the city, and suggests ways of grouping and analyzing standards. They called it "The Paulista Curriculum in [SP-Small]'s view."

Similarly, MS-Medium wanted to create its own curriculum to reflect their local context, including the history of the city and its demographic diversity, and their belief in the importance of family/school relationships. The writing process was led by municipal secretary staff, although they asked for contributions from pedagogical coordinators and teachers. This work took approximately one year, with the preliminary version released at the end of 2019 and expected to be piloted in 2020. Unlike other municipalities who decided to create their own local curriculum, this municipality had never before created and implemented its own curriculum.

We heard a similar story from MA-Small, which emphasized the need for local contextualization, explaining, "Ours will be separate from it; there are local differences we believe should be accounted for when you hope to compose a curriculum that's a 'living' curriculum." MA-Small also shared that they felt the need to improve upon the supplemental information found in the state's "suggested activities" column: "We've altered some, added some, improved some. This matter of suggested activities, we've improved it significantly when we noticed it was important to adapt it." Reportedly, this municipality completed roughly 60% of the curriculum writing they had planned to do before the COVID-19 pandemic, but soon realized that hybrid instruction required that they stress more strongly the ten BNCC general competencies, as one competency calls for students to "Understand, use and create digital information technologies and communication."

Municipalities creating their own curriculum

Two of our case study capitals decided to use their own curriculum and did not adopt the state's, including Campo Grande, although it also participated in the design of the state curriculum. As a rationale, Campo Grande respondents pointed to tradition ("we always have our own") and the availability of technical capacity in their municipality to do so. As such, the municipality did not ask for support from the state. Campo Grande released a provisional curriculum in February 2021, and based on the implementation and teachers' experiences with it, they had planned to edit it and then publish a final version. But given the pandemic, the meetings with teachers to discuss the implementation of the preliminary curriculum were canceled. To date, it is unclear if the provisional curriculum will ultimately become the official municipal curriculum or if a subsequent final version will be released that is substantively different.

São Paulo City developed and approved its local curriculum in 2017, prior to the final version of the BNCC and to the development of the state curriculum. Despite completing the process prior to the publication of the BNCC Implementation Guide, the municipality's process for developing its curriculum was quite similar to the state's. The municipality started with a careful analysis of the curriculum documents the municipal secretary had at that point. As one secretary of education staff member told us, "We took some time studying and analyzing these documents and also the new trends in teaching and learning theories." This was the foundation the teams used to write a first version of the curriculum, which was then shared for a larger public discussion. By analyzing and then mentioning the previous documents as much as possible, the municipality hoped to limit opposition to the new curriculum. To further reduce opposition, they included teachers from all 13 regions in designing each element of the curriculum. One interviewee outlined the process:

> The Municipal Education office is divided into thirteen regional offices and each of them has its own mini education secretary with its own pedagogical team. The workgroups had teachers, directors, pedagogical coordinators and supervisors from each of these regions because we wanted the educators to feel that they were represented. You can see the groups had a variety of professionals and, of course, the technical team of the Education

> Office, which is part of the coordinating body, is also made of people who worked for the network and are specialists in their area. These people were also part of the creation process. Finally, we invited people from the academic world to take part too. We invited those who were considered the best according to the beliefs of the office and who were important theoretical references for us. Actually, some of these people also worked on the creation of BNCC.

The first version of the curriculum was sent to schools and more than 13,000 teachers provided feedback. One interviewee viewed the process of engaging teachers in the writing process as a way of training teachers on the new curriculum. They also collected input from students (age 6-14) about what they wanted in school, and the teaching methods they valued most. In fact, all municipalities we spoke to that developed their own curriculum described following a similar process as the states that built on their state curriculum and engaged in public consultations.

Appendix C: Teacher Professional Development Case Studies

At a high-level, all three case study states planned to use a "train-the-trainer" model to prepare teachers to implement the new BNCC-aligned curricula into their classrooms. These models mirror those outlined in the fourth chapter of the BNCC Implementation Guide, which describes the "train-the-trainer" model as a cascade of training, where a central team of trainers would train regional teams of trainers to act as "multipliers" in their respective school systems. More specifically, the central team of state curriculum writers would train the regional team of trainers, who then train local school management teams (pedagogical coordinators and principals), who would then be responsible for training teachers by integrating the new curriculum into ongoing professional development activities at the schools (e.g., collective working time - Horário de Trabalho Pedagógico Coletivo/HTPC).

Plans for teacher professional development in Maranhão were disrupted and rewritten several times. The state's initial professional development plan was developed in partnership in 2018 with Formar, an initiative supported by the Lemann Foundation to assist secretaries of education, and was intended to be implemented in 2019. However, the plan was not put into effect, reportedly because the Federal Government did not send the necessary funding. Later in 2019, the state education office, together with Undime, created an alternative plan that was not reliant on federal funding. In 2020, the state made another plan for the year together with the Lemann Foundation and Undime, including continuous professional development using only state resources, as the federal government still had not released any funding. This plan contained detailed information of how many training sessions and training days were expected, and the locations and regions where each training would take place. As one stakeholder noted, "We have it all planned here, we have the plans, the people we'd invite to help us, people from each of the other states—two coordinators for primary education, the coordinator for middle education, and teachers according to each area—to be a part of our training sessions." Similar to the other case study states, these plans entailed a train-the-trainer model and a continuation of the collaboration regime (in that both state and municipal schools would be trained in this approach). However, all plans were halted due to the COVID-19 pandemic.

Teachers' Collective and Individual Time for Training

One commonly mentioned training opportunity is the teachers' collective time, which normally takes place at the school on a weekly basis for around 70 minutes. During these meetings, teachers and pedagogical coordinators discuss topics considered relevant. Agendas for these meetings are not planned in advance, but are rather defined collectively by the group at each meeting. Some teachers reported that it could also be used to organize meetings with parents. A small municipality in SP state reported that, in addition to the collective time, the educators had two days at the beginning of the year to design their planning for the school year, which took place online, with the main goal that each teacher developed their curriculum planning for the year. Teachers with full-time contracts also have 10 hours/class[14] weekly for activities outside the classroom: 5 hours for individual planning at the school; 2 hours for teachers collective working time; and 3 hours free to do the activities they consider necessary at the venue they wish. This municipality also reported that they offer a 30-hour training every year for teachers and pedagogical coordinators. This training is offered by a vendor that develops content related to the local curriculum. However, there was no document specifying the purpose and expected outcome of this training, the team at the secretary was not able to describe the focus of the work, explaining it would be defined collectively in the upcoming weeks.

Across municipalities, the topics to be covered during the four hours dedicated to the Special Plan for Action are organized on a weekly basis. Teachers and PC can suggest topics and together they decide what they are going to cover in the next meeting. There is no one responsible for organizing or leading these meetings. During the interviews, when asked what was discussed last week in those meetings the topics mentioned by educators from four different schools were: indigenous people, afro Brazilian culture, special education and assessments. It is also worth mentioning that there can be different groups of PEA in the schools. In one school teachers said there are three

[14] In Brazil the hour/class ("horas/aula") that guides the amount of workload in the contract is not a full 1 hour, but normally 45 minutes.

groups. This happens because not all teachers can meet at the same time, so they gather according to their availability.

The three hours for activities ("hora-atividade) teachers reported they spent doing research, consulting materials and organizing their classroom activities. In São Paulo there is also a platform called System for Pedagogical Management (SGP - "Sistema de Gestão Pedagógica"), in which teachers have to report student attendance, grades and also what was taught in each class (teachers said they have to indicate which BNCC standard was addressed and the summary of the lessons). Teachers mentioned they use the hours for random activities to fulfill this platform requirements. On the other hand, teachers under the JBD contract only have 3 hours for activities outside the classroom. Nevertheless, they have access to the City Training, so they can watch the videos. Although in this case it is not mandatory and not paid, teachers can sum hours to their career progression, which could be an incentive.

Scale and Scope of Training

The intended plan presented in the BNCC Implementation Guide (perhaps optimistically) suggested that professional development would start as early as March 2019 and continue throughout the calendar year. However, training on the state curriculum did not start until May 2019 in Mato Grosso do Sul and October 2019 in São Paulo. But the efforts in these two states were severely disrupted by the COVID-19 pandemic, and the early work was focused on training the regional training teams. There was no teacher professional development identified in Maranhão in 2019.

The quality of the training in 2019 to improve educator knowledge about BNCC and the local curriculum was limited. We heard of much variation in pedagogical coordinators' and teachers' professional development experiences during our 2019 interviews. Several PCs reported that they received no or little training from the Regional Office/Education Office. They felt the training they received was insufficient for them to adequately take the BNCC to schools and teachers, reporting that the primary focus of the training was to make the "PCs familiar and comfortable with the curriculum so they could act as multipliers in their schools." PCs reported that these training sessions happened once or twice per month and that there were incentives to take part, but that they were not mandatory. One shared that those involved in the training would get certificates that allowed for professional progression, while others PCs said that the training occurred during their working hours and that they received an allowance to cover the cost of travel. Importantly, none described receiving any materials during those training sessions outside of the curriculum itself.

During the pandemic, the secretaries shifted their efforts to online meetings, and many of the topics covered dealt with the use of technology and socioemotional aspects. At the secretary level, many interviewees blamed the pandemic for the disruption of training on the new curriculum. Although the impact of the pandemic was certainly overwhelming, there is no clear evidence that the training model was successfully functioning prior COVID-19, therefore, the extent to which training is not producing the expected effects is hardly a consequence of the pandemic, as the 2022 interviews suggest.

Appendix D: PNLD Textbook Analysis

We analyzed two third-grade PNLD textbooks that purport to be aligned with the BNCC (Apis & Buriti Mais).[15] The textbooks chosen were from the publishers with the largest market share and both were included on the PNLD 2018 list of mathematics textbooks. We examined a chapter from each textbook to determine the extent to which they reflect the BNCC, and whether they provide teachers the necessary instructional guidance to enact the BNCC into their classrooms. For each textbook, we analyzed chapters focused on addition and subtraction. By third grade, the basics of adding and subtracting have been taught so the instructional focus should be on extending basic ideas to more complex situations in the world (e.g, different meanings of addition and subtraction) and in mathematics related to extending place value numbers to multi-digit calculations. Students also use addition and subtraction while learning other topics (for example, we add when we learn to multiply), which provides beneficial experience, but we did not attempt to analyze such incidental uses. The emphasis of the BNCC on the development of the students' thinking, habits and connections between the subject, mathematics, and social, cultural and practical life should be prominent at this maturing stage of the topic. This sampling serves the purpose of detecting the responsiveness of textbooks to the BNCC and the extent to which they equip teachers and students to achieve the aspirations of the BNNC, but is insufficient for the purpose of evaluating a textbook or series of textbooks.

Alignment work has, inevitably, a degree of artificiality implicit in it. Each skill refers to a variety of different mathematics questions and problems students are expected to learn how to complete. At the same time, each problem makes use of mathematics from multiple skills. This "many to many" relationship quickly explodes into such complications that no conclusions would be possible. We simplify the situation by focusing on the single target skill.

The units we examined show clear influence of the BNCC. The teacher guidance for each lesson and activity makes explicit, useful references to the BNCC standards. However, there are significant limitations in terms of how addition and subtraction are being extending to more complex situations. The books give highest priority to the consolidation of first- and second-grade concepts. The progression moving forward into algebraic thinking receives only a few opportunities to be developed within the activities. Also, the skill related to understanding the idea of equality to write sentences of addition and subtraction—the foundational work for writing and using equations—have no problems assigned. This omission of explicit work with equations is related to the low emphasis on the meanings of addition and subtraction. Another limitation is how the activities address the skill regarding the number line. Although there are more than 60 problems dealing with this topic, they focus on the much simpler part of the skill: ordering natural numbers. However, the essential insight of the number line is the correspondence between number and length. Without connecting order to length, the number line remains an immature counting line. Numbers are ordered, but they also refer to magnitudes. The representation of magnitude by length is missing. This is unfortunate because students will need comprehension of magnitude on the number line to understand fractions and decimals. This has consequences for other thematic units as well, such as measurement. The opportunity for connecting measurement ideas to the number line is missed. No transfer between measurement and the number line is developed.

Coherence and progression are also irregular in both textbooks, indicating a need for more attention in future revisions. The APIS textbook shows a better coherence with past learning than with further learning. Coherence, however, must connect past to future. A pattern emerges across skills in the APIS book. Either in choice of skills or treatment within skill, APIS leans backwards toward prior grades and easier topics and avoids leaning forward toward developing skills needed for future work.

Addition and subtraction have already received priority attention in first and second grade. In third grade, the BNCC asks for more forward-facing priorities: extending addition and subtraction forward toward more mature concepts related to operations on the number line, number equations and application of addition and subtraction to different meanings specified in the BNCC and the correspondence between length and number that form the basis of number lines and, later, coordinate spaces. The text does not reflect these BNCC priorities. This something that could be fixed in the next edition without dismantling the coherence of the book. In the

[15] For the full analyses, please contact the authors of this report.

Buriti textbook, coherence and progression are weaker, with lessons jumping too much from topic to topic, and new concepts introduced with difficult numbers that could be a barrier to seeing the concept. Moreover, there is often an abrupt arrival of an advanced problem involving new concepts without any progression up to the problem.

Another concern found with both textbooks is the degree to which problems and activities are scaffolded. Too often, students are put in a passive role where steps are laid out for them so they can get to the end of the problem or activity even without having learned the mathematics. The BNCC paints a clear and vivid picture of active students learning to think with mathematics in life-relevant ways. Neither book lives up to this aspiration. While many of the activities are engaging and lively, the student role in thinking mathematically is minimal.

We also examined the priorities at the skill level and at the thematic level. Overall, we found that some topics are well developed, while some receive very shallow treatment. An example of a well-developed topic is calculation skills, where both textbooks make good investments, incorporating calculations relating place value diagrams, and decomposing and standard algorithms within the same problem. All of these topics are prioritized in BNCC at this grade level, suggesting strong alignment. APIS makes several good investments in progressions adding and subtracting single, two-digit numbers, and progression from one to three-digit calculations. On the other hand, Buriti does not, but instead leaps to three and four-digit calculations.

Both books exhibit a lack of future-facing coherence reflected in the lack of development of the correspondence of length with number on the number-line, and operations on the number line. As mentioned above, both books lack the discussion of the BNCC meanings of addition and subtraction, and are too light on some of the meanings. These different meanings lead to relations among quantities that develop into expressions and equations needed for algebra later. Not surprisingly, both books lack the development of number equations.

The findings for thematic expectations are disappointing and put us on alert for a possible weakness in the translation of BNCC into tools for teachers and students. Relatively speaking, the textbooks analyzed did a respectable job of addressing each skill in the BNCC. But the granularity of skill specifications makes them easier to operationalize and manage. However, managing for purpose is not so easy, yet it is a hallmark of good management. It is troublesome that the pervasive, cross-cutting reasoning themes, "Argue and justify the procedures used for the solution," and, "Evaluate the plausibility of the results found," are almost completely ignored. The expectation regarding developing different strategies for obtaining results, especially estimation and mental calculation, as well as algorithms and the use of calculators, are also very poorly addressed in both books. Also very insufficient is the expectation related to tasks, such as those involving measurements, in which natural numbers are not enough to solve them, indicating the need for rational numbers both in decimal and fractional representation. The only expectation that is fairly explored in the textbooks is the one related to solving problems with natural numbers and rational numbers whose decimal representation is finite, involving different meanings of operations.

The BNCC calls for the number thematic unit to "favor … an interdisciplinary study involving cultural, social, political and psychological dimensions, in addition to economics, on issues of consumption, work and money" (BNCC, page 269). In the two textbooks reviewed here, these priorities for connecting mathematics to cultural, social, political, economic and psychological life are often addressed in suggested activities rather than in problems for students to work, meaning that the assignments do not require students to actually produce something that shows how they are making sense of these priorities. Many of the activities are well-aimed at appreciating the mathematics being taught, but students are not required to produce any written work to culminate the learning. The problems that do require written work are much more familiar and traditional, independent of the suggested activities. Thus, the activities are easy for teachers to ignore. Given the implementation bias toward past practices and the familiar, it seems likely the lively, engaging games and other product-free activities will be omitted frequently from the enacted curriculum. This could throw the enacted curriculum out of balance with the BNCC.

The limitations found within these two textbooks highlight that curriculum alignment does not necessarily equate with high-quality instructional materials. In the design, development and evaluation of texts, public and private institutions should pay particular attention to areas most vulnerable to being overlooked or treated weakly, including coherence with future grade level work; progression from earlier grade level work; progression within grade level; real-life social, cultural, and

economic uses of mathematics; the active role of students in learning and using the mathematics, and formulating expression of their thinking when solving problems; and the systematic balancing of priorities, especially of higher-level learning.