BAYELSA PROMOTING REFORM TO IMPROVE & MODERNISE EDUCATION

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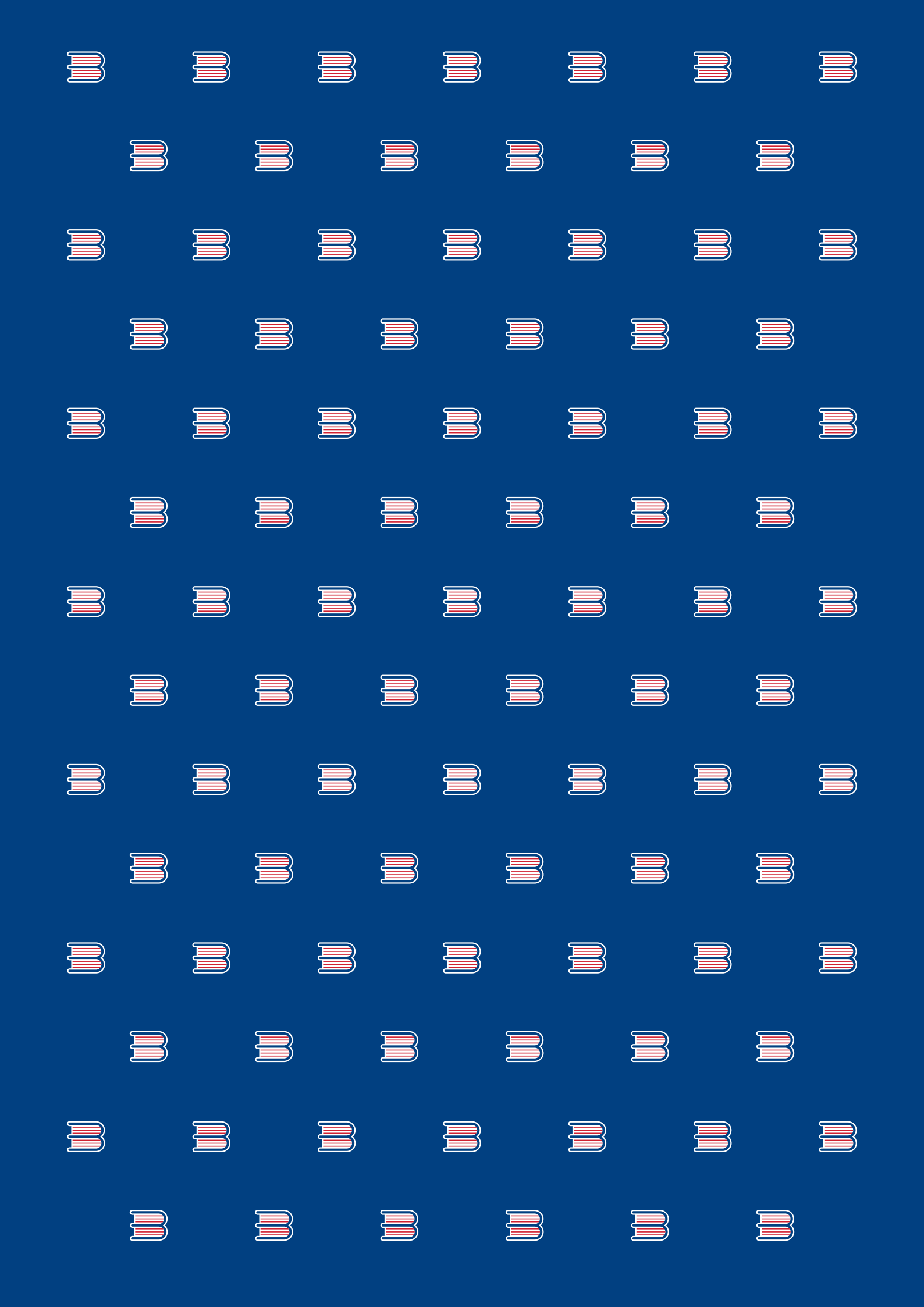

Can Data-Informed Management and Structured Pedagogy Improve Learning?

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BAYELSA PRIME
PROMOTING REFORM TO IMPROVE & MODERNISE EDUCATION

Executive Summary

The BayelsaPRIME programme has accelerated pupils' literacy learning in every grade level.

The average pupil in every grade developed literacy skills at a much faster rate than before the programme, with Primary 3 and 4 gaining the equivalent of a year's worth of learning in only 19 weeks.

Pupils now comprehend what they read more deeply, and as a result, increasingly benefit from lesson materials.

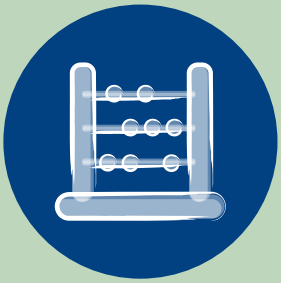
Primary 6 pupils' comprehension scores improved by 20 percentage points (an increase of 80%) relative to pupils not yet in the BayelsaPRIME programme, and Primary 2 pupils, on average, tripled their scores because of the BayelsaPRIME programme. As a result, these pupils can now engage with the national curriculum to a greater extent than they could before.

BayelsaPRIME also improved the numeracy scores of pupils in every grade.

The rate of growth in every grade in BayelsaPRIME schools was greater than those in non BayelsaPRIME schools. Primary 3-5 benefitted the most, making 1-2 years of academic progress as delivered before the programme in only 19 weeks.

The BayelsaPRIME programme helped teachers improve the quality of their instruction.

BayelsaPRIME teachers increased their rate of lesson completion and total time utilising pedagogically sound teaching practices throughout the programme.



Pupils in Nursery 1-3 improved their numeracy skills, setting them up for later success.

In all eight mathematics skills measured by this study, children in BayelsaPRIME nursery programmes out-performed their non-BayelsaPRIME peers.

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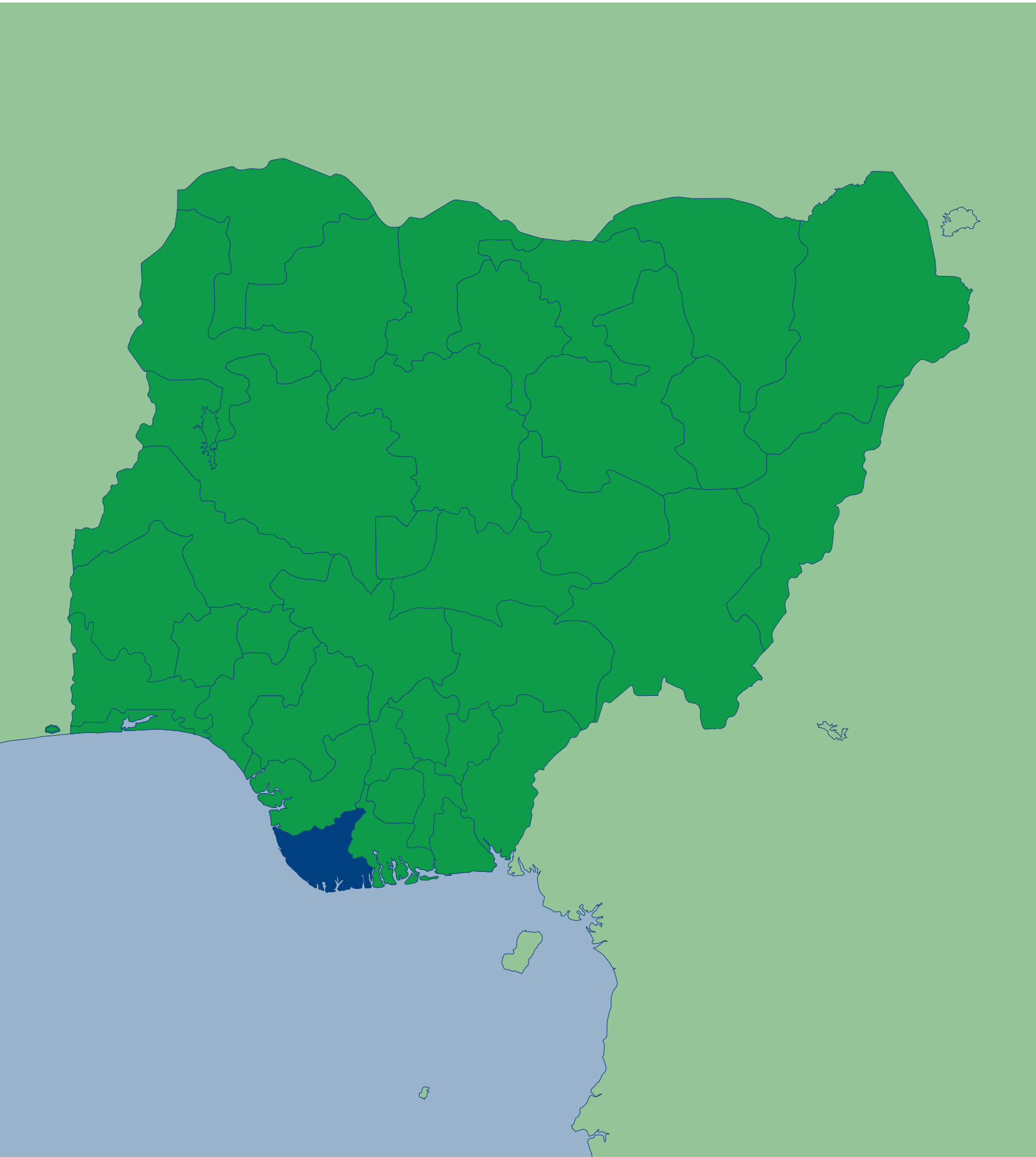

Acknowledgements

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We would also like to thank all school head teachers, teachers, pupils, and communities who welcome enumerators into their schools and classrooms. We are immensely grateful for their openness to this work. We are also grateful for the input and guidance of Dr Shannon May, Sylvester Mchihi, Oluwatoyin Ugbor, Taofeek Akinola, Dr Ibebietei Offor, Kunbi Wuraola, Funmi Ayeni, Femi Awoyinfa, Sean Geraghty, Dr Steve Cantrell, Andrew White, Annie Pinnell, and Tim Sullivan.

Finally, we appreciate our field team, the staff of the Bayelsa State Universal Basic Education Board and the Bayelsa State Ministry of Education who worked passionately as enumerators on this study; travelling the length and breadth of the entire State on land and water to ensure we assessed pupils in our sampled schools: Abuye Iwariu, Accrah Brutus, Aganaba Inemeiyeseigha, Akeere Kereobeb, Alabor-Odoni Ann, Aladin Paemenas, Angatimi Yabefa, Austine Peter, Bindei Kemeitemegha, Brown Timi Rex, Canus Dimomu, Comfort Babaudoh, Custom Becky, Daunemighan Ebibra, Dick Ebinabo Clever, Diepreye George Brah, Doripo Ezonebi, Douglas Ebiowei, Ebiere Makbere, Edith Gbaregolo, Elagha Pamo, Eli Zion, Elliot Bestman, Enaregha Ebilaaotu Ken, Enodeh Yinorere, Feingibaifa Ebiere, Fente A Fente, Frank Manasseh, Geku Preye Williams, Gift Ebiye Tutus, Gift Josiah, Gloria Okoto, Gold Olukutu, Gopamodei Philip, Hawels Brutus, Helen Beredugo, Howels Lucy Idibo, Ifieniya Isabella, Igula Bilerefie, Inie Bukurumo, Jacob Timinipre Stalla, Jeremiah Regina, John Samuel, Lucky Febo, Nabena Ebibowei, Nimi Alakenbi, Nubia Davison, Oputa Tari, Owubou Oyinbrakemi, Ozori Deniye, Pere Omodu, Raymond Ogbodo, Sincomoh Deborah Tamaraudou, Smith Gbale, Tarigbolo Egbebiri, Tekeme Yerindieke, Theophilus Okpoitari, Timidamere Okiakpe, Titlayo Hontonyon, Toronto Timipre, Wanemi Festus, Winnie Bekefula, and Yanga KuwuKuwu-ere.

A Foreword from Dr Gentle Emelah, Honourable Commissioner for Education

GOVERNMENT OF BAYELSA STATE OF NIGERIA
OFFICE OF THE HONOURABLE COMMISSIONER
MINISTRY OF EDUCATION

BayelsaPRIME 2022-23 Report

In our collective journey toward inclusive prosperity, the importance of education cannot be understated. The Bayelsa State Government has heavily prioritised and invested in transforming, especially, basic education in order to lay the appropriate foundation for the prosperous development of Bayelsa State for generations to come. Through these dedicated investments to improve both the access to and quality of public primary schools, we expect to provide thousands of current and future Bayelsan children equal opportunity to acquire the necessary skills to lead them to a bright future as empowered members of their communities and the state.

In our pursuit to elevate the global standing of our state's education, our administration introduced the "Bayelsa Promoting Reform to Improve and Modernise Education" (BayelsaPRIME) programme. This innovative, data-driven holistic initiative seeks to dramatically improve the quality of government schools across the state. Our prior policies, centred around teacher recruitment and school construction, have already expanded access to education, laying the foundation for this programme's implementation. With a scientifically backed curriculum, training and support for teachers, and tablets in every classroom which provide high-quality lessons for teachers and enable the tracking of pupil attendance and progress, BayelsaPRIME works from the inside out to propel our education system towards unparalleled efficiency and resounding effectiveness.

As of the preparation of the current report, the BayelsaPRIME programme currently spans 216 public primary schools across four Local Government Areas (LGAs) after its initial launch in January 2023. A total of 1860 teachers have received evidence-based training, leading to improved learning for over 37,000 pupils. In just 19 weeks of instruction, the programme has already delivered strong educational outcomes: thousands of children are acquiring literacy and numeracy skills at a much faster pace than before, more teachers are now delivering high-quality instruction, and head teachers now have access

1

Education House, Old Water Baord Road, Ovom Yenagoa P.M.B. 17 Yenagoa, Bayelsa State.
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to real time information on pupils' performance. The swiftness with which this programme was uptaken, despite the devastating floods that occurred in 2022, speaks to the quality of the programme, the dedication of the BayelsaPRIME teachers and staff, and our children's innate potential and desire to learn.

I must commend the unwavering dedication and enthusiasm of the entire Bayelsa State Universal Basic Education Board (SUBEB) and the Ministry of Education for their determination to bring about transformative changes to the Bayelsa education system. My gratitude extends to our technical partners, NewGlobe Educational Services International, for sharing their renowned technology-enabled methods. I also extend my appreciation to the teachers, students, and parents of the BayelsaPRIME schools for their trust and cooperation in our joint efforts to revolutionise the public education sector in our state.

This report underscores the significant progress achieved in the first stage of this major investment to reshape the educational trajectory in our beloved state. We recognize that these early accomplishments should serve as a robust foundation for the continuous growth and sustainability of our education system. We are proud and motivated, but not satisfied yet. It is our earnest desire to transform and integrate our public schools and the education system into the globally dynamic and competitive sector of the future Our children are the future entrepreneurs, innovators, and leaders of Bayelsa and of Nigeria; we will not cease to support their growth and development until they have every tool necessary to realise their full potential. This report also underscores the benefits and the importance of expanding the BayelsaPRIME programme to all LGAs and continuing to collaborate with Bayelsa SUBEB and our technical partners to strengthen individual schools and the entire public education system. It is my hope that you will find the report useful in your assessment of the progress that the Government of Bayelsa State is making to deliver high-quality, accessible education to all of our children.

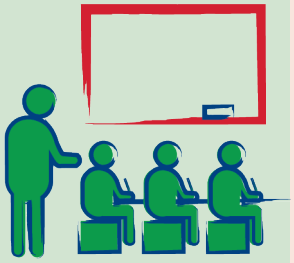
Dr Gentle Emelah
Honourable Commissioner for Education
Bayelsa State

The BayelsaPRIME Programme at a Glance as of March, 2024

In Numbers:

Schools

216



Primary Pupils

41,641

Teachers

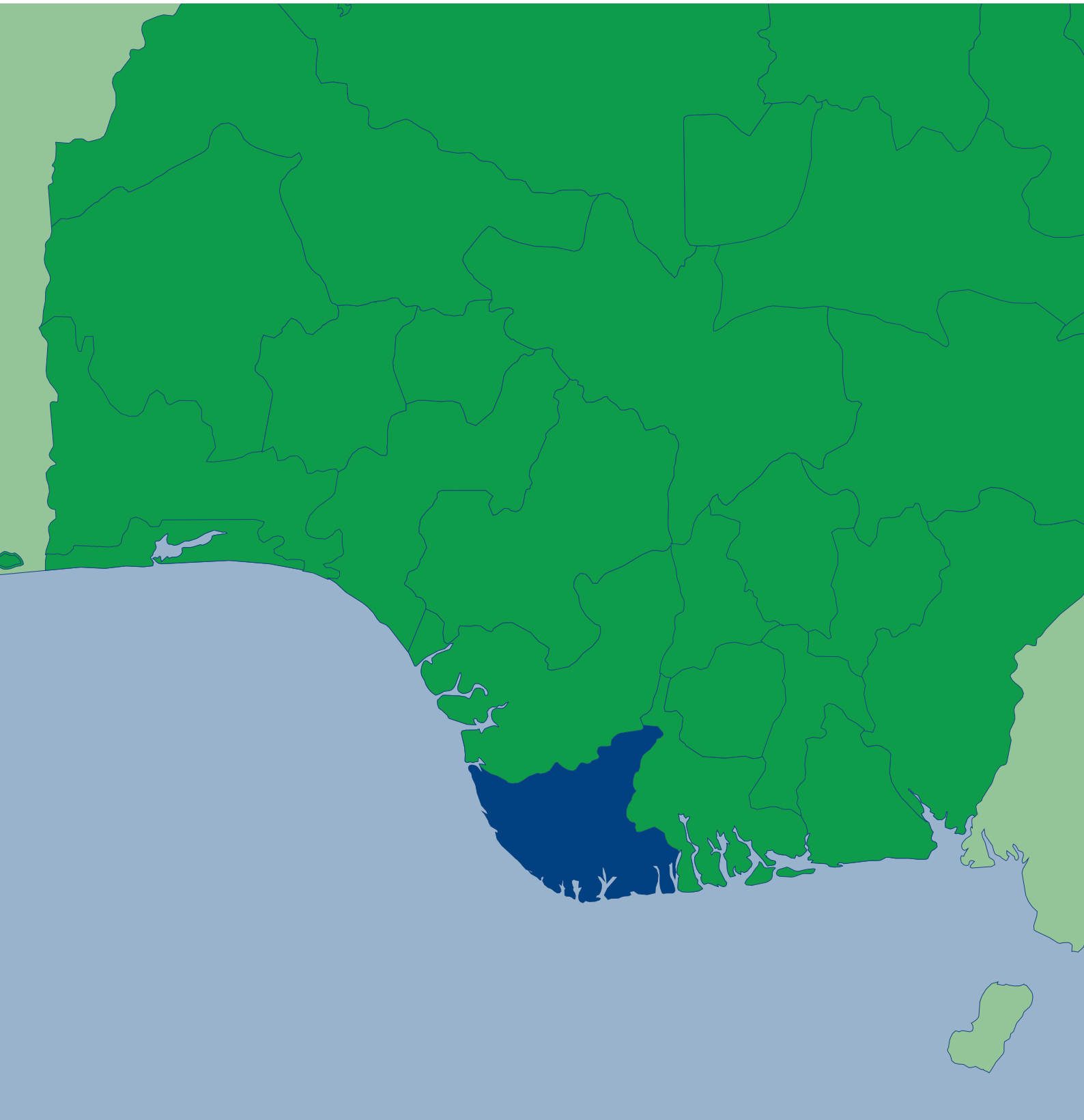
1825

LGAs

4

An average gain of 8 cwpm more than expected, given the learning trajectory of non-BayelsaPRIME schools	1 extra year of maths instruction in only 19 weeks for P3-5	Nearly 2600 tablets and phones provided to school staff	19 weeks of improved instruction and quality curriculum

II. The BayelsaPRIME Programme



Overview of the Programme

The Bayelsa State Government put forth a bold vision to transform the quality of public education across the state in order to ensure that all pupils reach their full potential. In January 2023, it launched the Bayelsa Promoting Reform to Improve and Modernise Education programme (BayelsaPRIME). BayelsaPRIME is a holistic, 360-degree programme strengthening all aspects of the public early childhood and Primary education system. Through BayelsaPRIME, school leaders and teachers are empowered to deliver transformative education to each child. The programme is dedicated to equipping all pupils with mastery in foundational skills, encompassing reading, language, and mathematics.

The BayelsaPRIME programme is anchored in 5 core pillars:

1. Scientifically-based learning materials aligned to the Bayelsa State curriculum
2. A technology-enabled instructional model
3. Data-driven training, coaching, and ongoing professional development
4. 360-degree support teams
5. Technology-driven monitoring and reporting

The programme has five central goals:

- To support the Bayelsa State government to better utilise the existing human and material resources allocated to the public education system
- To build capacity among school leaders and teachers, training them in the use of effective and scientifically-based instructional practices that create learning-centric classrooms
- To establish management structures that enable effective governance and ultimately increases the quantity and quality of instruction time that each pupil receives
- To provide materials that enhance the quality of teaching and learning within each classroom
- To raise learning levels in both foundational skills and in subjects covered by the state and national curricula

> “BayelsaPRIME has been a life changing opportunity for myself and the teachers…it has given us the room to learn and teach ourselves.”
>
> — Respondent 12, School Supervisor

BayelsaPRIME: A Holistic Programme with Integrated Features

Academic planning and lesson mapping

BayelsaPRIME drives pupil learning by providing school leaders and teachers with the tools and support they need to deliver life-changing education to each and every child. Moreover, BayelsaPRIME also offers government and programme leaders visibility into the minute-by-minute experience of pupils, teachers, and schools. This digital and operational transparency ensures that leaders can work in close collaboration and make strategic, data-driven decisions to improve the quality of education on a systemwide scale. Importantly, BayelsaPRIME schools remain under the purview of the Bayelsa State Ministry of Education. As such, they receive the same level of scrutiny and monitoring as do other public schools in Bayelsa outside of the programme. The key difference is that public schools in the BayelsaPRIME programme receive the additional support provided by the programme.

Below, we highlight the core pillars that enable the BayelsaPRIME programme to ensure high-quality learning in each and every classroom:

1. Scientifically-based learning materials aligned with state curriculum

One key pillar of BayelsaPRIME is the materials that teachers use to ensure that all pupils master the curriculum and build the necessary foundational literacy and numeracy skills to excel in their studies. BayelsaPRIME designs thousands of high-quality, syllabus-aligned teacher guides. Each teacher guide is based on thousands of hours of research and development on what works best to drive learning gains. These scientifically-based lessons provide the necessary structure and pedagogical support to lead a world-class lesson. This includes key lesson objectives, procedures for teaching new concepts, impactful and rigorous independent practice opportunities, and mechanisms for assessing learning. Each lesson is then observed in the classroom to ensure that there is a continuous cycle of improvement.

BayelsaPRIME enables the teaching of the national curriculum, while also building foundational skills that serve as the building blocks that allow access to all curricular content. BayelsaPRIME's lesson materials cover all curriculum-mandated subjects, and include lessons that strengthen the core foundational literacy and numeracy skills necessary for pupils to meaningfully engage with and master the content in the national curriculum. Importantly, lesson content in the foundational areas is levelled — that is, adjusted to actual learning levels as measured in schools — so that instruction can be aligned with pupils' current learning needs. BayelsaPRIME aims to meet pupils where they are, thus more effectively raising learning levels and guiding progress towards grade-level standards.

The quality of instructional materials is constantly evaluated through several mechanisms. First, continuous and comprehensive assessments of pupils' learning are administered termly, and the data are automatically captured from these assessments, providing ongoing visibility into pupils' progress across the entire system. Second, BayelsaPRIME programme officers observe lessons each day, evaluating the quality of the design and opportunities for improvement. This continuous cycle of observation and iteration ensures that each and every lesson drives effective classroom instruction and contributes to optimised learning outcomes.

2. Technology-enabled instructional model

BayelsaPRIME's instructional model is made possible by technology. Teacher guides are shared digitally with teachers through a teacher tablet. These digital teacher guides not only deliver high-quality academic content, but also enable the consistent implementation of pedagogical strategies to ensure that teachers are engaging all pupils. For example, teachers are provided with prompts to pause for pupil questions or to facilitate small-group sessions, and they can track which pupils they have called on, so that they can be sure to call on others. Technology also enables the efficient allocation of time, ensuring that every minute of the school day maximises learning. Lessons are organised by a digital timetable, and the teacher tablet automatically tracks the amount of time spent on each page of a lesson, providing insights into time-on-task.

3. Data-driven training, coaching, and ongoing professional development

High-quality instructional materials are necessary but not sufficient to transform teaching and learning in the classroom; in addition, teachers need professional development, as well as ongoing support from school leaders. Another key component of BayelsaPRIME is data-driven professional development programmes. Additional induction training sessions are scheduled at each expansion phase of the programme.

BayelsaPRIME induction training has three core objectives:

- To ensure that every teacher has the **skills and knowledge** to deliver lessons, manage a classroom, assess learning, and motivate pupils.
- To develop the **mindset** that every pupil can be successful, that high-quality instruction is possible and leads to improved learning outcomes, and that positive reinforcement is the most effective tool to motivate pupils.
- To strengthen the **communication strategies** needed to engage with the school community and beyond.

A teacher's support does not end with induction training. BayelsaPRIME also provides continuous professional development for teachers. This professional development, delivered at the school level by a Schools Supervisor, reinforces core skills from induction training. It delivers training on new processes, skills, and tools in the BayelsaPRIME programme.

Importantly, BayelsaPRIME empowers school leaders to provide powerful coaching for their teachers. School leaders receive frequent visits from supervisors, during which they conduct joint lesson observations and hone their skills in providing improved feedback to teachers. Thus equipped with the tools and training to monitor performance and observe teachers, school leaders can observe teachers and deliver coaching sessions that celebrate areas of strength and target areas of growth. Coaching, alongside continuous professional development, ensures that every single teacher receives constant feedback and reinforcement of the skills they need to become a stronger teacher.

4. 360-degree support teams

BayelsaPRIME knows that to be successful, systems must be put in place to ensure that all members of the school ecosystem deliver the programme with fidelity. A 360-degree support team ensures that at every school, all of the conditions are in place for learning. This includes operational factors (Is there a teacher assigned to every classroom? Does every teacher have a tablet?). It also includes performance indicators (What percentage of lessons are teachers delivering each day? Are teachers taking attendance for their classrooms?). A team of School Auditors review school operations both in person and remotely on a regular basis to ensure that all schools maintain an environment conducive to learning. Also, a team of Schools Supervisors checks in with schools daily, and visits in person every other week to ensure that these conditions are met. When issues surface, a support team responds in order to resolve these issues. This includes IT support, operational support, and other departments in place to ensure optimal conditions for learning.

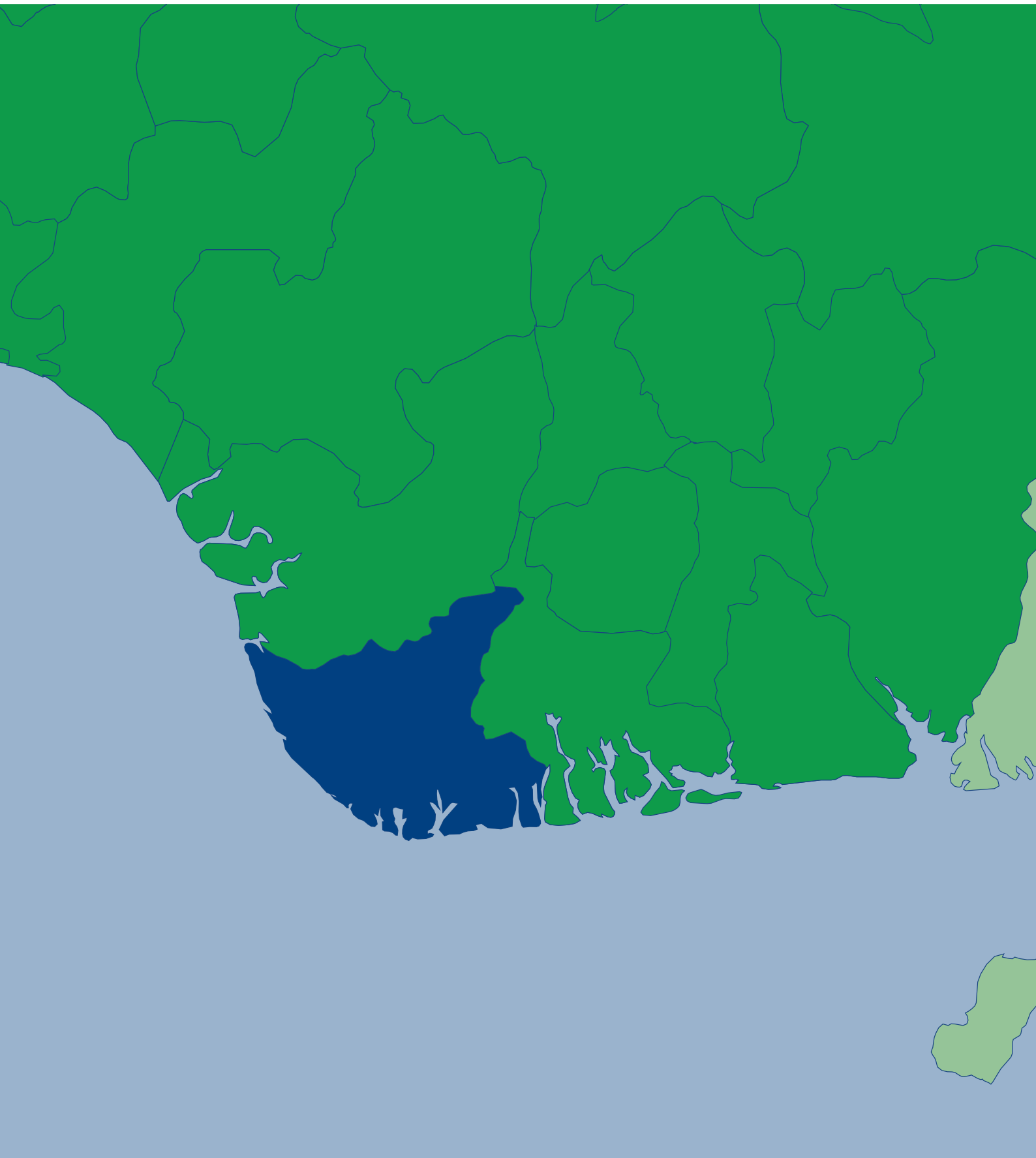
5. Technology-driven monitoring and reporting

The identification and resolution of school-based issues does not only occur during in-person visits. BayelsaPRIME tracks all core operational and performance drivers that contribute to learning outcomes, such as pupil and teacher attendance, lesson completion, school leader coverage, and more. Digital tools capture these data automatically and in a decentralised manner; for example, teachers do not need to manually log lesson completion, and school leaders do not need to take teacher attendance. Technology then transforms these data into usable insights for school leaders, which, in turn, enables more effective school management and teacher coaching. These data are also used by BayelsaPRIME's 360-degree support team to identify challenges, resolve issues, support school leaders, and drive improvement at the school level. These data are also available for government and BayelsaPRIME leadership. These insights inform strategic decisions at the programme level and ensure that all key programme decisions are responsive to the reality of the school system as a whole.

Optimised teacher coverage with "Primary" vs. "Progressive" staffing models

One important way in which data play a crucial role in shaping strategic decisions is in the prescription of staffing models at the school level. Given the challenges in many schools across the State due to low staffing, the BayelsaPRIME programme is implemented in two different modalities: the "Primary" model and the "Progressive" model. The Primary model follows a more traditional model of one-teacher-one-classroom with class-level grouping of pupils. The Progressive model, implemented in schools with fewer than one teacher per classroom, uses a "multi-grade" teaching model and incorporates ability grouping across grade levels. Specifically, for English and mathematics classes, classes are combined in the following groupings: N123, P1+2, P3+4, and P5+6, with curricula being adjusted to cover content of both grades in each class. Other classes are then taught by one teacher, one after the other. For example, when one group of P5 pupils are receiving instruction, P6 pupils are undergoing independent study, and vice versa. Employing this model ensures that all pupils can receive high-quality instruction from teachers in their school, even if the school is significantly short-staffed. Unless otherwise stated, results in this report are weighted by pupil enrolment in each modality, for the first cohort of schools that joined the programme. Additionally, because these inherent differences between Primary-model and Progressive-model schools impact the educational experience of pupils, outcomes from schools are carefully compared to similarly staffed schools outside of the programme.

III. Methodology



During the first year of the programme, the Measurement and Evaluation strategy had two objectives: (1) track progress observed in BayelsaPRIME schools, and (2) benchmark gains in light of other schools outside of the programme. Doing this required following a strategy based on the careful monitoring of learning outcomes in 32 BayelsaPRIME schools from the initial cohort of 216 schools, and 32 additional schools where the programme did not roll out in Year 1, but which were included in a school census conducted by the programme several months before the first day of class. Within these 64 schools, data were scheduled to be collected at the start of the programme and also at the end of the school year in July of 2023.

Sampling of Schools and Pupils

Schools included in the study

In selecting which particular schools would comprise the set of 60 schools[1] for this study, there were three goals in mind. The aims were that (1) the subset of 32 treatment schools was representative of the broader set of 216 BayelsaPRIME schools, (2) the subset of comparison schools closely resembled the 32 treatment schools in terms of school characteristics, so that they would be a reliable comparison, and (3) jointly, the comparison schools resembled the broader set of 216 BayelsaPRIME schools as much as possible, so that the estimated effects of the programme would be generalisable to the full set of BayelsaPRIME schools in Year 1.

To obtain a comprehensive view of education in Bayelsa, a proportional stratified random sampling method by Local Government Area (LGA) was employed. In this method, the number of schools sampled in each LGA was proportional to the number of enrolled pupils in that specific area. The selected schools were randomly chosen from a list of all publicly-funded Primary schools in the State, categorised by LGA. The combination of proportional sampling by LGA and the random selection process ensures that the sampled schools are broadly representative of the overall educational landscape in the State. Consequently, the findings in this report can be applied beyond the sampled schools to encompass all 216 BayelsaPRIME schools throughout the State.

Pupils assessed for this study

Within the 60 selected schools, approximately 8 pupils per grade level were sampled for each assessment, across Nursery 2-3 and Primary 1-6. We ensured that the gender representation reflects that of the school for each grade. Among the grades and classes of interest, pupils were randomly sampled. This random selection of pupils from a representative sample ensures that the sample is representative of the overall class and population of interest at the school. Since these schools were representative of the 216 BayelsaPRIME schools, randomly selecting pupils allows for a sample group that is representative of all pupils in the BayelsaPRIME programme.

[1] Initially, data for the midline year 1 report was to be collected from 64 schools: 32 treatment and 32 comparison. However, data from 4 schools are not available due to data collection security issues and data quality issues flagged by the Quality Assurance Protocol used after data collection.

Data Collected

Assessments of learning outcomes

This report documents relevant information on the status of learning outcomes in the State of Bayelsa prior to and throughout the implementation of the BayelsaPRIME programme. For the programme to be effective — and any educational intervention targeting foundational learning, for that matter — understanding pupils' baseline literacy and numeracy levels is crucial. This information ensures that the programme can meet the needs of all learners through appropriately levelled instructional materials.

Oral reading fluency

Oral reading fluency is the skill of reading quickly, accurately, and with expression. The most common metric to assess oral reading fluency is correct words per minute (cwpm) — in other words, how quickly and accurately a pupil can read a passage aloud in one minute.

This evaluation relies on two assessments of oral reading fluency for Primary 1-6: a Primary 2 passage that all pupils read and a grade-level passage specific to each pupil's grade. The Primary 2 passage enables a comparison of performance levels across all Primary grades and the measurement of growth throughout grades on the same passage. The grade-level passage assesses functional fluency — in other words, how well can a pupil read a grade-level text like the ones they will encounter in typical lessons? The only exception to this is the Primary 1 "passage", which consists of a word list, in keeping with BayelsaPRIME and DIBELS expectations that pupils do not need to be reading a fully connected text by this grade. As a result, 7 total passages are used: one Primary 2 passage read by all pupils and 6 different grade-level passages (Primary 1-6).[2]

The Primary 2 passage is taken from DIBELS, a reliable and valid assessment of early literacy development widely used in evaluation studies of educational interventions (University of Oregon, 2018; Vernon-Feagans, et al., 2018; Cheung, A. C. K & Guo X., 2018; Kim et al., 2011). This, in turn, means that the use of DIBELS allows a comparison between the fluency results from Bayelsa State's schools with performance in comparable educational systems. Grade-level passages (Primary 2-6) are selected from NERDC-approved English textbooks. Primary 2 passages are selected from an NERDC-approved Primary 2 textbook. The only exception is Primary 1, for which we use a word list (as opposed to a passage of connected text) from DIBELS to reflect grade-appropriate expectations for this level. For Primary 2-6, using grade-level passages allows us to more accurately assess functional fluency. We can specifically evaluate how quickly and accurately a pupil can read one of their grade-level textbooks, which are appropriately-levelled for each grade and also contextually appropriate for Bayelsa State.

[2] Pupils in Primary 2 receive two different passages at a Primary 2-level: one classified as a grade-level passage, and the other being the Primary 2-level passage that is used to assess pupils across Primary 1-6. Utilising two different passages maximises the total data collected and ensures that data are comparable across grade levels.

Reading comprehension

In addition to oral reading fluency, reading comprehension is also assessed for Primary 1-6 through two constructs: direct and inferential comprehension. Direct comprehension questions assess a reader's ability to answer questions that assess information directly located in the text. Inferential questions assess a reader's ability to make inferences based on the content of a passage. Answers to inferential questions cannot be found directly in the text. Reading comprehension will be assessed based on the Primary 2 passage and the grade-level passages used during the fluency assessment, except for Primary 1 (where the grade-appropriate text will consist of a word list and hence assessing reading comprehension questions is not possible). Because DIBELS does not provide specific comprehension questions for each passage, the comprehension questions are written by the BayelsaPRIME Academics team. Each pupil answers a total of four comprehension questions for each passage with reading comprehension questions: three direct questions and one inferential question. Comprehension questions are open-response, but a rubric of acceptable answers is provided to enumerators.

Numeracy

In order to assess pupil numeracy skills in Primary 1-6, this project uses the **International Common Assessment of Numeracy (ICAN)**. ICAN, developed by the PAL Network, is a widely acclaimed tool used internationally to assess performance across a range of core numeracy competencies. Specifically, ICAN assesses five subskills: number recognition, addition, subtraction, multiplication, and division. Within each domain, there are 2 tasks. Task 1 is a simple application of the concept (for example, addition without carrying). If the pupil answers Task 1 correctly, they attempt Task 2, which is a more challenging application of the concept (for example, addition with carrying). Two of the domains (subtraction and division) also include a separate word problem as part of Task 2. ICAN targets the set of numeracy subskills relevant for the age group in this evaluation in appropriate depth and breadth. Global assessments like PISA and TIMSS target older pupils and assess more complex mathematical topics. ICAN targets foundational subskills, while also allowing pupils to demonstrate higher levels of performance through questions like word problems involving division. Similarly, ICAN is a shorter assessment than PISA and TIMSS, allowing enumerators to reach a larger sample size within the same amount of allotted time for pupil assessments. Finally, by using ICAN across all grades, reports emerging from this plan will be able to illustrate how different grades perform on the same assessment, and thus, how pupils progress grade-on-grade.

Because there are several rounds of data collection, enumerators use different versions of this assessment throughout time to avoid pupils answering correctly due to their familiarity with specific questions, and not due to their actual mastery of the content. These different versions were all carefully crafted by the BayelsaPRIME Academics team so that the difficulty level and actual assessed skills remain constant across assessments.

School readiness in pre-Primary grades

Since the BayelsaPRIME programme was rolled out in pre-Primary grades, learning outcomes are also measured for Nursery 2 and 3. For this, different tools from those used in Primary 1-6 are needed so that the assessments are developmentally-appropriate. As such, the Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA) are used to measure school readiness in pupils' foundational literacy and numeracy. These tools were developed by RTI International in conjunction with USAID and have been used by education ministries and multilateral agencies around the world. The EGRA component of the baseline focuses on writing and reading skills in English. The EGMA component captures skills in numeration and operations, the metric system, and geometric figures. These assessments are not developmentally-appropriate for pupils as young as Nursery 1, so they are not tested. The measurement of these constructs in both literacy and numeracy reveal whether the BayelsaPRIME programme is also creating a strong foundation for young learners to thrive and take advantage of the programme once they reach Primary grades. For more information on the value of foundational skills, see Box 1.

Box 1

The Value of Universal, Early, Conceptual and Procedural Mastery of Foundational Skills

Over the last few decades, educational enrolment in low- and middle-income countries (LMIC) has been catching up with the enrolment rates in high-income countries (HIC). However, international standards of literacy and numeracy indicate that the average pupil in a LMIC performs worse than 95% of the pupils in HIC (World Bank Group, 2017) — that is, despite these global enrolment increases, learning levels remain low because children are not mastering foundational skills like literacy and numeracy. For instance, a 2021 study conducted across 32 countries highlighted that on average, only 30% of Grade 3 pupils possessed foundational literacy skills, with only 18% possessing foundational numeracy skills (UNICEF, 2022).

Foundational skills are necessary to effectively advance learning, comprehension, and problem solving skills in their future academic careers and personal lives. Lacking foundational skills in the early grades creates even larger gaps in learning in later grades, as pupils who did not master the foundations will have a harder time advancing through higher order concepts. This can have a negative impact on further skill development, career opportunities, and social mobility later in adulthood (Belafi et al., 2020).

To increase overall learning levels, education systems must prioritise universal, early, conceptual, and procedural mastery of foundational skills (Belafi et al., 2020). Universality ensures that learning progress is being made and measured for all children, regardless of socioeconomic status, gender, race or ethnicity, or whether the child is in school. It's also important that foundational skills are mastered in early grades, as learning gaps emerge early and widen throughout grade progression (Belafi et al., 2020). Additionally, developing both conceptual and procedural knowledge helps pupils cultivate a well-rounded understanding of foundational skills, which contributes to mastering the skill and being able to apply it in other contexts (Kilburn, 2020). Implementing all these components in conjunction is necessary for a more comprehensive and equitable approach to teaching and learning.

Prioritising universal, early, conceptual, and procedural mastery of foundational skills may require government intervention, curriculum reform, additional instructional support, and/or targeted remediation efforts for pupils falling behind (Belafi et al., 2020). To successfully implement this, reform should aim to specifically target learning outcomes instead of inputs that may influence learning, such as technology, textbooks, or teachers. For example, in 2015 Tanzania enacted the "3Rs" reform, which consisted of major curriculum reforms in Grades 1 and 2 that aimed to focus 80% of instructional time on foundational literacy and numeracy. The reform had a positive effect on both literacy and numeracy; the likelihood of a pupil reaching grade 2 maths proficiency increased by 50%, and the likelihood of reaching grade 2 Kiswahili proficiency increased by 71% (Rodriguez-Segura & Mbiti, 2022). In this sense, realigning curricular expectations for teachers such that they would focus more heavily on foundational skills led to significant learning gains in the earlier grades, and will allow these pupils to be better prepared to learn new subjects later on.

Insufficient mastery of foundational skills has a detrimental effect on overall levels of learning, thus perpetuating an ineffective education system. To make the system more effective, governments and schools can prioritise universal, early, conceptual, and procedural mastery of foundational skills in schools' curriculum, with the goal to increase learning for a wider range of children. A system-wide commitment to prioritising foundational skills mastery in schools is a necessary step that not only lays the groundwork for future learning, but also effectively bridges national and global equity gaps with more impactful educational investments.

Collection of other data

Longitudinal metrics on pupil attendance and enrolment

BayelsaPRIME's technology-based platform allows the programme team to track metrics on pupil attendance and enrolment in real-time. Analysis of these data are completed by comparing average network-wide attendance and enrolment at the beginning of the programme to the same figures observed at the end of the school year. This sheds light on whether programme adoption has led to improved pupil matriculation and participation over time as the programme matures. One major limitation of these metrics is that they are not available for comparison schools, since they are collected using the BayelsaPRIME Education platform.

Teacher attendance

Data on teacher attendance and time-on-task are collected through the BayelsaPRIME Education platform. Teachers are required to sign into the BayelsaPRIME platform on their tablets prior to their first lesson of the day. If a teacher fails to sign in, they are marked as not in attendance. Head teachers and school supervisors have access to these data in order to hold teachers accountable and encourage consistent attendance.

Teaching practices

Finally, in order to better understand actual teaching behaviours in the classroom, this project uses an adapted version of the TEACH observation Tool. The TEACH Tool was originally developed by the World Bank for use in classrooms in low- and middle-income countries (World Bank, 2022). The tool is designed to measure teaching practices which are pedagogically sound and empirically proven. For more information on the specific practices that the TEACH Tool measures, see Figure 3.1.

By using this adaptation of the TEACH Tool in this study, researchers are able to measure the frequency at which BayelsaPRIME teachers use these effective practices at the beginning and end of the 19-week term compared to non-BayelsaPRIME teachers. From these data, researchers can see how the quality of teaching changes with the BayelsaPRIME programme's implementation — although there are some additional limitations with these data that are not present in the other learning assessments used to measure the effects of the programme. More specifically, given that the baseline data were collected at the beginning of the programme but after teacher training, it is possible that TEACH data on instructional quality improvements underestimates the impact of the programme on teachers' skills and instruction by already incorporating part of the treatment effect into the baseline measures for the BayelsaPRIME schools. Therefore, the magnitude of the changes in pedagogical practices relative to the comparison group presented throughout this report should be taken as likely underestimates of the real effect of the BayelsaPRIME programme.

The TEACH Primary Framework

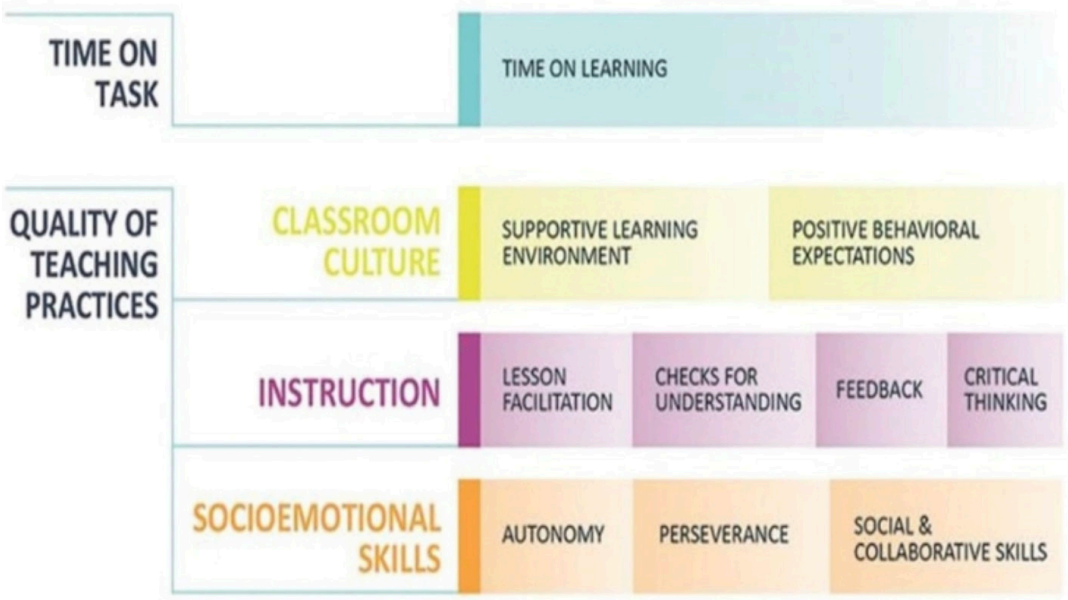


Figure 3.1

Evaluating the Impact of the Programme

The empirical strategy for measuring learning growth in BayelsaPRIME

The impact of the BayelsaPRIME programme is measured using a statistical methodology called "difference-in-differences". Comparing BayelsaPRIME ("treatment") schools with non-BayelsaPRIME ("comparison") schools at a single point in time is not a sensible approach, as it would not show what the difference between these two groups would have been had the treatment schools not joined the programme.

To account for that, two rounds of data collection were conducted: one in February of 2023 and one at the end-of-year check-in in July of the same year, for both treatment and comparison schools. Analysing start-of-year and end-of-year data for comparison schools provides a window into how current BayelsaPRIME schools would have progressed had they not taken part in the programme. The difference between the actual performance of pupils in treatment schools and their expected performance without the programme is calculated by the "difference-in-differences" technique, and this, in turn, allows for quantifying the "BayelsaPRIME effect". The analytical setup of the study is illustrated in the callout box and graphic below (*Figure 3.2*).

Visual Representation of Statistical Technique Used to Identify the "BayelsaPRIME Effect"

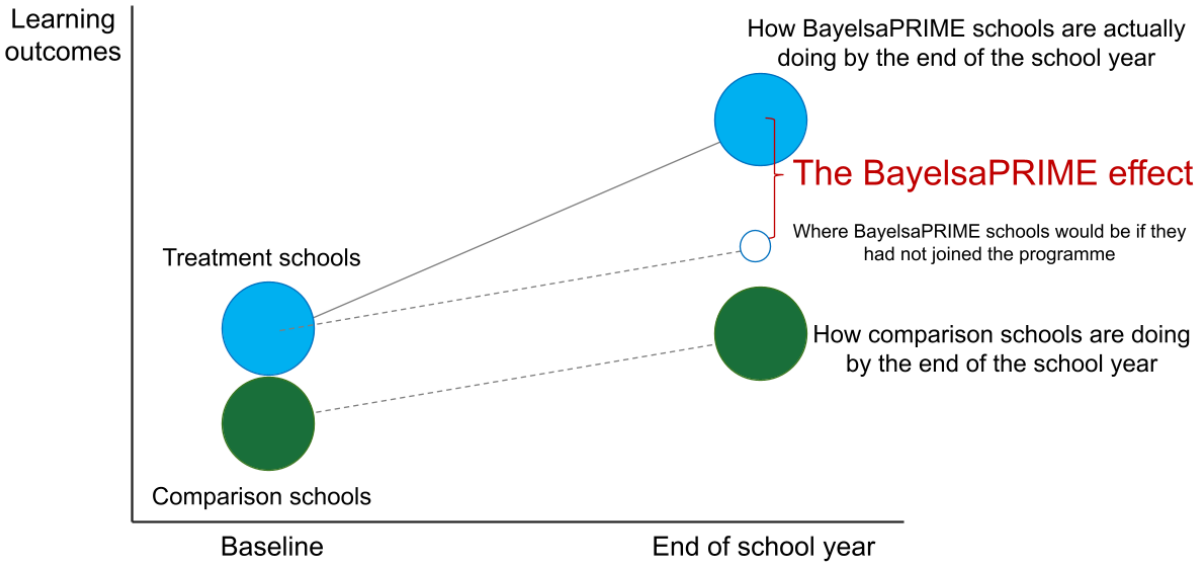


Figure 3.2

Box 2

The "Difference-in-Differences" Method

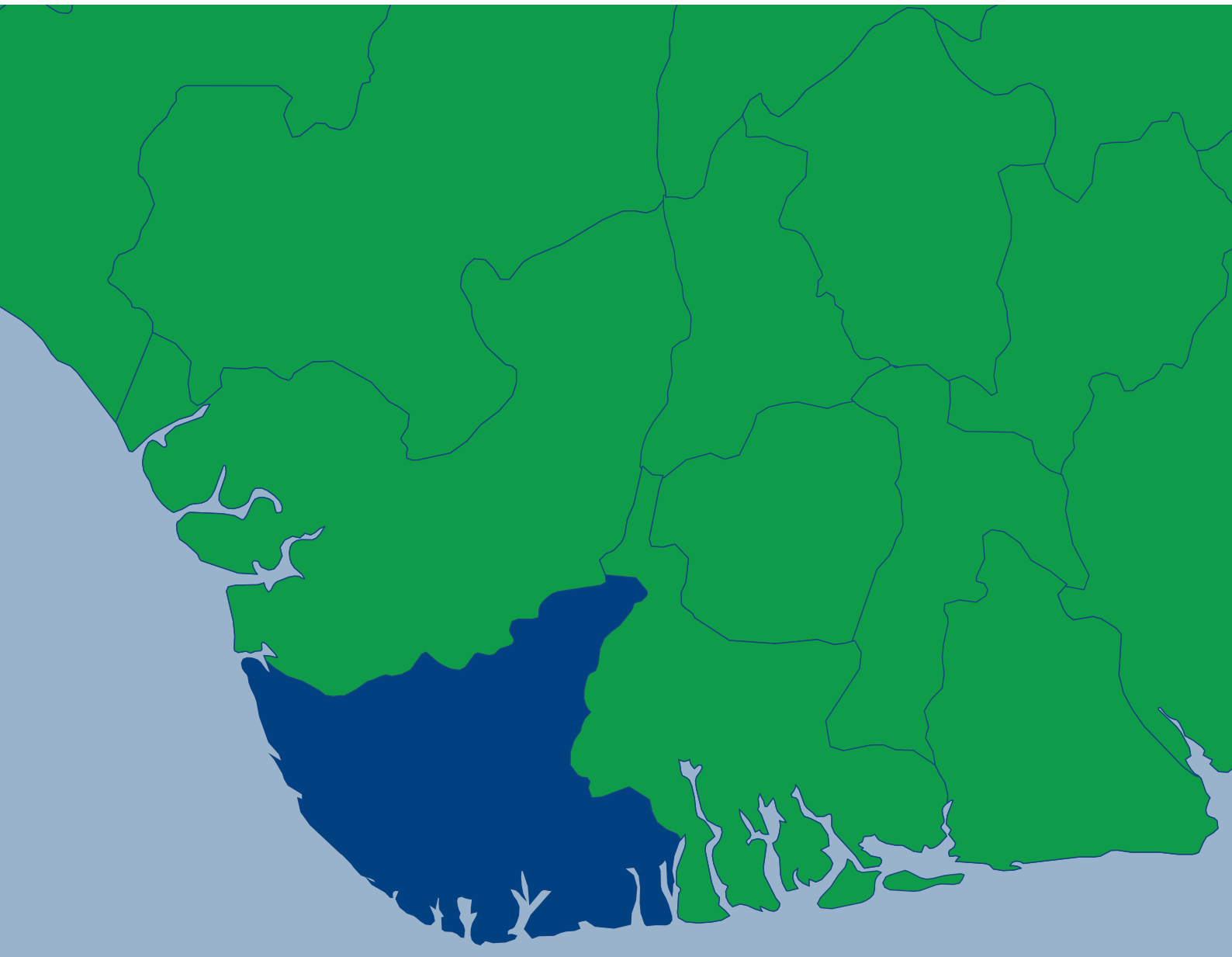
To understand the impact of a programme, the gains observed among participants of the programme must be compared to the gains that would have been observed for the same participants over the same period of time in the absence of the programme. Comparing the learning levels at BayelsaPRIME ("treatment") schools and non-BayelsaPRIME ("comparison") schools at a single point in time would not allow meaningful interpretation, as this could mask differences between the groups that would have existed regardless of their participation in the programme. Similarly, following the changes in the learning levels at BayelsaPRIME schools over time, without reference to what these changes would have looked like without the programme, would not yield meaningful conclusions about the impact of the programme. Therefore, impact is calculated using a statistical methodology called "difference-in-differences".

The "difference-in-differences" method relies on two rounds of data collection: one before the start of an intervention (such as the rollout of BayelsaPRIME), and one at the end of an instructional period (such as a school year), for both treatment and comparison schools. Using these data, a status-quo growth trajectory can be established based on how comparison schools progressed over the course of the instructional period; in other words, the first "difference" calculated is the difference between end-of-period and start-of-period learning levels at comparison schools. This growth trajectory at comparison schools serves as a reference for how current [BayelsaPRIME] schools would have progressed had they not taken part in the programme, and it is added to the start-of-period learning level at treatment schools to calculate the **expected learning level** at the end of the instructional period. Then, the **actual learning level** at the end of the instructional period is compared to the expected learning level; i.e., the difference-in-differences is calculated, yielding a quantitative measure of the **"BayelsaPRIME effect": the amount of growth beyond expected levels made by BayelsaPRIME pupils.** The full analytical setup of the study is illustrated with a graphic on the left (Figure 3.2). **Except where noted, results in this report are presented in terms of expected vs. actual outcomes.**

Complementing quantitative results with a qualitative study

To complement the quantitative results from the first year, this study also conducted a qualitative follow-up to better understand the mechanisms behind some of these quantitative results. The in-depth interviews comprising the qualitative study touched upon topics of stakeholder satisfaction with the programme, parental and pupil engagement, and areas for improvement, among others. In total, 23 interviews were carried out with 7 teachers, 4 head teachers, 8 supervisors, and 4 parents, from different schools across the state. Results were subsequently analysed using conventional coding practices for qualitative data.

IV. The State of Learning Before the BayelsaPRIME Programme



To adequately contextualise the findings of this report, it is essential to recall the educational landscape in Bayelsa State in terms of learning outcomes prior to the implementation of the BayelsaPRIME programme. In a previous report, "The State of Education in Bayelsa State," researchers from the BayelsaPRIME team assessed learning levels among a representative subsample of public-Primary pupils across Bayelsa State as of December 2022, using similar learning assessments to those used in the current report. This earlier study found a deep need for intervention through a holistic programme like BayelsaPRIME. Consequently, the following section is a summary of key findings from "The State of Education in Bayelsa State" report to better contextualise the impact of the BayelsaPRIME programme.

The Median Pupil in the State Could Not Read a Single Word

Data collected before the programme's launch revealed that Bayelsa State pupils struggled significantly with English Studies, specifically reading fluency. For example, 2 in 3 Primary pupils in the state were classified as non-readers, meaning they were not able to read a single word within a minute (*Figure 4.1*). Even by Primary 6, over 20% of pupils remained non-readers.

Pupil English Oral Fluency: Share of Pupils Reading Zero Words (Both Passages)

At the end of Term 1

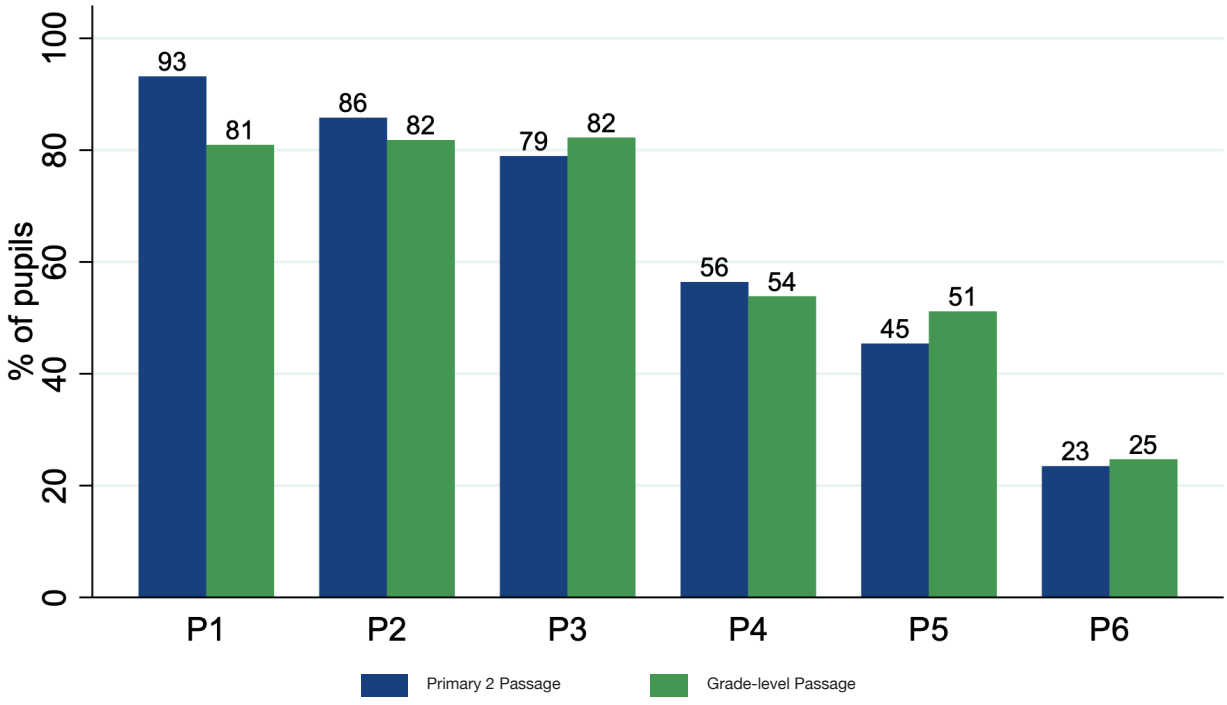


Figure 4.1

Low reading fluency translated into low comprehension levels

As a result of these critically low reading fluency levels, reading comprehension was an exceptionally rare skill among Primary pupils. On average, pupils in Bayelsa schools scored approximately 2.5% on a reading comprehension assessment. Even in upper-Primary, the average score was only 3.7%. In fact, 90% of all upper-Primary pupils were unable to answer a single reading comprehension question. Worryingly, only 2% of pupils could answer more than one out of four questions correctly, and only 0.5% of all pupils could accurately answer more than half of the questions. This is not surprising given that a certain level of fluency is needed to comprehend a text. The median pupil who scored 0% on reading comprehension was not able to read a single word of a Grade 2 passage correctly. (See Appendix B for reading passages and corresponding comprehension questions used to assess pupils.) Without the ability to comprehend written text, pupils were unable to benefit from academic materials across all subjects. Therefore, these low comprehension levels were a severe hindrance to the academic potential of children within Bayelsa State.

Pupil Average Reading Comprehension By Grade and Passage

At the end of Term 1

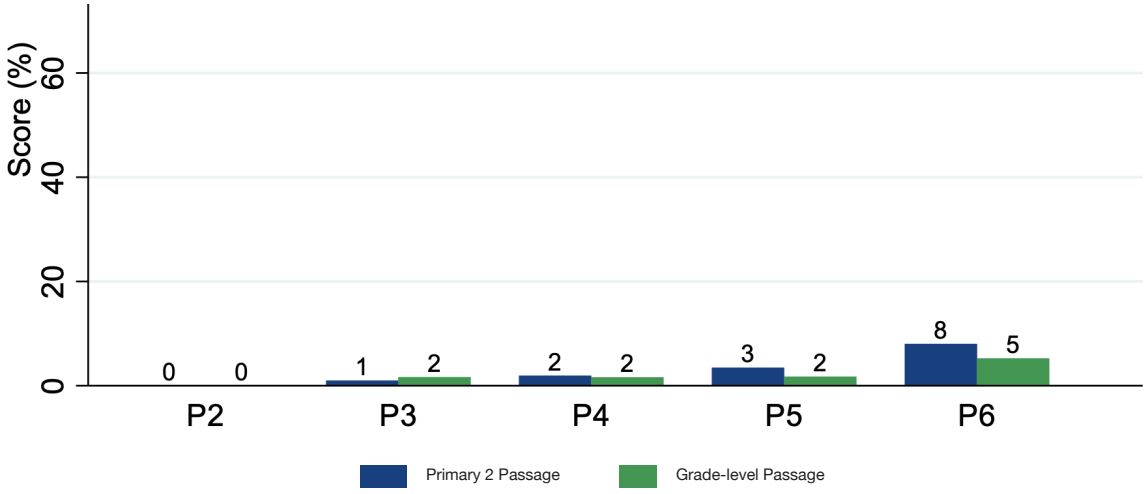
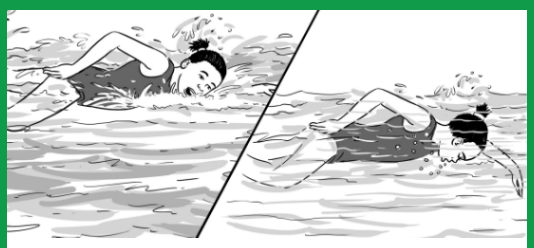


Figure 4.2



To float is to stay still above water. We float by filling our body with air. If we are tired in the water, we float. We can float on our front. It is a front float. We can float on our backs. It is a back float.

Above images are taken from page 280 of a Primary 2 Science NERDC textbook.

The average Primary 6 pupil could barely read the first sentence of the passage to the left in under a minute despite the fact that this is from a Basic Science textbook ***for Primary 2.***

No Primary 2 pupil surveyed could read a single word of this passage from their own textbook in a minute.

Pupils Struggled to Master Basic Mathematics Skills

Similar to literacy, pupils proficient in mathematics were few and far between in Bayelsa State. In Primary 1, only approximately 1 in 10 pupils could solve a simple addition task (32+15). By Primary 6, even though the share of pupils with the ability to solve simple addition problems went up to approximately 3 in 4, 50% of Primary 6 pupils could not perform a simple division problem such as '9÷3'. According to both the NERDC curriculum and UNESCO's Global Proficiency Framework for Mathematics, this is a skill which should be mastered in Primary 3. Therefore, half of all P6 pupils in government schools in Bayelsa are 3 years behind curricular expectations. A similar pattern was observed for subtraction: by Primary 6, nearly 40% of pupils could not solve a simple subtraction problem such as '46-21'. The NERDC curriculum classifies this as a Primary 2-level skill. This lack of proficiency with basic operations prevented pupils from progressing in an inherently cumulative mathematics curriculum. For more information on how ICAN results were mapped onto the Global Proficiency Framework for the purposes of this report, see Appendix D.

Share of Pupils Who Can Perform Simple Operations By Grade and Domain

At the end of Term 1

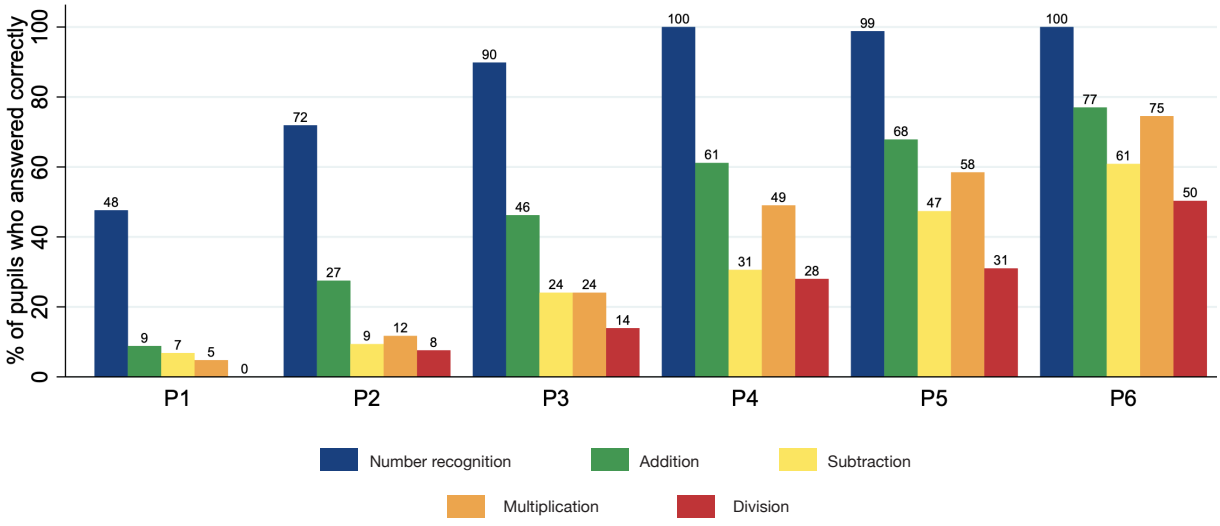


Figure 4.3

In turn, what was surprising is that even the few pupils who could perform more complex operational mathematics tasks often struggled to translate these skills into real-world situations. In fact, only 50% of all pupils who could answer "78-29" were also able to answer "There were 43 children in the park. Out of these, 25 of them have gone home. How many children are left in the park now?" — even though both problems require subtraction of two digit numbers with regrouping.

Share of Pupils who Can Solve Complex Subtraction Problems

At the end of Term 1

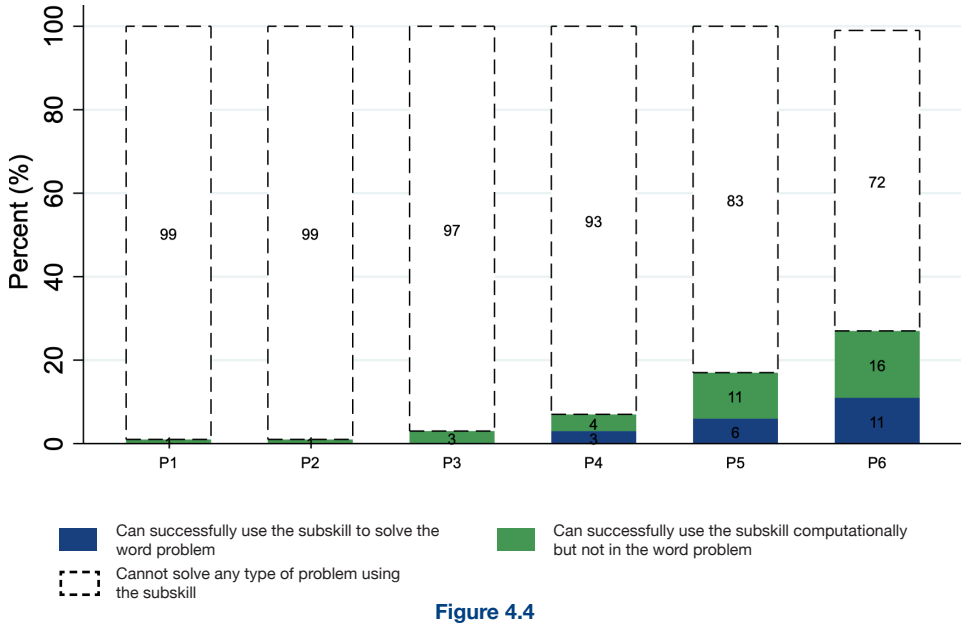


Figure 4.4

Poor outcomes in operational and word problems implied that pupils had difficulty applying their maths skills to contexts outside of the classroom. This compounds with poor English skills, setting pupils up to fall behind and drop out of school (World Bank, 2018).

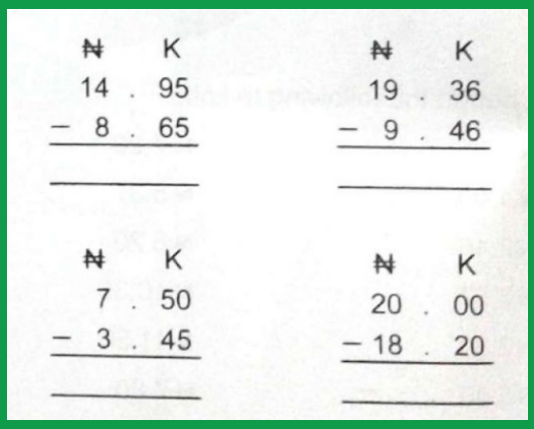


Image taken from pg 86 of Understanding Mathematics for Primary 2 by Maria N. David-Osuagwu, PhD.

Fewer than 30% of Primary 6 pupils were able to solve any of the subtraction problems on the left, despite the fact that this is a mathematics textbook for ***Primary 2.***

Virtually no Primary 2 pupil could accurately solve any of the subtraction problems shown ***from their own textbook.***

Prior to the BayelsaPRIME programme, the Bayelsa State education system was unable to provide its pupils with the opportunity to realise their full potential — in spite of the large efforts and resources that stakeholders within the system individually devoted to it. A majority of pupils could not read, understand, or effectively interact with written English, let alone their learning materials. For more information on the consequences of overambitious curricula, see Box 3. However, after just 19 weeks of the BayelsaPRIME programme, the education system is beginning to realise its potential to produce high-level learning outcomes for its pupils.

Box 3

How Overambitious Curricula are Facilitating Low Learning Outcomes in Low- and Middle-Income Countries

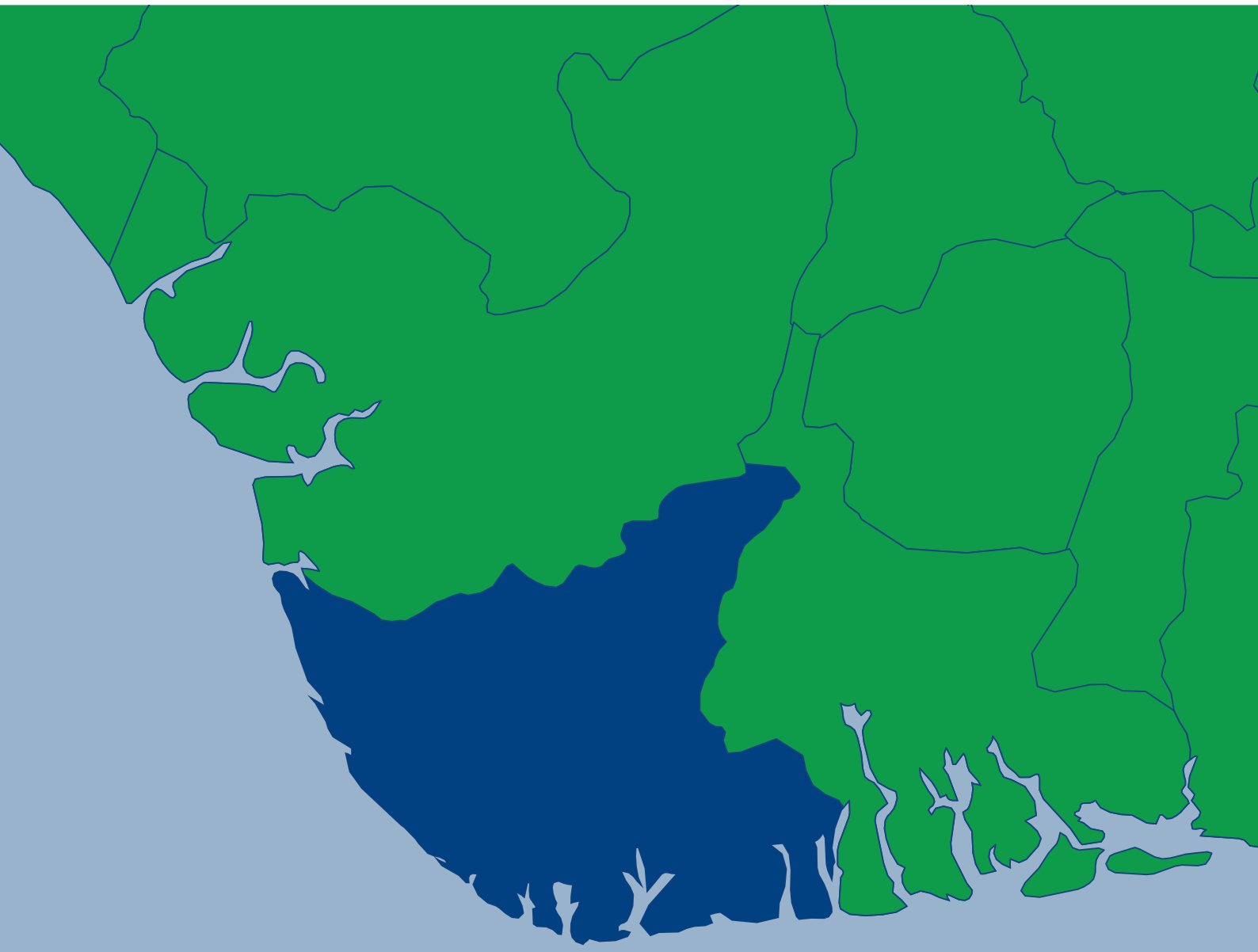
Curricula play a crucial role in educational systems because they establish standardised content and instructional approaches on a system-wide scale. Ideally, curricula should align with the economic and developmental needs of students and the country. However, in many low- and middle-income countries, researchers have documented the common discrepancy between students' actual performance and curricular expectations, particularly in the early grades — resulting in "overambitious curricula" (Pritchett & Beatty, 2015). In part, the misalignment between curricula and students' learning levels is due to inadequate measurement; that is, students are not being assessed in the early grades for their mastery of foundational skills, and/or the results from these assessments are not systematically informing whether students move to the next level. In addition, misalignment can result from curricula that inherently outpace children's cognitive capabilities. For example, in Meghalaya, India, 10 year old children are expected to accurately find the "smallest whole number by which [a number can] be divided so as to get a perfect square, and find the square root of the number obtained" (NCERT, 2018). Even in high-performing countries such as South Korea, students are not expected to solve this type of problem until age 12 (Park, 1997). This discrepancy between expectation and capacity has been suggested to be one of many contributors to the current learning crisis (Glewwe et al., 2009; Muralidharan et al., 2019). Importantly, the consequences of poorly structured curricula that drive low foundational literacy and numeracy outcomes are not exclusive to the early grades, due to the cumulative nature of learning. Students who perform poorly in early elementary school are more likely to drop out when compared to their peers (World Bank, 2018). Conversely, mastery of foundational literacy and numeracy (FLN) skills is correlated with future success in secondary school and future employment opportunities (Evans & Hares, 2021; Muralidharan & Sundararaman, 2010). Therefore, effectively implemented, large-scale curricular reforms focusing on foundational literacy and numeracy in low- and middle-income countries can bridge the gap between students' knowledge and policymakers' educational goals and lead to improved learning outcomes and increased regional economic productivity.

Curricular changes that align instruction with students' measured levels, particularly with respect to FLN, have been shown to assist low-performing students in achieving national standards. For example, a study in India implemented a curriculum that was better suited to the median student's level with scientifically tested learning materials and accessible technology, which resulted in increased achievement in maths and Hindi after just 4.5 months

(Muralidharan et al., 2019). In Tanzania, targeted restructuring of early elementary curriculum to better suit the median student's performance was found to increase all participating students' proficiency in literacy and numeracy in grades 1 and 2. Students were twice as likely to reach minimum proficiency in grade 2 maths and significantly improved their language proficiency when compared to their peers who did not receive the restructured curriculum (Rodriguez-Segura & Mbiti, 2022). In both studies, researchers note that a key element to the success of these programs was the initial low learning outcomes in the nation. Bringing instruction closer to the average student's levels led to wide-spread benefits, as the median student in many low- and middle-income countries tends to have similar outcomes to the lowest performing students. Also, in both India and Tanzania, these curricular reforms were found to be cost-effective in that they did not require expensive inputs, such as increased staffing in schools or additional classroom resources. Because curricula can be restructured and implemented on a system-wide scale with minimal cost, curricular reforms can yield high returns on learning outcomes in LMIC.

To effectively develop and implement high-quality curricula, data collection and effective educational pedagogy must be incorporated with intention. Accurate and regular data collection on student performance is crucial for tailoring the curriculum to the needs of the student population. Analysing student performance throughout the academic year enables policymakers to identify areas where students are struggling and allocate more attention accordingly. In a curriculum reform in Costa Rica (Rodriguez-Segura, 2020), the lack of monitoring teaching methods and reliance on end-of-year results resulted in unintended consequences, such as long-term grade repetition and insufficient improvement in reading skills. However, when curriculum reforms are aligned with the median student's academic performance and incorporate effective pedagogical practices at the individual level, they can successfully enhance learning outcomes on a broader scale (Rodriguez-Segura & Mbiti, 2022). Well-designed curricula provide clear guidance to teachers regarding prioritised topics, pacing, and learning objectives for students at different academic stages, leading to improved learning outcomes without requiring high-cost measures, such as additional teachers or instructional time. By prioritising mastery of essential pre-skills in curricula before introducing new content, governments can significantly enhance the likelihood of meaningful learning outcomes for both whole classes and individual students.

V. Achievements During the First 19 Weeks of the Programme

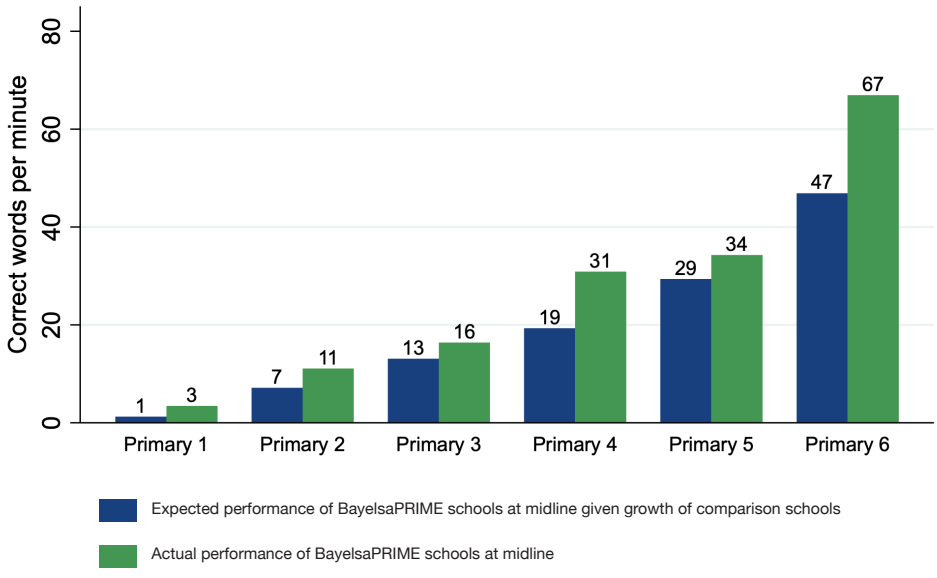


English Reading Fluency

Within only 19 weeks of instruction, the average pupil in BayelsaPRIME schools gained between 8 and 10 cwpm beyond what they would have gained without the programme. **Notably, pupils in Primary 6 increased their English reading fluency by 20 cwpm more than expected with a Primary 2-level passage, given the progress made by pupils in non-BayelsaPRIME schools.** In addition to making large gains over the course of the 19-week period, pupils in Primary 6 ended the period with an average reading fluency of 67 cwpm; given that 45-60 cwpm is a threshold[3] at which pupils begin to comprehend text, pupils will have greater access to written content in other subjects and be more likely to continue learning as they progress in their academic career. The pupils benefiting from this instruction have achieved this improvement in only 19 weeks of instruction, indicating that they are on a promising pathway towards English proficiency, establishing the foundation for future learning in other subjects.

BayelsaPRIME: Reading Fluency (Primary 2 Passage)

By grade



Note: Estimates pool results from Primary and Progressive schools, applying weights to reflect the full distribution of pupils across school types.

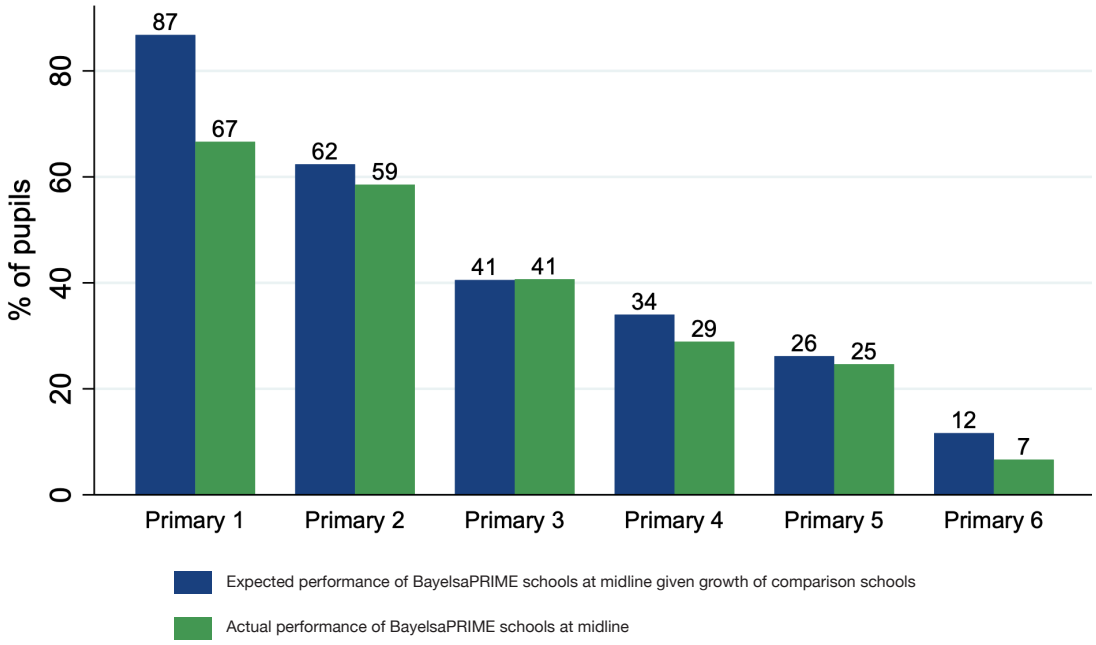
Figure 5.1

[3] Abadzi, H. (2012). Developing cross-language metrics for reading fluency measurement: some issues and options. GPE Working Paper Series on Learning No. 6.

The BayelsaPRIME programme also decreased the total number of non-readers in the state. Prior to the programme rollout, over 4 out of 5 pupils in Primary 1 were unable to read a single English word within a minute. After only 19 weeks, the proportion of non-reading Primary 1 pupils was 25% lower than those schools that had not implemented the programme. Across the entire representative sample, the BayelsaPRIME programme decreased the number of non-readers by 5% within only 19 weeks.[4] These data imply that across all 216 BayelsaPRIME schools, an estimated 2,160 children are no longer classified as non-readers because of the programme. This number is expected to only grow the longer the programme is in place.

BayelsaPRIME: Non-readers (Primary 2 Passage)

By grade



Note: Estimates pool results from Primary and Progressive schools, applying weights to reflect the full distribution of pupils across school types.

Figure 5.2

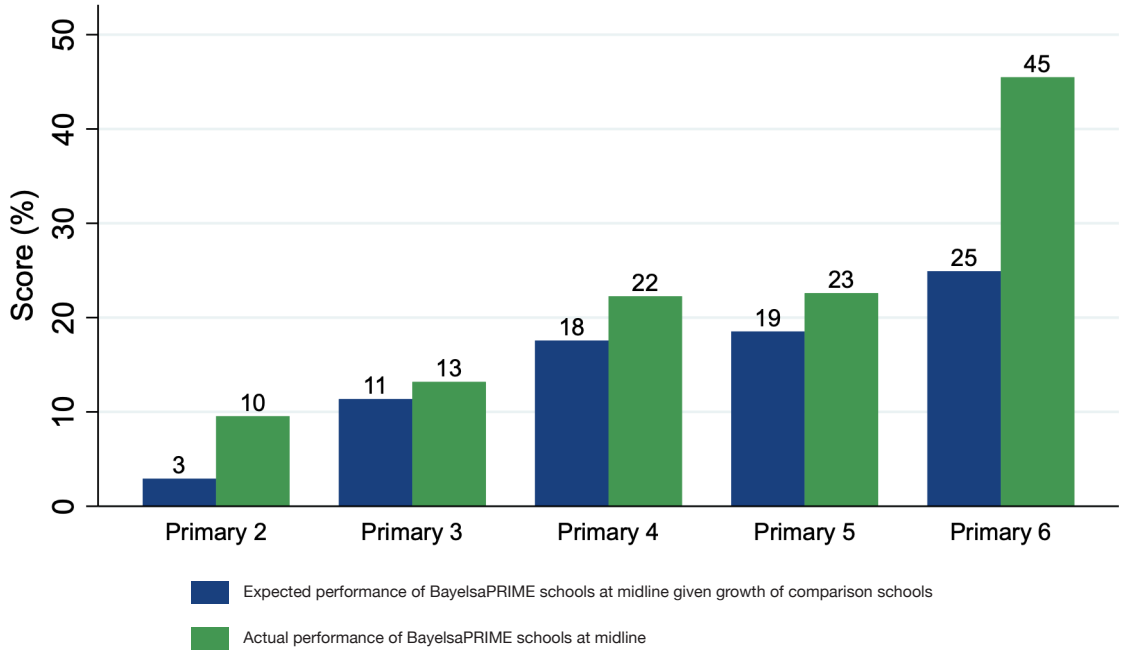
[4] Results across the full sample of treatment schools pool results from Primary and Progressive schools when given a grade-level passage, applying weights to reflect the distribution of pupils across school types.

Reading Comprehension

Like English reading fluency, the programme successfully increased reading comprehension levels across all grades. BayelsaPRIME raised the average pupil's comprehension score by an impressive 5.4 percentage points. **The largest gains were observed amongst Primary 2 and 6 pupils. Primary 6 pupils experienced an impressive 20 percentage point (or 80%) increase in their reading comprehension scores within just 19 weeks, while Primary 2 pupils tripled their comprehension scores during the same period.** BayelsaPRIME pupils have made substantial progress within only 19 weeks, positioning them on a promising trajectory towards achieving advanced levels of literacy proficiency. This proficiency, in turn, is expected to have a significant bearing on their overall performance across various core subjects. For more information on the connection between reading fluency and comprehension, see Box 4.

BayelsaPRIME: Reading Comprehension (Both Passages)

By grade



Note: Estimates pool results from Primary and Progressive schools, applying weights to reflect the full distribution of pupils across school types.

Figure 5.3

Box 4

The Relationship Between Oral Reading Fluency and Reading Comprehension

Being able to read with comprehension is the ultimate goal of literacy. Reading comprehension is a complex skill which encompasses a wide range of cognitive capacities such as attention, memory, critical analytic ability, inferencing, and visualisation (Snow, 2002), and as such, it is a challenging construct to measure and compare across contexts. There are various ways in which evaluators can assess comprehension, including multiple choice questions, fill-in-the-blank tasks, and writing summaries (Habib, 2016). Certain administration characteristics like timing and rereading practices can also make a difference in the quantification of reading comprehension outcomes. Furthermore, the use and types of administration practices vary greatly across assessments, making it difficult to establish a standardised measure of reading comprehension levels.

Education research has consistently documented a strong, positive relationship between "oral reading fluency" and reading comprehension. "Oral reading fluency" (ORF), or simply "fluency," refers to the efficient, effective word recognition skills that allow a reader to derive meaning from the text. Fluency is typically composed of three major components — accuracy, the ability to precisely decode words; automaticity, the capability to recognise and decode words effortlessly; and prosody, the skill to read a text with appropriate expression and intonation (Aldhanhani & Abu-Ayyash, 2020; Pikulski & Chard, 2005) — and is typically measured in units of "correct words per minute" (cwpm), enabling a simpler comparison across contexts than other units of measurement of literacy outcomes.

Importantly, researchers have established a clear link between fluency and reading comprehension. For instance, using the Early Grade Reading Assessment, Jiménez et al. (2014) found fluency to be a key predictor of reading comprehension performance, with pupils who had high ORF scores exhibiting significantly higher average comprehension scores. Additionally, interventions that focus on increasing fluency have demonstrated considerable improvements in reading comprehension (Klauda & Guthrie, 2008). Often, a significant portion of pupils who struggle with comprehension find that their issues stem from a deficiency in oral fluency (Aldhanhani & Abu-Ayyash, 2020; Abadzi, 2011). Hence, a lack of appropriate reading fluency negatively impacts both the further development of reading comprehension and academic performance throughout subsequent years of schooling.

Given the close empirical relationship between fluency and reading comprehension, ORF can be used as a proxy for assessing broader literacy skills. Fluency involves many of the same processes that make up reading comprehension, and in contrast to reading comprehension, is easy to measure, comparable across contexts, and is a construct for which there are well-known benchmarks (Pikulski & Chard, 2005; Rodriguez-Segura et al., 2021). Therefore, the value of measuring fluency lies not only in its intrinsic significance but also in its role as a signal that prefigures important, harder-to-measure skills such as reading comprehension.

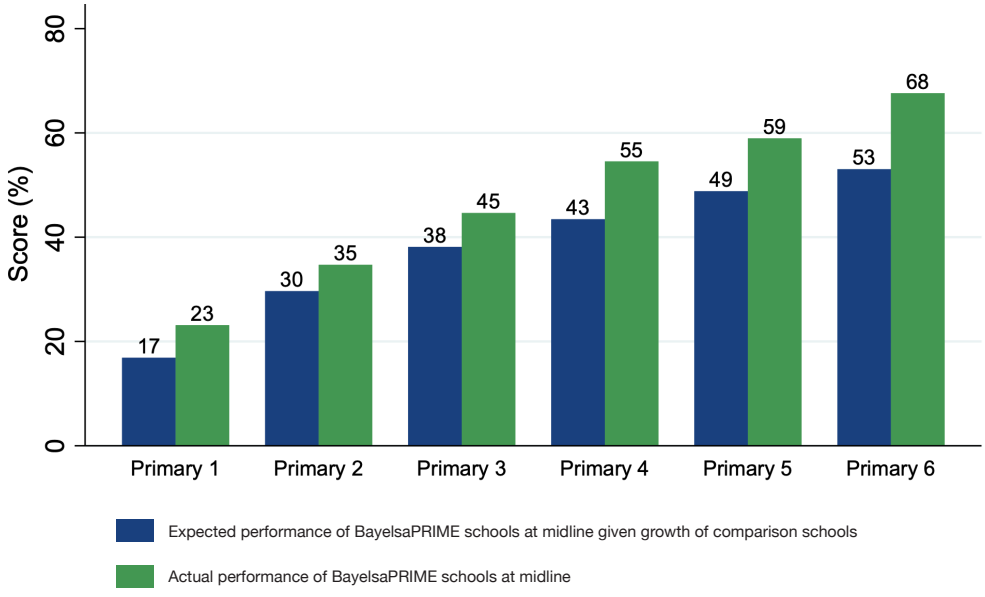
Foundational Mathematics

All Primary grades have improved in all foundational mathematics skills measured by the ICAN assessment, with an average increase in test scores of 9 percentage points. Since the average grade-on-grade growth before the programme was 10 percentage points on this score, the gains achieved in maths amount to almost a full year of education before BayelsaPRIME. Similarly, with the programme, Primary 3 pupils exceeded Primary 4 numeracy levels, and both Primary 4 and 5 pupils surpassed Primary 6 levels. From this angle, one can also see that **Primary 3 and 5 pupils achieved a year's worth of numeracy progress in 19 weeks, while Primary 4 achieved two years' worth in the same period.**

These results were most prominent in subtraction and multiplication skills. Across the entire sample, the BayelsaPRIME programme increased pupils' ICAN test scores by 15 percentage points more than non-BayelsaPRIME pupils in complex subtraction, and 11.44 percentage points in simple multiplication. These results were concentrated in upper-level Primary grades, where subtraction and multiplication are increasingly necessary in order to progress through the curriculum.

BayelsaPRIME: Average ICAN Score

By grade



Note: Estimates pool results from Primary and Progressive schools, applying weights to reflect the full distribution of pupils across school types.

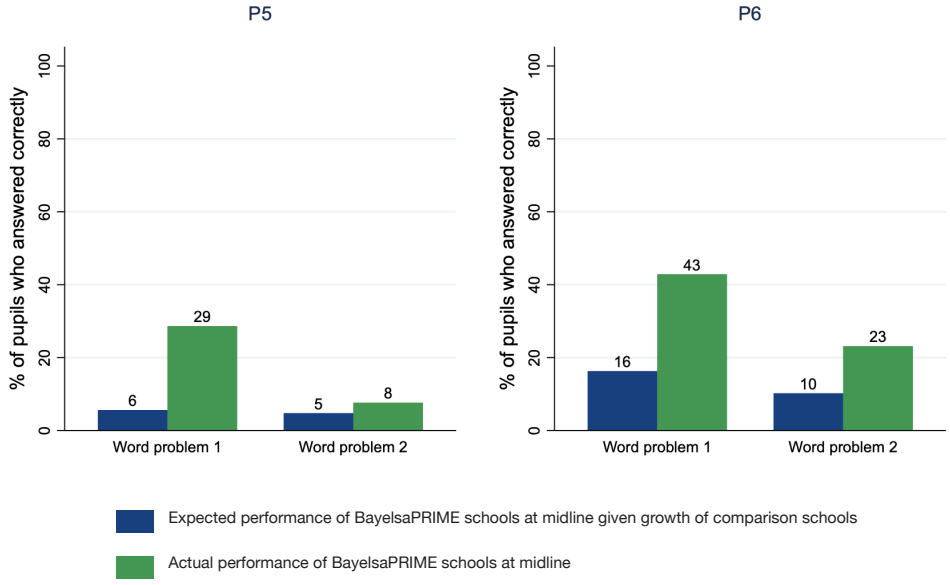
Figure 5.4

> "My child has improved significantly, especially in mathematics."
>
> — Respondent 23, BayelsaPRIME Parent

Along with operational skills, significant improvement was measured in word problem proficiency among upper Primary pupils as well. With word problems involving subtraction, the average Primary 3-5 pupil ended the 19-week period outperforming expectations set for one grade above them. In other words, pupils in Primary 3-5 gained the equivalent of one year's worth of instruction in only 19 weeks with the BayelsaPRIME programme. Increased proficiency with operational problems gives pupils the tools needed to develop their capacity for word problems, as they are able to apply a skill that they have mastered to a new, more challenging, and more practical application.

BayelsaPRIME: Pupil Math Performance (ICAN)

By word problem subskills and grade



Note: Estimates pool results from Primary and Progressive schools, applying weights to reflect the full distribution of pupils across school types.

Figure 5.5

EGMA Results

Early childhood education is one of the most cost-effective and impactful education interventions available to governments, as it consequently increases the efficacy of subsequent education systems and investments on a national scale. Ensuring school-readiness before entering Primary school reduces variability and raises learning outcomes overall, thereby rendering instruction appropriately levelled to a greater number of children. Children who are enrolled in Primary school without necessary prerequisite foundational skills are much less likely to succeed academically in the future (Bendini et al., 2022). The BayelsaPRIME Early Childhood Care and Development Education (ECCDE) programme is designed to give early learners the mathematics and English skills necessary to maximise learning in Primary school. Despite staffing and programme implementation issues, the programme helped pre-Primary pupils improve on foundational skills on average, increasing the overall efficacy of the Bayelsa State education system.

Pupils show promising results in early mathematics subskills

During the first 19 weeks of the programme, pupils have increased their capacity for early maths subskills over the course of the programme.[5] **In every subskill measured by the EGMA exam, pupils improved their scores faster than children in non-BayelsaPRIME schools during the same period.** Given the performance of children in non-BayelsaPRIME schools, children outperformed expectations in number identification by 18 percentage points (a 56% increase), number discrimination by 14 percentage points (a 35% increase), and word problems by 10 percentage points (a 50% increase).

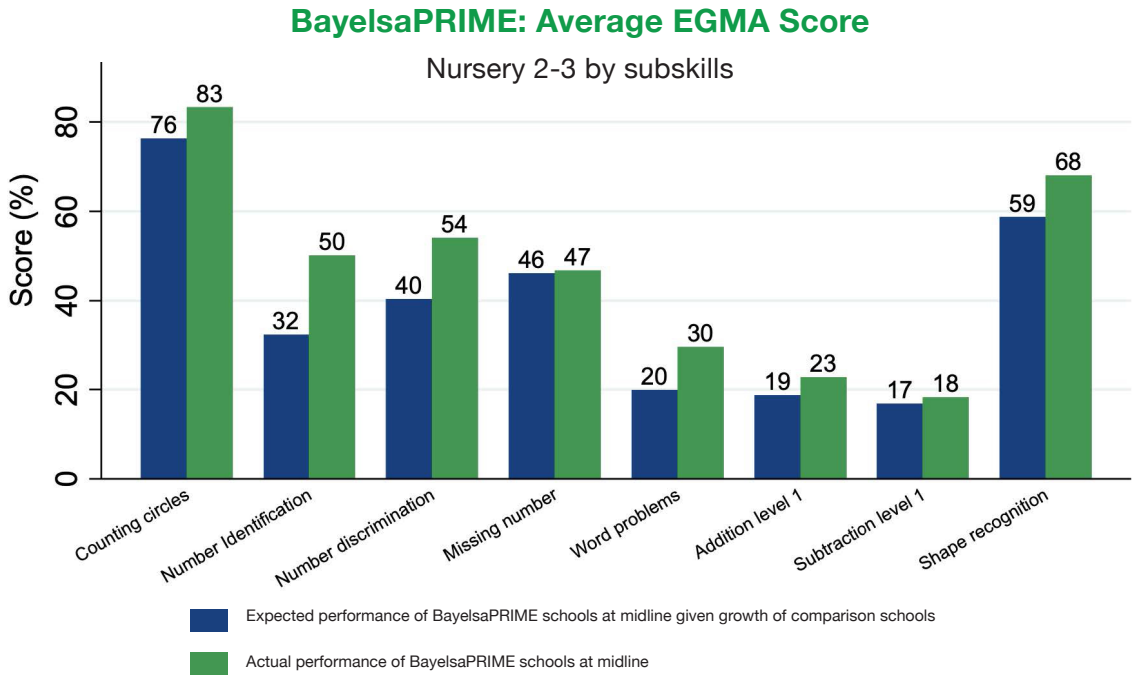


Figure 5.6

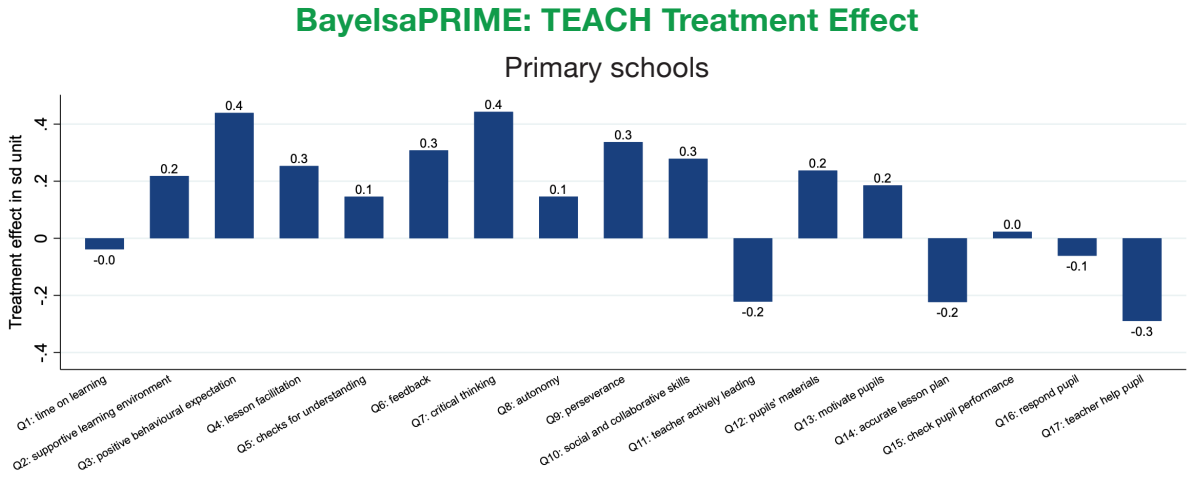
Instructional Quality

Teachers improved the quality of their instruction over the 19 weeks

For any education system to deliver strong outcomes, it is critically important that teachers deliver high quality instruction. Effective teachers are well-equipped with the classroom management capabilities and pedagogical knowledge necessary to equitably and effectively engage with pupils, assess their pupils' disparate achievement levels, and facilitate productive learning gains. The TEACH Tool from the World Bank is designed to measure the rate at which teachers engage in these research-proven practices. Data indicating instructional quality - i.e., teachers' pedagogical practices - are valuable to head teachers and support staff, as this information helps them better support teachers and monitor their progress in implementing pedagogical practices.

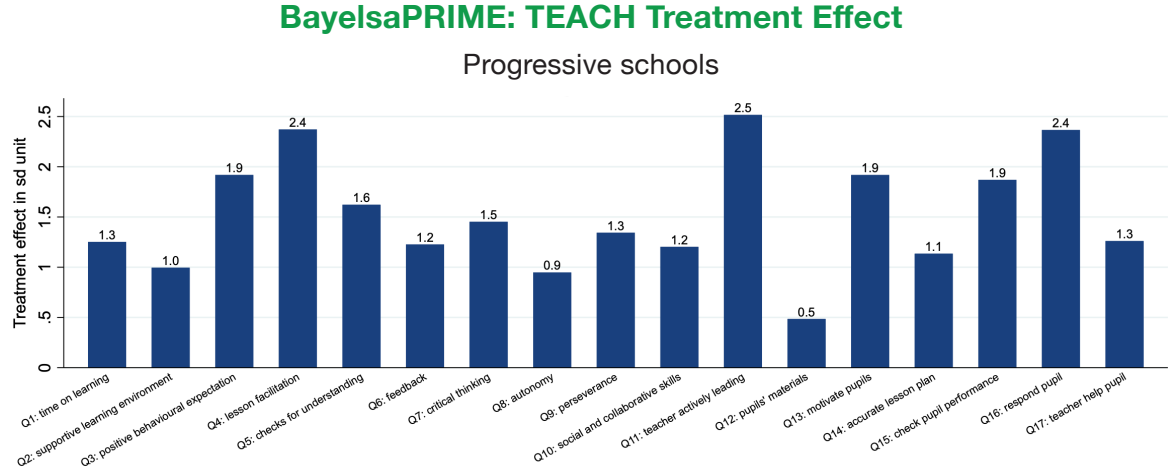
[5] Due to the limited number of existing ECCDE programmes in Bayelsa, as well as issues regarding data collection and data quality, Progressive-model ECCDE programmes are not represented in this report. All EGRA and EGMA data shown are exclusive to Primary-model schools.

Data gathered using the TEACH Tool show significant improvements by the average BayelsaPRIME teacher in most areas measured, as compared to teachers outside of the programme.[6] **Teachers in both Primary-model and Progressive-model schools significantly improved their capacity for critical thinking, ability to persevere through difficult lessons, and expectations of pupil's behaviour.**[7] Overall, the TEACH data shown in Figures 5.7 and 5.8 in conjunction with data on learning outcomes ultimately point to higher quality of instruction in BayelsaPRIME schools with the implementation of the programme. For more information on the importance of instructional quality and structured pedagogy, see Box 5.



Note: The data is standardised across full sample.

Figure 5.7



Note: The data is standardised across full sample.

Figure 5.8

[6] The sample size differs notably between chronically understaffed schools and Primary-model schools, with 8 schools in the chronically understaffed sample and 47 in that of the Primary-model. Data on pedagogical practices for ECCDE teachers were not collected due to inapplicability of the TEACH Tool to early childhood educational settings.

[7] As discussed in Section III: Methodology, the TEACH data on instructional quality improvements may underestimate the programme's impact on teachers' skills and instruction. Since teacher training occurred before baseline data collection, the effects of these training sessions are not reflected in this report. For example, Figure 5.7 indicates a negative treatment effect for Question 14, suggesting no improvement in the use of accurate lesson plans. Comparison teachers go from 48% to 55% from baseline to midline, gaining 7 percentage points, while teachers in the treatment group go from 70% to 76%, gaining approximately 6 percentage points — suggesting that the treatment effect for the full sample per the difference-in-differences estimate is approximately -1 percentage point. Yet, since the treatment effect is measured from baseline to midline and training happened before baseline, the programme might have positively impacted accurate lesson plans prior to baseline, which is not captured in these analyses. In fact, assuming BayelsaPRIME teachers prior to training were comparable to their counterparts, the baseline value for the treatment group is approximately 22 percentage points higher than that in the comparison group for the full sample.

According to qualitative data, community members report noticeable improvements in the local teachers' pedagogical methodologies. Parents and head teachers in BayelsaPRIME schools expressed greater satisfaction with their teachers' renewed punctuality and consistent dedication to properly imparting the day's lesson.

> "The teachers have been really trying, they attend classes regularly. They are also employing [new] teaching methods."
>
> — Respondent 20, Parent of Kpansha Primary Pupil

> "The programme is laudable for me as a Headteacher as it ensures effective teacher management with the smartphone, helping to make teachers active and punctual in school."
>
> — Respondent 10, Head Teacher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Box 5

Enhancing Learning Outcomes Through Structured Pedagogy

Classroom instruction is one of the most important components of an educational system. Teacher and lesson quality have a greater impact on pupil achievement than any other school-level factor (World Bank, 2018). The absence of effective instructional practices can consequently render education inputs and systems futile. One of the most effective ways to maximise instructional quality at scale is to incorporate appropriately scaffolded lessons and curricula which enhance retention, employ proven instructional strategies, and are facilitated by educators who possess a comprehensive understanding of subject matter. Unfortunately, classroom instruction in many low- and middle-income countries lack these critical characteristics. Data collected from 2,600 schools over 7 countries in sub-Saharan Africa show that approximately 14% of grade 4 language teachers could not spell a simple word like “traffic”, and a similar share could not correctly answer questions on a simple grammar exercise. Moreover, even when teachers did possess an adequate amount of subject matter expertise, it did not guarantee their ability to communicate knowledge to pupils. The same study found that only 31% of teachers were able to independently prepare a lesson plan, and an even smaller share of teachers could develop lesson objectives, formulate questions to check pupils’ understanding, and give feedback (Bold et al., 2017). Given the challenges many teachers face regarding lesson planning, competing time demands, school understaffing, and absenteeism rates, it is highly probable that educators lack both the time and capacity required to develop comprehensive course syllabi.

According to the World Bank, structured pedagogy is a package for educational systems that consists of inputs such as lesson plans, learning materials, and ongoing teacher training. Structured pedagogy has been classified as a highly cost-effective intervention by an advisory panel made up of international education experts (World Bank, UNICEF, & USAID, 2023). This makes pedagogy reform and implementation particularly attractive for countries who are facing budgetary challenges and inequitable learning outcomes, as it equips teachers with expertly developed and coherent materials, benefiting pupils regardless of external factors such as location, income, or background (The World Bank et al., 2023). Evidence indicates that structured pedagogy has significantly improved learning outcomes in several LMIC. For instance, the RARA (Nigeria Reading and Access Research Activity) programme focusing on supporting teachers with lesson plans and effective strategies resulted in substantial gains in

language fluency for Primary 2 pupils, equivalent to almost half a year of additional schooling (RTI International, 2015). Similar patterns were observed in a 2018 study by Research Triangle International (RTI), which highlighted the contribution of structured lesson plans to improved learning outcomes across 19 education programs in 13 countries (Piper et al., 2018). In a randomised control trial, conducted by a group of education experts led by Nobel Prize-winner Dr. Michael Kremer, pre-Primary and Primary pupils enrolled in Kenyan schools using structured pedagogy for two years experienced average learning gains equivalent to 1.5 and 0.8 additional years of schooling respectively, ranking in the 99th percentile of effect sizes measured in LMIC education studies (Gray-Lobe et al., 2022). A comparable model evaluated in government schools in Rwanda also yielded substantial gains after only 17 weeks of instruction (Rodriguez-Segura et al., 2023). While evidence supports the positive impacts of structured pedagogy, it is important to note that this intervention is not monolithic in its ability to improve learning outcomes.

The efficacy of structured pedagogy relies on well-crafted implementation, comprehensive support, and monitoring. Empirical research indicates that structured pedagogy, when lacking research-supported methodologies and adequately trained educators to implement it, can lead to diminished or negligible effects on learning outcomes. In sub-Saharan African school systems between 1990 and 2010, despite the provision of new lesson plans and materials, learning outcomes stagnated due to inadequate teacher training (Hassan et al., 2022). Similar studies in Kenya, Uganda, and Malawi found that after implementing reformed pedagogy, teachers who received minimal training exhibited lower levels of effectiveness (Piper et al., 2018). To address this issue, robust monitoring mechanisms are essential. The same 2018 studies have shown that incorporating effective teaching aids, prioritising core competencies like literacy and comprehension, and reinforcing prior knowledge positively impacts learning outcomes. Through effective implementation strategies, resources tailored to diverse classroom settings, and comprehensive training, structured pedagogy can improve learning outcomes and empower teachers to facilitate meaningful educational experiences for pupils.

BayelsaPRIME Improved Learning Outcomes for Pupils Regardless of Gender

In Primary-model schools — which encompass approximately 95% of the sampled schools — notable improvements in educational outcomes were observed for both boys and girls. These advancements surpass those measured in comparison schools, primarily due to the BayelsaPRIME programme's impactful interventions. Therefore, boys and girls benefited equally from the programme.

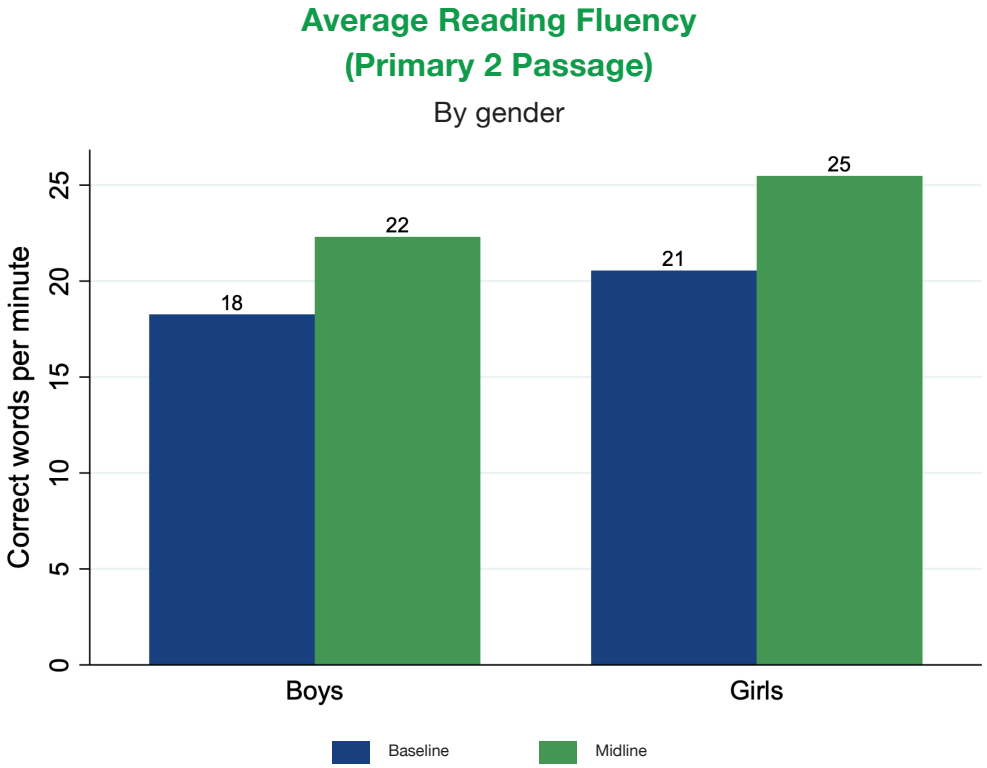

Figure 5.9

Community Perceptions of Education Quality

Parents and educational staff saw meaningful changes in education

Since the programme was implemented in January of 2023, community members including pupils, parents, teachers, and staff have observed noticeable and positive changes in the education system. **Qualitative data show that the BayelsaPRIME programme has been met with abundant approval from pivotal stakeholders in Bayelsa State.** Since the programme's expansion, it has provided school-level accountability and support systems, which forms the necessary foundation for teachers to optimise their performance. Head teachers and supervisors have noted increased attendance and quality among their teaching staff. In turn, the improved teacher performance has driven greater enthusiasm among families to encourage school attendance and engagement.

"Teachers are now being held accountable. Gone are the days when teachers' absenteeism was a norm. Now, teachers understand that they have to turn up to work on school days."

— Respondent 1, School Supervisor

"My child has become more interested in school since I moved her from a private school to Modern Primary school. For the first time, she has come first in her semester examination."

— Respondent 2, Parent of Modern Primary School Pupil

"The programme couldn't have come at a better time… I believe we have made an impact. Pupils are now more motivated to come to school."

— Respondent 18, School Supervisor

Even when all of the critical components of an education system are aligned towards a common goal of producing significant learning gains, the quality of this system must be apparent to the surrounding community in order for it to ultimately thrive. It is therefore essential that parents, pupils, and education personnel jointly recognise the benefits of participating in the BayelsaPRIME programme. The public response to the BayelsaPRIME programme emphasises the impact that the BayelsaPRIME programme has had on communal perceptions of the Bayelsa State education system. People of Bayelsa State recognise the positive impact that the programme has had on their schools and children, and are in full support of the programme's continuation.


SATURDAY
SUNDAY
MAY
JUNE
JULY
AUGUST
Pp
Gg
Hh
UBEC/SUBEB/
FURNITURE NCB/
2021/LOT 06
UBEC/SUBEB/
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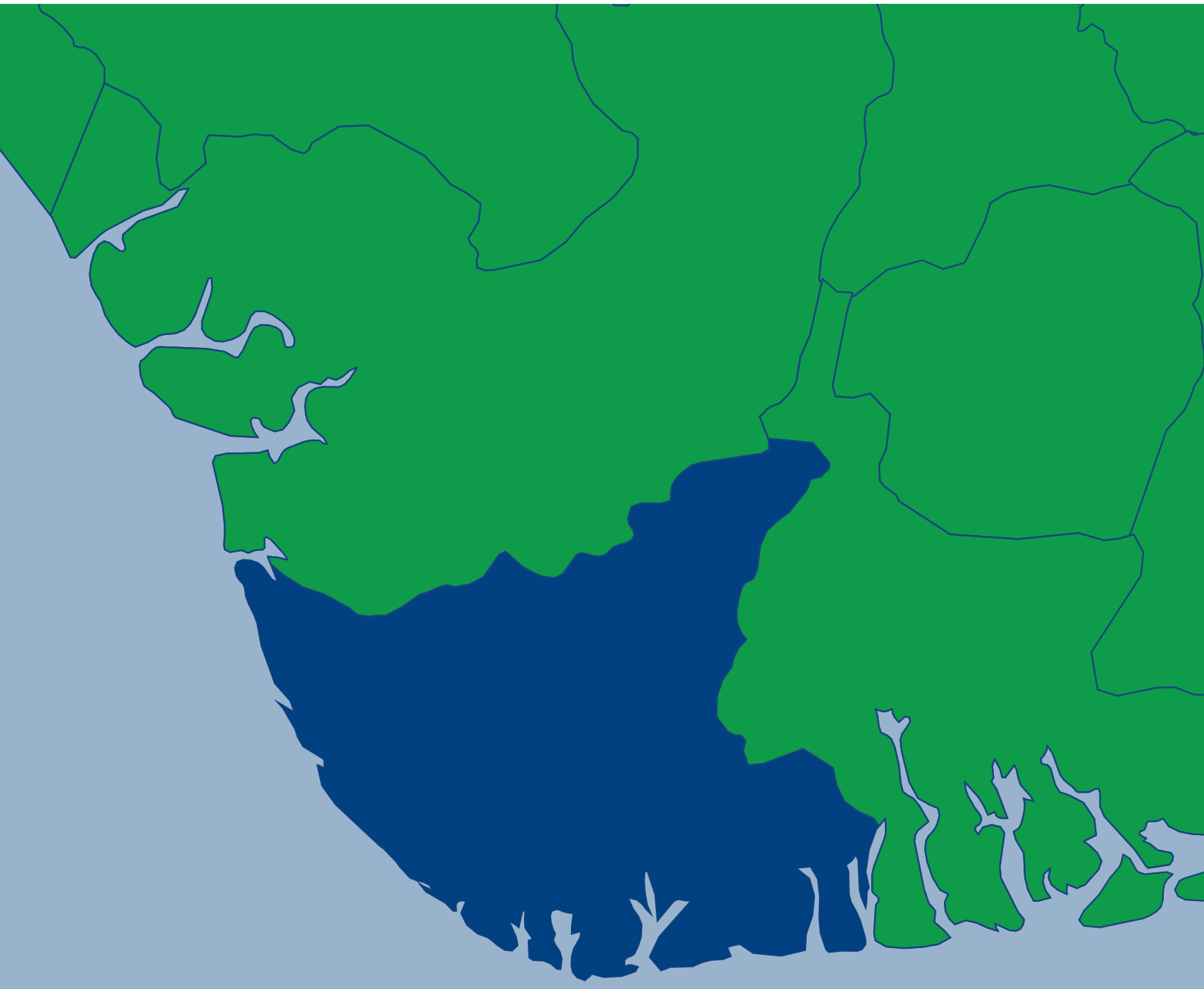
VI. Lessons Learned and Recommendations for the Programme's Enhancement



Programmatic Recommendations for Future Improvement

After 19 weeks of instruction, the BayelsaPRIME programme has gained momentum in transforming the educational landscape within the State, effectively adapting its approach to meet the specific needs of both pupils and school staff. In turn, the quality of instruction and pupil learning outcomes continue to improve year-on-year. During the first 19 weeks of the programme, pupils made tremendous strides in foundational literacy and numeracy. The average pupil in Primary 3 and 4 gained the equivalent of a year's worth of literacy and maths instruction. The BayelsaPRIME programme decreased the number of non-readers in Primary 1 by 25%. The average Primary 4 pupil in a BayelsaPRIME school surpassed Primary 6 numeracy expectations, as measured by their composite ICAN score. These findings, among other improvements, demonstrate the positive impact of the continued educational investments made by the Bayelsa State Government.

Despite the improvements observed by the end of the 2022-23 school year, more work is required in order to sustain these positive trends — and build upon them — in the coming years of the programme. Learning outcomes in Progressive-model schools and ECCDE programmes did not improve at the same rate as those in adequately staffed, Primary-model schools. Therefore, for the 2023-24 school year and beyond, the BayelsaPRIME programme will focus on improving learning outcomes specifically in Progressive-model schools and ECCDE programmes, while continuing to provide high-quality, effective instruction to all pupils in the BayelsaPRIME programme.

Pupils in chronically-understaffed schools received less instruction overall than their peers in adequately-staffed schools

In these chronically-understaffed schools, BayelsaPRIME teachers had an average lesson completion rate of 36%, compared to 53% among teachers in Primary-model schools. Not only did teachers in understaffed schools get through less of the curriculum, but they also faced higher rates of chronic absenteeism among their pupils. As seen in Figure 6.1, a higher percentage of Progressive-model pupils were chronically absent from school — those with the extremely low attendance rates — shown by the red peak on the left side of the graph, where the share of pupils with low attendance rates in Progressive-model schools (in red) outnumber those in Primary-model schools (in green). Therefore, while instructional quality in Progressive schools improved significantly according to the TEACH data collected, time spent on instruction per pupil in Progressive schools was less than that in Primary schools.

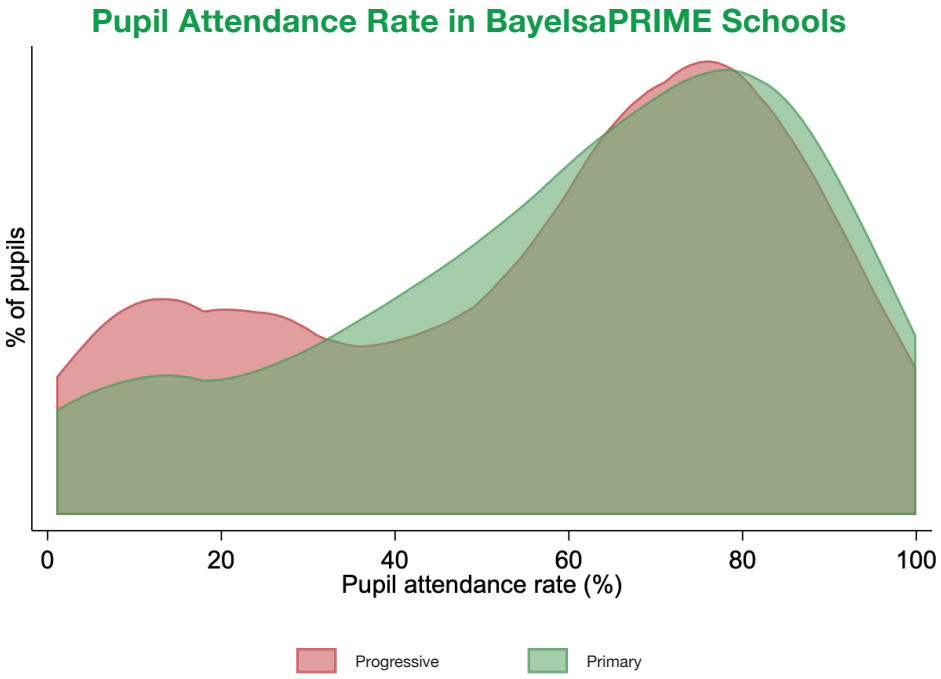
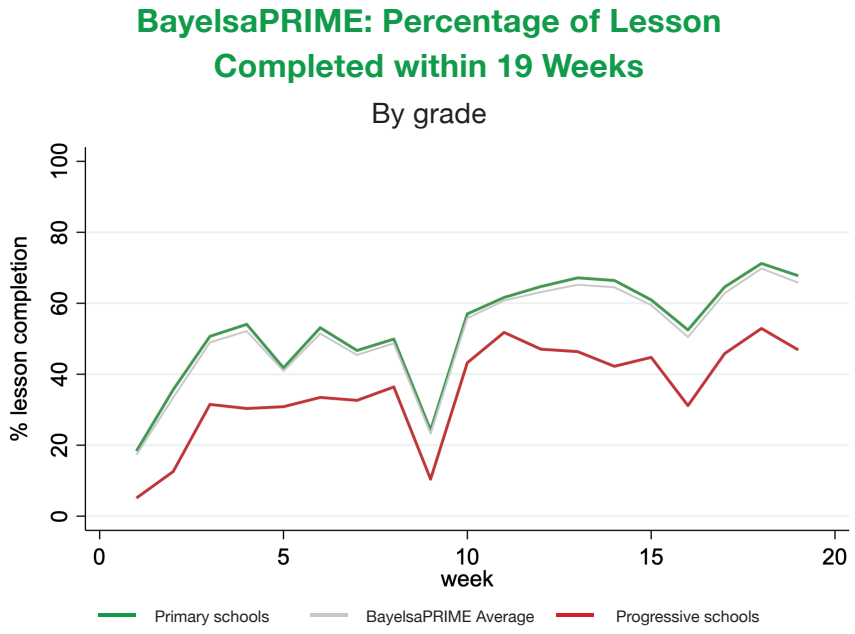


Figure 6.1

This disparity in total time of instruction per pupil between Primary- and Progressive-model schools was also amplified by differences in rates of lesson completion. Both school types saw an increase in lesson completion rates throughout the 19 weeks of approximately 25 percentage points. Unfortunately, Primary-model schools completed an average of 53% of lessons in a given week, while Progressive-model schools averaged only 36%. Therefore, not only did Progressive-model schools have higher rates of chronic absenteeism, but they also covered less curriculum than Primary-model schools, resulting in less instructional time.



Note: BayelsaPRIME Average data are weighted by the proportion of pupils within each school type. Week 9 of the programme coincides with the first week of the new term, when school attendance typically drops across the State, according to bayelsaPRIME programme officials

Figure 6.2

Learning outcomes in chronically-understaffed schools did not meet BayelsaPRIME expectations

Given the disparity in instructional quantity between the two types of schools, as well as the inherently low staffing in Progressive-model schools, it is unsurprising to find that learning outcomes in Progressive-model schools did not improve at the same rate as Primary-model schools, particularly in foundational learning. In both English reading fluency as well as foundational numeracy, pupils in Primary-model schools outperformed and out-improved pupils in Progressive-model schools. Across all grades, the average pupil in an adequately staffed BayelsaPRIME school increased their oral reading fluency on a Primary 2-level passage by an average of 7 cwpm more than their counterparts in non-BayelsaPRIME schools. Conversely, pupils in understaffed BayelsaPRIME schools gained 3 cwpm less on average than their peers in non-BayelsaPRIME schools with similar staffing levels.

Gains in Reading Fluency in BayelsaPRIME Schools Relative to non-BayelsaPRIME Schools

Primary 2 passage
By grade and school type

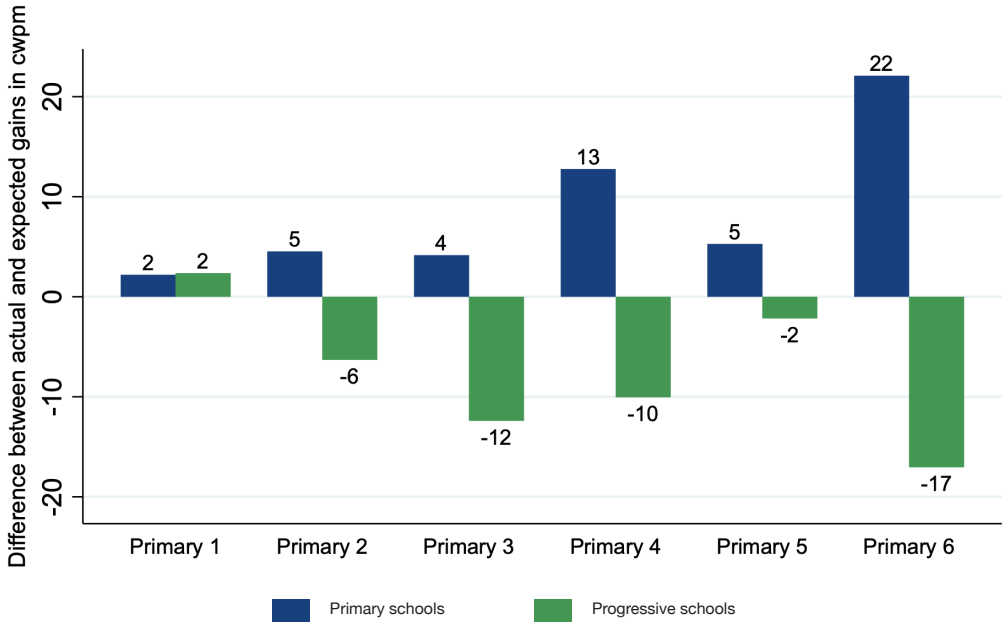


Figure 6.3

Similar results to a lesser extent were found in mathematics. While BayelsaPRIME pupils in Primary 4, 5, and 6 all improved their ICAN scores more than their non-BayelsaPRIME peers, they did not improve at the same rate as pupils in adequately staffed BayelsaPRIME schools. In Primary 2 and 3, pupils in non-BayelsaPRIME schools improved their ICAN scores more than BayelsaPRIME pupils — by eight and four percentage points respectively. It is worth noting that unlike literacy, learning outcomes in mathematics in Progressive-model schools relative to other chronically-understaffed, government schools in Bayelsa vary significantly between grades. Therefore, while there is room for improvement in programmatic implementation in Progressive-model schools regarding mathematics, literacy should be the primary focus of programmatic reform in these schools.

Gains in ICAN in BayelsaPRIME Schools Relative to non-BayelsaPRIME Schools

By grade and school type

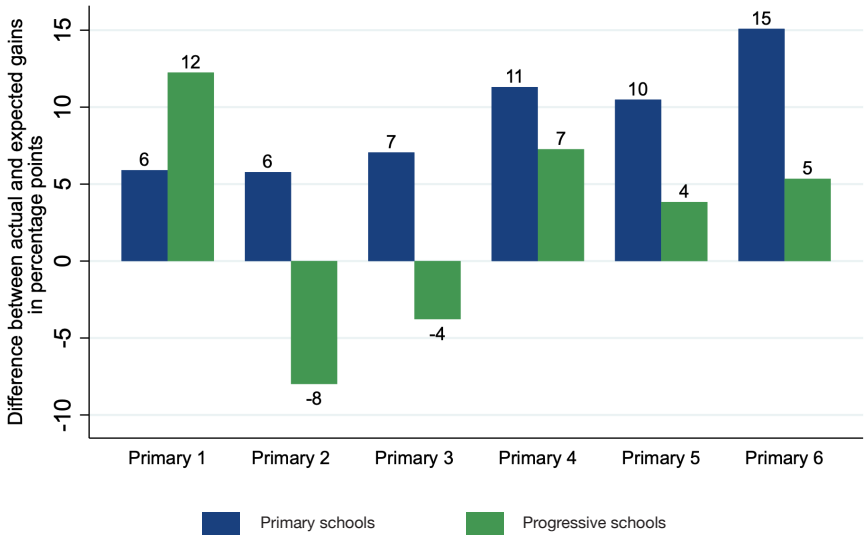


Figure 6.4

Ensuring that teachers are in classrooms and delivering lessons as intended is an important factor in fostering strong learning outcomes. However, such efforts would be greatly undermined if a school is understaffed. The first-order priority should be system-wide increases in teacher hiring, ensuring that these new teachers are assigned to the areas and schools with greater need. While this is by far the most impactful policy alternative in the medium-term, there are other policy actions that the Bayelsa State Government can take in the short-term to improve the utilisation of existing human resources in the system. For example, the Government of Bayelsa could allocate existing teacher capacity more effectively across public schools to improve teacher staffing in areas where these transfers are not very logistically challenging for teachers, and as such, vacancies can be filled in a fiscally neutral manner. Geographical school location data, combined with staffing data, indicate that in Bayelsa, there are schools with teacher surpluses in close proximity to schools with teacher shortages. Through BayelsaPRIME's technical partner, an analytical tool is now available that can identify potential transfers of teachers from schools with teacher surpluses to nearby schools with teacher shortages. Thoughtful implementation of the potential transfers identified by this tool could potentially fill vacancies in chronically understaffed schools, meaning all BayelsaPRIME schools would have a Primary-staffing model.

The impact of the BayelsaPRIME programme on ECCDE pupils' literacy is inconclusive

While improvements were seen in ECCDE literacy skills over the course of 19 weeks of instruction, non-BayelsaPRIME ECCDE programmes improved as well. Across all subskills as measured by the EGRA assessment, pupils in BayelsaPRIME ECCDE programmes showed improvement in most key literacy subskills: letter identification, oral vocabulary, print orientation, and listening comprehension. These subskills are instrumental in creating a strong foundation for future literacy. For more information regarding areas measured by the EGRA assessments, see Appendix E.

BayelsaPRIME: Score in EGRA

Nursery 2-3 by subskills

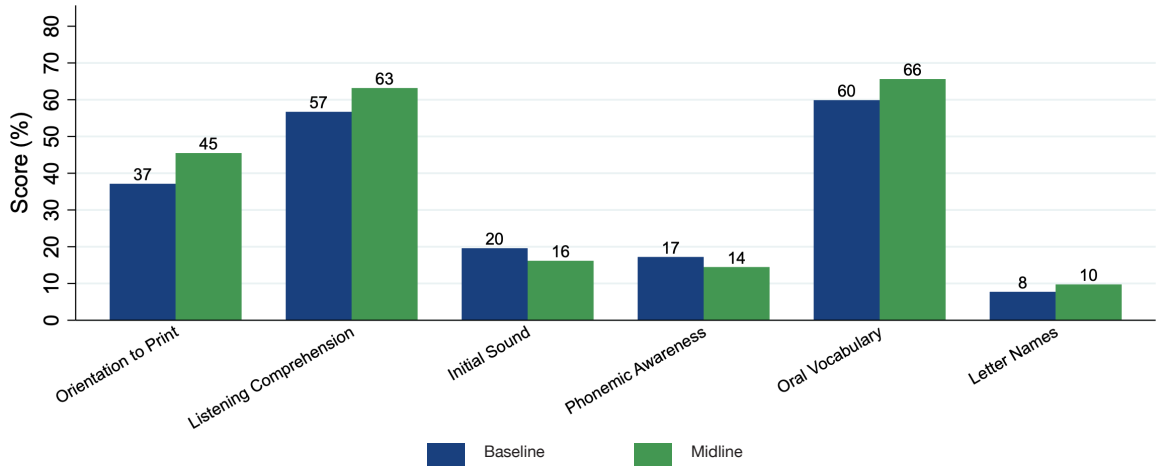


Figure 6.5

However, pupils in non-BayelsaPRIME ECCDE programmes gained greater proficiency in some subskills — initial sound identification and phonemic awareness — compared to pupils in BayelsaPRIME schools.[8] Given that ECCDE pupils in the BayelsaPRIME programme improved more in some skills and less in others compared to their counterparts in other government schools, it is unclear whether one group outperformed the other. Therefore, conclusions about the impact of the programme on ECCDE pupils cannot be made. The potential causes of these inconclusive results are not immediately evident given the findings of this report; programme officials are working to determine why this is the case in order to provide greater learning outcomes for BayelsaPRIME pupils.

BayelsaPRIME: Average EGRA Score

Nursery 2-3 by subskills

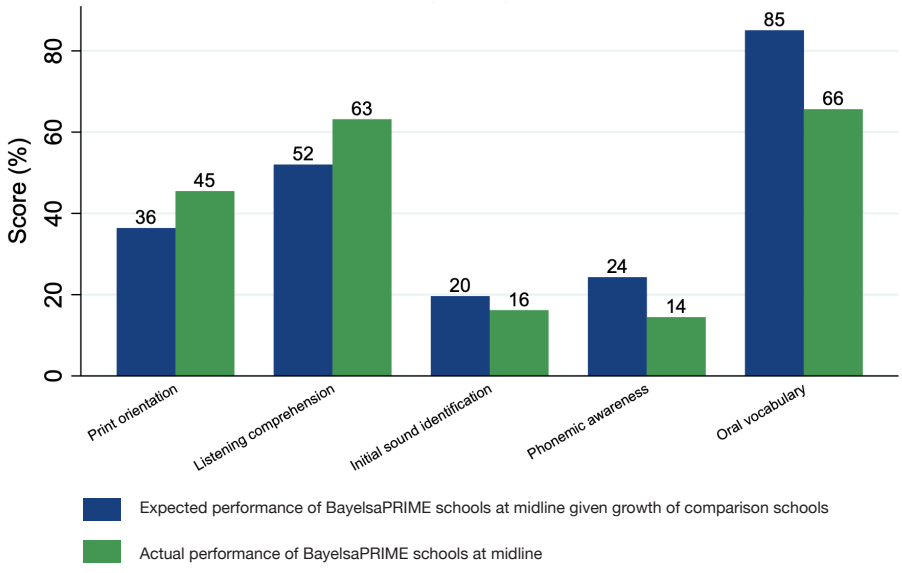


Figure 6.6

[8] Due to a limited sample size, understaffed schools employing a Progressive-staffing model are not represented in ECCDE data. All conclusions regarding ECCDE programme outcomes are therefore representative of schools employing a Primary-staffing model alone.

Looking Ahead

The impressive progress of the BayelsaPRIME programme during its first 19 weeks represents a powerful and encouraging first step in the continued work to transform education in Bayelsa State. In addition to the main findings reported above, supplementary data obtained during the course of this study provide strong signals of even greater educational success to come as the BayelsaPRIME programme matures and incorporates additional schools in need of transformative interventions.

As with ECCDE, the BayelsaPRIME programme effect at the Primary level is predicted to increase over time, as substantiated by data from this report. BayelsaPRIME teachers were able to increase both the quality and quantity of their instruction over the course of the programme. This positive trajectory is projected to persist throughout the programme's duration, signifying that the longer the programme is in effect, the more proficient teachers will become in their instructional methods. This, in turn, is expected to result in an augmentation of the BayelsaPRIME programme's impact on pupils' learning outcomes.

In terms of policy design, this M&E report documents areas that the programme still needs to strengthen both internally and externally. In this way, M&E work does not function purely as a celebration of the gains achieved, but also as a way to take an honest and evidence-driven look at the programme and keep improving it. M&E work does not end after this report. As a data-driven programme, we will continue to conduct similarly large-scale, rigorous evaluations for the upcoming school years as well. The same comparison group will be maintained to continue benchmarking learning gains throughout the duration of the programme, relative to the initial set of treatment schools, while also incorporating representative samples of the new cohorts of schools and monitoring learning gains among those schools. These rounds of data collection will give the Bayelsa State Government further insights on the impact of the programme: what is going well, and what needs to be strengthened.

The BayelsaPRIME programme is a bold initiative from the State Government of Bayelsa. During its 19 weeks of operations, it has enabled pupils to be on faster, higher learning trajectories than what they could have expected from non-BayelsaPRIME education. The large impact on foundational literacy and numeracy outcomes — through a large-scale system-wide transformation of education — is a laudable achievement by the Government. Through its BayelsaPRIME programme, Bayelsa State will continue to provide rich, nurturing learning environments across the country, where pupils of all backgrounds will have the unprecedented opportunity to actually learn in school and thrive academically.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VII. Appendix

Appendix A: Hasbrouck-Tindal Spring Norms

The Hasbrouck-Tindal Oral Reading Fluency Norms are widely used as a tool to benchmark appropriate pupil progress in English oral reading fluency, given their developmental stage at different points of their primary school experience. These benchmarks are developed based on data from a few different assessments, including DIBELS, collected primarily in high-income, English-speaking countries. The chart below contains the Hasbrouck-Tindal grade-level benchmarks for pupils in the 25th, 50th, and 75th percentiles during the Spring term, the last term of the school year. Furthermore, the chart also includes the average expected growth per week from a pupil in the 50th percentile at this point of the school year.

2017 Oral Reading Fluency Norms				
	25th percentile	50th percentile	75th percentile	Median average weekly improvement
Primary 1	34	60	91	2.0
Primary 2	72	100	124	1.6
Primary 3	91	112	139	0.9
Primary 4	105	133	160	1.2
Primary 5	119	146	169	0.8
Primary 6	122	146	173	0.3

Appendix B: Oral Reading Fluency and Comprehension Assessments

Passage for all Pupils (Levelled for Expectations as of Primary 2)

The Bus Ride

Today was my first day taking the bus to school. My mom put curls in my hair because I like my hair when it is curly. I felt happy walking to the bus stop.

When I got to the bus stop there were a lot of big kids standing on the corner. I was scared to get on the bus because there were so many older kids. Everyone was talking. I didn't know anyone. No one looked at me and no one talked to me. I got on the bus and I sat down fast. The bus was loud. It felt like we were riding for a long time.

I walked to my bus after school. I was the last one to get on the bus. There were only two seats left in the front. I had to sit next to an older kid. I didn't look up. When the bus took off the girl sitting next to me smiled and said she liked my hair. She said she wished her hair was long and curly like mine. We started talking about everything and the bus ride seemed short this time.

Comprehension Questions

Q1. Why does the girl get on the bus at the beginning of the story?
(Answer: To go to school)
Q2. Why does the girl feel scared to get on the bus? **(Answers: There are so many older kids. She does not know anyone. No one looks at or talks to her.)**
Q3. On the bus ride home, what does the older girl say? **(Answers: The older girl says she likes her hair. The older girl says she wishes her hair was long and curly.**
Q4. Why does the bus ride home seem short? **(Answers: She has a new friend. The older girl likes her hair. She has someone to talk to. She is not scared any more.)**

Grade-Level Primary 1 Passage (DIBELS)

Fluency Assessment: Oral Reading Fluency

PROBE

Primary 1

not	a	for	with	if
that	it	the	we	at
from	no	of	one	they
said	once	bad	got	went
turn	poor	need	day	white
off	voice	sound	front	five
home	take	land	left	up
fire	half	could	their	like
write	less	man	cut	strong
know	point	hear	good	march
out	list	name	sure	give
field	years	so	third	right
mean	life	first	late	she
did	saw	size	needs	me
why	tried	done	call	age
now	work	hope	time	put
best	am	old	too	move

Grade-Level Primary 2 Passage (NERDC-Approved Textbook)

The Ant and the Grasshopper

In a field one summer's day, a grasshopper was hopping, chirping, and singing to its heart's delight. An ant passed by, carrying an ear of corn to its nest.

'Why not come and chat with me,' said the grasshopper, 'instead of working and sweating in that way?'

'I am helping to store up food for the winter,' said the ant, 'and I think you should do the same.'

'Why bother about winter?' said the grasshopper. 'We have got plenty of food at present.'

But the ant went on its way and continued its work. When the winter came, the grasshopper had no food and found itself dying of hunger, while it saw the ant happily eating corn and grain every day from the stores it had made in the summer.

Then the grasshopper knew: it is best to prepare for the days of necessity.

Comprehension Questions

Q1. What is the grasshopper doing at the beginning of the story?
(Answer: Hopping, chirping, and singing.)
Q2. Why is the ant carrying food to its nest? **(Answer: To store up food for the winter.)**
Q3. What happens to the grasshopper when winter comes? **(Answer: It is dying of hunger. It has no food.)**
Q4. What does the grasshopper learn from the ant? **(Answer: That you have to prepare for winter. That you have to work hard.)**

Grade-Level Primary 3 Passage (NERDC-Approved Textbook)

Jabar and His Tricks

Jabar was a young boy who enjoyed playing pranks on the road. He would never look at either side of the road before he crossed. He considered it a waste of time. He was very proud of his habit because it had never caused an accident once.

One day Jabar saw a cyclist coming very fast at a distance. He decided to have some fun as usual. He crossed the road when the cyclist was close to him. The cyclist could not control his speed and so hit Jabar. They both fell down.

Although Jabar escaped injury, the cyclist was hurt badly.

The bike had fallen on him and he was wounded in many parts of his body. A group of people took him to the hospital and Jabar's father had to pay for his treatment out of his little salary.

For that term, Jabar could not go to school because his father could not pay his school fees.

He felt very sad for being the reason for all that happened. He decided that he would never play pranks on the road again but adhere to road safety rules always.

Comprehension Questions

Q1. What prank does Jabar like to play on roads? **(Answer: He does not look at either side of the road before he crosses.)**
Q2. Who hits Jabar when Jabar crosses the road? **(Answer: A cyclist)**
Q3. What happens to the cyclist after he hits Jabar? **(Answer: The cyclist is hurt badly. The bike falls on him. He is wounded. He has to go to the hospital.)**
Q4. Why can't Jabar go to school that term? **(Answer: Jabar's father does not have enough money to pay for school because he paid for the cyclist's treatment.)**

Grade-Level Primary 4 Passage (NERDC-Approved Textbook)

Safety at Home

Children learn about their environment by exploring it, that is by watching, touching, and trying things out. They are curious by nature and need careful and gentle guidance from a young age about what danger is and what to stay away from.

Most accidents happen in the home. This is why it is important to ensure that your home is safe for all your family.

There are many measures to take to protect children from injury or accident in the house. In the kitchen, elders should keep all sharp utensils and household cleaning products out of the reach of children.

In the bathroom, never leave water in the tub or sink. It takes very little water to create the danger of drowning.

Do not place furniture near a window that opens onto the balcony. A child could climb onto the furniture and out of the window and fall off the balcony. If you have a bar in the family room, lock away all alcohol.

Always buckle your child into the child safety seat every time your child rides in the car.

Keep all drugs securely locked up in a cabinet. Never keep firearms in a home with little children. If you must keep a firearm, dismantle or unload it, and secure its trigger lock. Then keep it locked in a gun safe.

Comprehension Questions

Q1. Where do most accidents happen? **(Answer: In the home)**
Q2. What can cause drowning in the bathroom? **(Answer: Leaving water in the tub or sink.)**
Q3. What should you do to keep a child safe in the car? **(Answer: Buckle the child into the child safety seat.)**
Q4. Why is it important to lock up all drugs in the home? **(Answer: Children may eat the drugs by mistake. This could make them very ill.)**

Grade-Level Primary 5 Passage (NERDC-Approved Textbook)

The Stone Cutter (page 1)

There once was a stone cutter who was dissatisfied with himself and with his position in life.

One day he passed a wealthy trader's house. Through the open gateway, he saw many fine cars and other possessions. He became very envious and wished he could be like the wealthy trader. To his great surprise, he suddenly became the trader. He enjoyed more luxuries and power than he ever imagined.

Soon a high official passed by, accompanied by attendants and escorted by soldiers. Everyone, no matter how rich, had to bow low to the official. 'I wish I could be a high official,' he thought.

Then he became the high official, carried everywhere, but was feared and hated by the people all around.

It was a hot summer day, so the official felt very uncomfortable in the sticky sedan chair. He looked up at the sun. It shone proudly in the sky. 'How powerful the sun is!' he thought. 'I wish that I could be the sun.'

Then he became the sun, shining down on everyone, burning the fields, cursed by the farmers and labourers. But a big cloud moved between him and the earth, so that his light could no longer shine on everything below.

'How powerful that storm cloud is!' he thought. 'I wish that I could be a cloud!'

The Stone Cutter (page 2)

Then he became the cloud, flooding the fields and villages, shouted at by everyone. Soon he found that he was being pushed away by some great force — the wind. He thought, 'I wish I could be the wind!'

Then he became the wind, blowing tiles off the roofs of houses, and uprooting trees. He was feared and hated by all below him.

But after a while, he ran up against something that would not move, no matter how powerfully he blew against it — a huge rock.

'How powerful that rock is!' he thought, 'I wish that I could be a rock!' Then he became the rock, more powerful than anything else on earth.

But as he stood there, he heard the sound of a hammer pounding a chisel into the hard rock and felt himself being changed. 'What could be more powerful than me, the rock?' he thought. He looked down and saw far below him the figure of a stone cutter.

It is wise to be contented with one's position in life. Greed kills.

Comprehension Questions

Q1. How does the stone cutter feel when he sees the wealthy trader's house? **(Answers: Envious. Jealous. He wants to be the wealthy trader.)**
Q2. Why does the stonecutter wish to be the sun? **(Answer: Because it is powerful)**
Q3. What object does the stonecutter become after being the wind? **(Answer: A rock)**
Q4. Why does the stonecutter keep changing into new things? **(Answer: He wants to be more and more powerful.)**

Grade-Level Primary 6 Passage (NERDC-Approved Textbook)

Chike and the Headmaster

Chike was not easily frightened. In fact, it took a lot to frighten him. But, standing outside Malam Usman's door, he felt a little scared. Perhaps it was because he knew that he should have done better in his mathematics examination. He knocked on the door.

'Come in,' called the Headmaster's voice. The sharpness of it made Chike shiver, as he opened the door and walked into the room.

'Good morning, sir,' he greeted.

'Good morning, Chike. I shall come to the point quickly. I received a letter from your father. He told you that he had written to me?' asked Malam Usman.

'Yes sir,' replied Chike, hanging his head. 'Then you know what it is about. It is about your mathematics results, which according to your father, is not up to your usual standard, although it is a pass mark.' He turned a stern eye upon the boy standing before him.

'No, sir,' replied Chike.

'Do you know why you did not do as well as usual, Chike?'

'No, sir,' Chike replied, looking down at his toes.

'Hold your head up, boy,' commanded the Headmaster, 'and have another try to think of any reason why your result disappointed and worried your father.'

There was a long pause. You could have heard a pin drop in the headmaster's office. Then Chike spoke. 'Perhaps, sir, it was because I did not work hard enough,' he said quietly.

Comprehension Questions

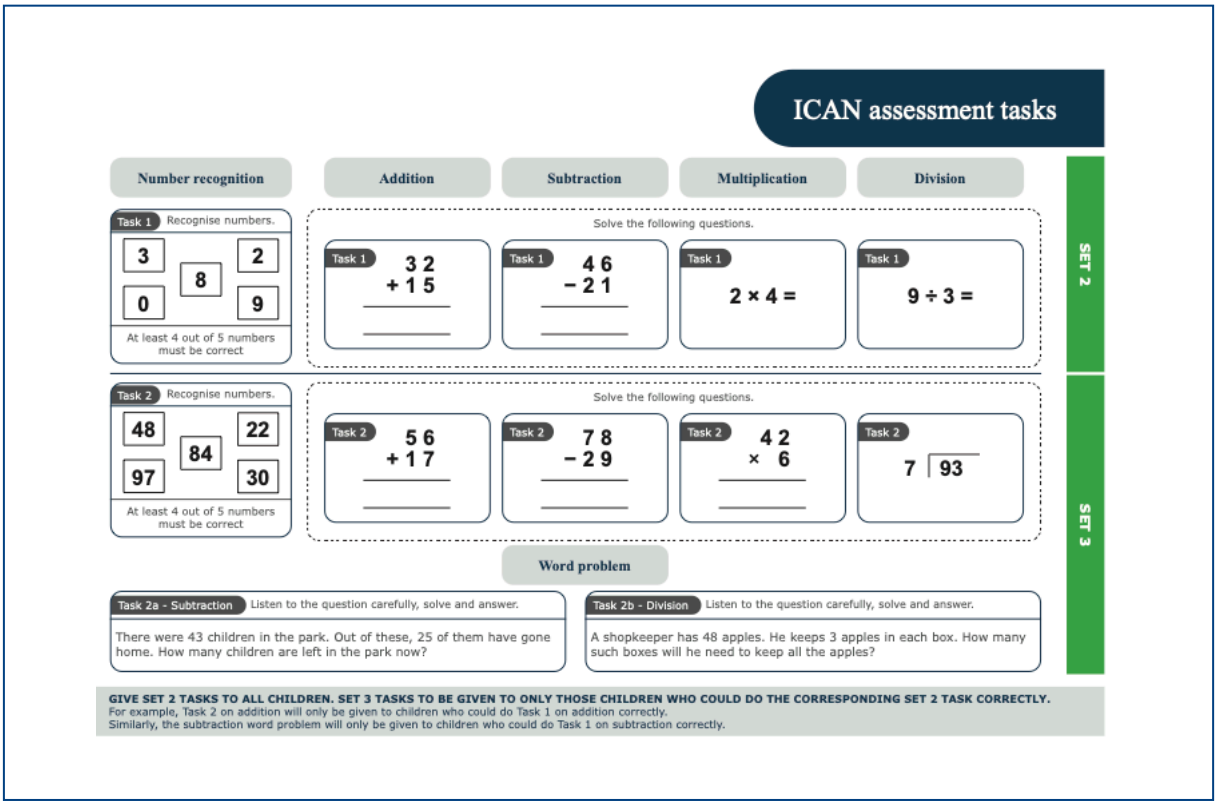
Q1. How does Chike feel when he is standing outside Malam Usman's door? **(Answer: Scared)**

Q2. Who is Malam Usman? **(Answer: The Headmaster)**

Q3. What did Chike's father write to Malam Usman about? **(Answers: Chike's mathematics result. The mathematics exam.)**

Q4. How is Chike feeling when the Headmaster is asking him about the exam? **(Answers: Embarrassed. Ashamed.)**

Appendix C: Numeracy Assessment



Appendix D: Mapping ICAN Results onto Global Performance Standards

Mastery of numeracy skills in the early grades plays a crucial role in a pupil's ability to form a strong academic foundation, which then contributes to the individual's opportunities for economic, social, and personal prosperity. Yet, despite its importance, it is often the case that pupils are performing far below expectations in mathematics. In fact, a third of the global population of pupils will complete their Primary school education without mastery of foundational numeracy (Sitabkhan and Platas, 2018). Therefore, it is important for policymakers to have visibility into pupils' numeracy progress and to understand the amount of growth needed for pupils to achieve mastery of grade-appropriate skills before the end of their schooling careers. For this, researchers need an international performance standard which aggregates data on pupil competencies from a broad array of contexts so that pupil numeracy levels can be benchmarked against globally representative expectations and the actual performance of other contexts.

The Global Proficiency Framework (GPF) is a context-agnostic compilation of numeracy proficiency descriptors developed by the UNESCO Institute for Statistics and myriad contributing organisations. The "Global Proficiency Descriptors" (GPD) included in it leverage mathematics performance data collated from fifty countries to form a standardised definition of grade-appropriate numeracy skills. Mathematical competencies that may be demonstrated by pupils at a particular grade level, but exceed expectations for that grade level, are categorised as such, and underperformance is likewise attributed accordingly (UNESCO Institute for Statistics et al., 2023). As such, policymakers are granted the comprehensive insight necessary to manage expectations and implement a gradational approach to elevating pupil success in their particular education system. Furthermore, the GPF is recognised as the source material for tracking learning progression in alignment with Sustainable Development Goal 4, which underpins its utility for translating within-system mathematical proficiency analysis to effective policy decisions (UNESCO Institute for Statistics et al., 2023).

Given the prominence of the GPF to understand global numeracy standards, this study has created a crosswalk between each skill assessed via the International Common Assessment of Numeracy (ICAN), described in this report, and the grade in which children are expected to master that skill according to the GPF. The study team carefully identified the mathematical benchmarks in the GPF that most closely correspond with assessment items, based on both the exact problem and the skill that is assessed by each problem. The grade level at which assessed pupils should be reaching these benchmarks was then determined by referencing the grade level(s) described under the framework's "Meets Global Minimum Proficiency" threshold.[9] In the following table, the precise alignment between each assessed ICAN skill and the grade-level expectation, per the GPF, for sufficient ability to demonstrate this skill can be found:

[9] By design, this threshold is formed from a lenient definition of the level of proficiency students need to demonstrate the skill. Therefore, if an ICAN skill is assessed by a problem that is marginally more advanced than the corresponding GPD on the GPF, it is still reasonable to state that students would achieve this skill by the grade level designated by the GPD. Since the GPD describes the minimum level of skill a student can demonstrate that is still considered sufficient, it is likely that a significant proportion of students at this grade level would have stronger proficiency.

ICAN skill	Sample problem	Grade-level expectation, according to GPF	Rationale[10]
Simple number recognition: One-digit number recognition	3, 0, 8, 2, 9	KG	G1: N1.1.1_M Count in whole numbers up to 30.
Complex number recognition: Two-digit number recognition	48, 97, 84, 22, 30	CI-CP	G1: N1.1.1_M Count in whole numbers up to 30. G2: N1.1.1_M Count in whole numbers up to 100.
Simple addition: Two-digit addition without carrying	32 + 15 =____	CP	G2: N1.3.1_M Add and subtract within 20 (i.e., where the sum or minuend does not surpass 20), and represent these operations with objects, pictures, or symbols. G3: N1.3.1_M Demonstrate fluency with addition and subtraction within 20 and add and subtract within 100 (i.e., where the sum or minuend does not surpass 100), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 32 + 59; solve an addition or subtraction problem presented by images of bundles of tens and ones; use number lines or skips on a hundreds grid to reason through or solve addition and subtraction problems).
Complex addition: Two-digit addition with carrying	56 + 17 =____	CE1	G3: N1.3.1_M Demonstrate fluency with addition and subtraction within 20 and add and subtract within 100 (i.e., where the sum or minuend does not surpass 100), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 32 + 59; solve an addition or subtraction problem presented by images of bundles of tens and ones; use number lines or skips on a hundreds grid to reason through or solve addition and subtraction problems).
Simple subtraction: Two-digit subtraction without borrowing	46 - 21 =____	CP	G2: N1.3.1_M Add and subtract within 20 (i.e., where the sum or minuend does not surpass 20), and represent these operations with objects, pictures, or symbols.
Complex subtraction: Two-digit subtraction with borrowing	78 - 29 = ____	CE1	G3: N1.3.1_M Demonstrate fluency with addition and subtraction within 20 and add and subtract within 100 (i.e., where the sum or minuend does not surpass 100), with and without regrouping, and represent these operations with objects, pictures, or symbols.
Simple multiplication: One-digit multiplication without regrouping (exact multiplication)	2 x 4 = ____	CP	G3: N1.3.2_M Multiply and divide within 100 (i.e., up to 10 x 10 and 100 ÷ 10, without a remainder), and represent these operations with objects, pictures, or symbols.
Complex multiplication: Two-digit multiplication with regrouping	42 x 6 = ____	CM1	G5: N1.3.2_M Multiply, with and without regrouping, and divide, with no remainder, any number by a one-digit number and multiply two, 2-digit numbers, with and without regrouping (e.g., 342 x 4 = __; 42 x 34 = __; 1380 ÷ 5 = __).

[10] In this column, the Global Proficiency Descriptors for each grade level are coded in accordance with which domain and where in the GPF they are located ("N" stands for "Number Operations" and "A" stands for "Algebra"). The "M" at the end of each descriptor's label indicates that this is the expectation for the "Meets Minimum Proficiency" level. To access the GPF firsthand, please follow this link: https://gaml.uis.unesco.org/wp-content/uploads/sites/2/2021/03/Global-Proficiency-Framework-Math.pdf.

ICAN skill	Sample problem	Grade-level expectation, according to GPF	Rationale
Simple division: Exact, one-digit short division with no remnant	9 ÷ 3 = ____	CE1	G3: N1.3.2_M Multiply and divide within 100 (i.e., up to 10 x 10 and 100 ÷ 10, without a remainder), and represent these operations with objects, pictures, or symbols.
Complex division: Short division of a two-digit dividend by a one-digit divisor with a remnant	93 ÷ 7 = ____	CM2	G6: N1.3.2_M Multiply any number by a 2-digit number, with and without regrouping, and divide any number by a 1-digit number, with and without a remainder (e.g., 3427 x 68; 1380 ÷ 6 = __).
Simple fractions: Recognition of the magnitude of fractions	Which is greater: 4/5 or 3/15	CM1	G5: N2.1.3_M Compare and order fractions with different but related denominators up to 12. G6: N2.1.3_M Compare and order proper and improper fractions with different, unrelated denominators.
Complex fractions: Addition of a fraction and a mixed number	1 1/6 + 1/3 =____	CM2	G6: N2.2.1_M Add and subtract improper fractions or mixed numbers with different but related denominators.
Simple algebraic equations: Solving for a variable requiring one step	17x = 68 x = ____	CM2	G6: A3.2.1_M Find a missing value in a number sentence using any one of the four operations.
Complex algebraic equations: Solving for a variable requiring two steps	-5y - 3 = 12 y = ____	G5	G7: A3.3.1_M Represent and solve problems, including real-world problems, using a two-step equation with any of the four operations.
Subtraction word problem	There were 43 children in the park. Out of these, 25 of them have gone home. How many children are in the park now?	CE2	G4: N1.4.1_M Solve simple real world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) with and without regrouping, including problems involving measurement and currency units.
Division word problem	A shopkeeper has 48 apples. He keeps 3 apples in each box. How many such boxes will he need to keep all the apples?	CM1	G5: N1.4.2_M Solve simple real-world problems involving the multiplication of two whole numbers to 10, and associated division facts.
Fractions word problem	There were 108 goats in the pen. 1/6 of them were black. How many goats were NOT black?	CM1	G5: N2.3.2_M Solve real-world problems involving the multiplication and division of a proper fraction and a whole number.
Algebraic equations word problem	A number plus 8 equals √144. What is the number?	G7	G7: A2.1.1_M Use linear expressions to represent problem situations with a single variable (e.g., The cost of buying cinema tickets online is £12 per ticket plus a £2 booking fee. Write this as an expression where x is the number of tickets purchased). G7: A3.3.1_M Represent and solve problems, including real-world problems, using a two-step equation with any of the four operations (e.g., solve 3x + 4 = 22; Some people got on a bus, doubling the number of passengers. At the next stop, 8 people got off, leaving 16 people on the bus. Represent the situation as an equation, and solve to find the number of people on the bus originally).

Appendix E: EGRA and EGMA Subskill and Subtest Descriptions

The following subskill and subtest definitions are from the EGRA and EGMA Toolkits, authored by RTI International, and designed to inform proctors how to properly administer the assessment (RTI International, 2014; RTI International, 2016).

EGMA Assessed Subskills	
Subtest	**Definition**
Number Identification	The number identification test is timed (60 seconds) with no stop rules, and it consists of 20 items that increase in difficulty. The first three items of the subtest include the numerals 0,9, and one other single digit number. The next 12 items consist of two-digit numbers from 10 to 99, and the last five items are three-digit numbers from 100 to 999. Students are asked to say each number aloud.
Number Discrimination	The number discrimination subtest is an untimed test of 10 items with a stop rule after four successive errors. Each item consists of a set of two numbers, one of which is greater than the other. The first item is a set of one-digit numbers, the next five items are sets of two-digit numbers, and the last four items are a set of three-digit numbers. Students state the higher of each set of two numbers (pointing at the correct number is insufficient evidence for scoring).
Number Pattern Identification	Proficiency in number pattern identification is measured using the Missing Number subtest. The ability to detect number patterns is an important early skill that can support later mathematical skills such as multiplication and algebra. The Missing Number subtest is an untimed test of 10 items with a stop rule after four successive errors. The items are presented as four horizontally aligned boxes, three of which contain numbers and one of which is empty (the target missing number). Eight of the items increase in number from left to right; two of the items decrease in number from left to right. Items 1,2, and 6 increase by one (in a set of one-, two-, and three-digit numbers, respectively). Items 3, 4, 5, and 8 increase by tens, hundreds, twos, and fives, respectively. Items 7 and 9 decrease by twos and tens, respectively. The last item with numerals within the range of 1-20 increases by fives, but does not begin with a multiple of five. Students are asked to state the number that belongs in the empty box.
Addition and Subtraction	The Addition and Subtraction Level 1 subtests are timed tests (60 seconds) consisting of 20 items each that increase in difficulty. No addends are greater than 10, and no sums are greater than 19. The subtraction problems are the inverse of the addition problems. Three of the items mirror three of the Word Problems items. Assessors also keep track of whether the student used one of three problem-solving strategies: finger/tick marks, paper and pencil calculation, or mental arithmetic. The Addition and Subtraction Level 2 subtests are untimed tests consisting of five items each that increase in difficulty, with a stop rule of four successive errors. Addition Level 2 is not given to students who receive a score of zero for Addition Level 1, and Subtraction Level 2 is not given to students who receive a score of zero for Subtraction Level 1. No sums are greater than 70. The subtraction problems are the inverse of the addition problems.
Word Problems	The purpose for learning mathematics is to solve real-world problems, which are rarely, if ever, presented as stand-alone equations. Instead, they require interpretation of a problem and an understanding of the operations required to solve that problem. Word problems mimic, in a rudimentary way, these real-world situations. The World Problem subtest is an untimed test consisting of six items each that increase in difficulty, with a stop rule of four successive errors. Three of these items use numbers that match three items from the Addition and Subtraction Level 1 subtest. Assessors also keep track of whether the student used one of three problem-solving strategies: finger/tick marks, paper and pencil calculation, or solved problem in his or her head. Students are also provided with counters that can be used to solve the problem.

EGRA Assessed Subskills	
Subskill	**Definition**
Orientation to Print	The orientation to print subtask is a measure of concepts of print. It is considered one of the lowest order skills students develop as they begin to learn to read. The subtask is administered by asking students questions such as how to hold a book or where the text begins.
Letter Names	The letter names subtask tests students' ability to recognise letters and accurately speak their corresponding name. The students are presented with a grid listing letters in a random order. Students are asked to read out loud as many as they can, as quickly and carefully as they can, in 1 minute. The EGRA administrator times the child, making note of any mistakes the child makes while calling out the letter names. The score is typically reported as correct letters per minute (clpm).
Initial Sound Identification	The initial sound subtask is a measure of a student's ability to identify the first sound in a word. It also measures a student's ability to separate words into sounds and to manipulate those sounds. Students are told a word verbally and asked to isolate and pronounce the first sound of the word (the initial sound). The EGRA administrator records the number of correct letter sounds identified.
Non-familiar Words	The nonword subtask tests students' skill in using letter-sound connections to figure out ("decode") words. While many students learn to memorise a broad range of "sight" words, they need skills to decode less familiar words. In this subtask, students are given a list of made-up words that do not exist in the language tested and asked to read out loud as many as they can, as quickly and carefully as they can. The EGRA administrator times the student and records the number of correct words per minute (cnwpm).
Familiar Words	The familiar word reading subtask is similar in format to the nonword reading subtask except that it presents the student with a grid containing words they are expected to be able to read at their grade level and have likely encountered before. The students are instructed to read aloud as many words as they can in 1 minute. The EGRA administrator times the student, making note of any mistakes the student makes while reading the words aloud. The score is reported as correct words per minute (cwpm).
Oral Vocabulary	Vocabulary is words and their meanings; this subtask measures what words students know. Research suggests children need to understand at least 90% of the vocabulary in a passage for comprehension to occur. In this subtask, the EGRA administrator speaks words aloud and asks the student to "point" to what they mean (e.g., a body part, a simple object). The administrator records the number of vocabulary words the student got correct, with no time limit.
Listening Comprehension	Listening comprehension is a measure of students' oral language skills, which also contribute to reading. In this subtask, the EGRA administrator reads a passage to the student, who does not see it. The student then responds to questions or statements read by the EGRA administrator.
Reading Fluency (cwpm)	The oral reading fluency (ORF) subtask measures how quickly and accurately a student can read. It is a core component of EGRA because it brings together lower-level reading skills (such as decoding and familiar word recognition) with how quickly and easily the student can read a given word (called automaticity). Students are given a short, written passage on a topic that is familiar to them. They are asked to read it out loud "quickly but carefully" and are given 60 seconds from when they begin to read. The EGRA administrator times the student, making note of any mistakes the student makes while reading the words aloud. The score is reported as correct words per minute (cwpm).
Reading Comprehension	Comprehension is the main goal of reading, and a complex task that requires some ability in all other reading skills. This subtask is paired with the ORF subtask. Depending on how much of the ORF passage the student was able to read, the EGRA administrator asks the student up to five questions about the story. The EGRA administrator keeps track of the number of questions answered correctly.

Appendix F: The Learning Crisis in Low- and Middle-income Countries: An Overview of Causes, Contributors, and Consequences

1. Enrolment and literacy rates in low- and middle-income countries have increased at record speed in recent decades

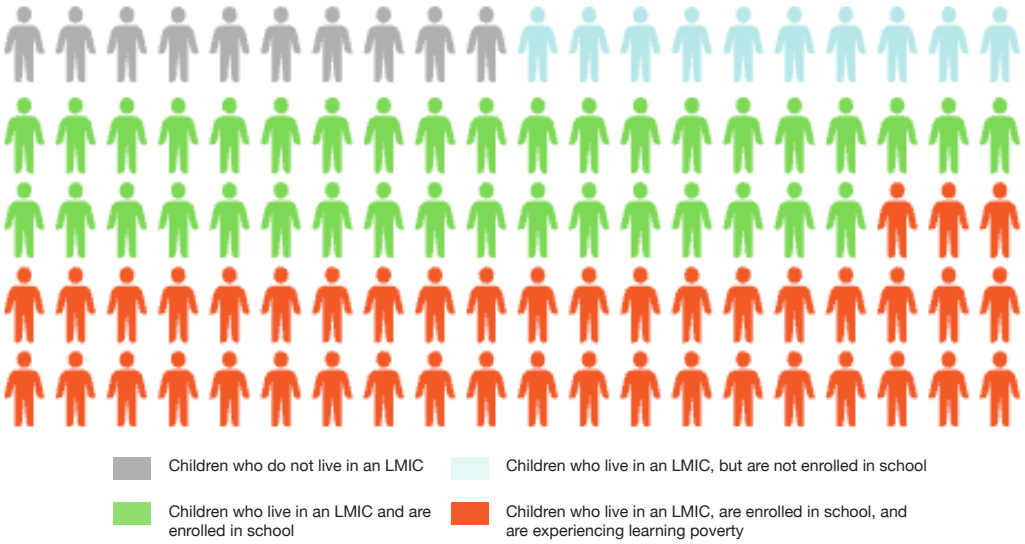
a. The growing global focus on broadening access to schools has led to significantly improved enrolment rates

Over the last 75 years, there has been a massive global shift towards the expansion of schooling infrastructure and enrolment outreach in an effort to reach a goal of universal education. As such, there are more children presently in school than at any other time in history (World Bank, 2018). Of them, 80% go through an education system in a low- to middle-income country, and in low- and middle-income countries (LMIC), in particular, enrolment rates have increased to unprecedented levels (Pritchett, 2013) as a result of groundbreaking achievements in schooling equity that deserve to be recognised. Morocco, for example, saw an impressive increase in girls' enrolment, equivalent to 54%, over the course of 11 years. By comparison, it took the United States 40 years to accomplish a similar feat. Meanwhile, in the 40-year interval between 1970 and 2010, the gross primary enrolment rate skyrocketed from 68% in all of sub-Saharan Africa and 47% in South Asia to over 100% for both regions (World Bank, 2018).[11]

Remarkable gains such as these demonstrate a successful push from LMIC to match enrolment rates in high-income countries, which further demonstrates a universal emphasis on the importance of education. However, designated focus alone is not equivalent to improved rates of learning. The goal of universal education is not limited to the single criterion that all children within a given population are exposed to an educational institution; it also requires that the education provided by that institution is adept at equipping students with the necessary foundational skills for them to function as key members of a knowledge-based economy and lead fulfilling lives (Pritchett, 2013). This is what defines the current learning crisis — that an unprecedented number of children are attending school for longer periods, but are still not mastering the skills they need to excel. In this regard, nearly all education systems across LMIC have areas in which they must progress.

[11] A gross enrolment rate over 100% indicates that some children have enrolled in a grade who are over the official age of entry for that grade.

Distribution of Children Age 0-14 by Region, Enrolment, and Learning Status



b. Barriers to enrolment still persist nonetheless

Unconditional access to schooling is a crucial prerequisite for supporting global policy attention on improving education quality and efficacy. However, while rapid, worldwide increases in enrolment in recent history are cause for hope, global universal enrolment has not yet been reached, and there are myriad factors inhibiting its realisation. To better conceptualise the gravity of the situation, it may be considered that in 2018, 1 in every 6 primary and secondary school-aged children still remained out of school, which accounts for a total of 258 million children worldwide (UNESCO, 2023). The advent of the COVID-19 pandemic further exacerbated this situation: almost 1.6 billion children in more than 180 countries were kept out of school due to closures (Azevedo, 2020). Even after the prolonged period of sweeping closures ended, many students never returned to school. In some nations, dropout rates soared, with as many as 400,000–500,000 children in South Africa, 2 million children in Ethiopia, and 6 million children in India permanently leaving the education system between 2020 and 2021 (UNICEF, 2023; Mighati, 2022). Among them, the students who were disproportionately affected were those who had already been struggling academically, or whose families were facing severe financial hardships during this period (Kidman et al., 2022; UNICEF, 2023).

In this sense, quantifying the share of children who are not enrolled in school not only underscores the urgency of improving enrolment outreach as a necessary condition for improving education systems in LMIC, but it also raises the question of why this problem persists. In some contexts, access is a central obstacle. Across the globe, and particularly in rural areas, there are ‘education deserts’, where large shares of the population do not live within a reasonable distance from the closest school in order to be able to reach school. Additional factors, like impassable terrain or issues of travel safety, may exacerbate problems with physically accessing schools beyond distance alone. Furthermore, school construction meant to mitigate instances like these has not always been optimally efficient, in the sense that fewer schools would need to be built in a given area if they were more advantageously located relative to the locations of prospective students, though other constraints do not always allow for this.

Another restricting factor to equitable access is the financial burden to households. In contexts in which schooling is not free and/or compulsory, and even in those instances in which it is, school fees — even the relatively smaller ones associated with school uniforms, meals, or textbooks — presented barriers to entry for many prospective students and their families (Abdul Lateef Jamil Poverty Action Lab, 2019). In a current report, it was shown that an average of one-fifth of students in Nigeria — which has the highest absolute rate of out-of-school children in the world — gave their top reasons for inability to attend school as competing financial responsibilities/untenable cost and the too-far distance to school (Oyekan, 2023). Further evidence indicates that the issue is widespread. Across an array of LMIC studied in a 2021–2022 report by UNESCO, individual financial contributions to schooling costs accounted for a large share of each economy. On average, household spending on education amounted to 2.3% of countries' GDP (Global Education Monitoring Report Team, 2021–2). The implications of these findings are that hindrances to educational equity are prevalent, but there are actionable incentives — such as conditional cash transfers and merit-based scholarships — that governments can use to encourage enrolment among previously excluded students (Abdul Lateef Jamil Poverty Action Lab, 2019). In doing so, a greater number of children will have the opportunity to fulfil their potential via the benefits of education.

Often, however, the issue with enrolment is that the last mile is the hardest. Beyond physical, financial, and infrastructural barriers, the quality of education offered by school systems is a crucial factor for ensuring that children not only enter school, but also remain in and advance to the next levels of school. There is a significantly stronger likelihood that students will drop out of school or will not transition to higher grades or levels of education if they are not academically thriving (Pritchett, 2013). However, the responsibility of ensuring the scholastic achievement of all students falls on the education system, to a far greater degree than it is dependent on students' backgrounds or characteristics (OECD, 2012; Eble and Escueta, 2022). Ultimately, failure to ensure adequate student retention and attainment has negative implications for both parties. It is more costly for education systems to devote educational resources to students who must repeat grades or who ultimately withdraw from formal education, and, namely, high rates of dropout are equated with lower levels of productivity in the labour force, which is detrimental for individuals and whole societies alike (OECD, 2012; Patrinos and Psacharopoulos, 2018).

c. Access to education must be prioritised from the beginning of children's academic careers

It is often also the case that children enter school later than the intended age, which can have a profound negative impact on the rate at which they master skills during their academic careers, and, thus, how well they develop into adulthood. According to 2019 data, for example, 1.8 million Nigerian children were attending primary school after the age of 11 years old (Sasu, 2022), while in the Democratic Republic of the Congo, nearly half of students (44%) begin school later than the intended age (USAID, 2018.; Global Education Monitoring Team, 2022). In a study conducted in Uganda in 2017, student ages in the last year of Primary school ranged from 12 to 22 years, and most students were 16 years old (Nath et al., 2017). In some contexts, late entry is the product of positive systemic changes that have broadened an education system's access (World Bank, 2020). While it is an undeniable step in the right direction to make schooling available to children who were previously barred from it, it is more advantageous, in the long term, for students to be equipped with school readiness by matriculating into a learner-centred environment as soon as possible — ideally via early

childhood development education (Sosu and Pimenta, 2023) — which plays a critical role in ensuring that students are able to keep pace with curricular expectations, therefore maximising their potential throughout their academic careers and beyond.

Yet, two-hundred fifty million children in LMIC were found to be developmentally at-risk, due in part to a lack of early learning programmes, in 2016, which is a number alarmingly similar to that of children found to be out of school entirely in 2019 (Black et al., 2017; UNESCO, 2019). Similarly, UNICEF (n.d.) states that developmental stunting of this kind affects 43% of the population under the age of 5. This indicates a prevalent, systemic issue that has not been improved upon at least in the last decade — an issue that starts with pre-Primary programmes and continues to hinder retention in later years of schooling across education systems. Still, low enrolment in early childhood education is a widespread phenomenon: Over 4 in 10 age-appropriate children, worldwide, were not enrolled in pre-Primary school in 2020, but the vast majority of countries do not include it in free and compulsory education (UNESCO, 2022). In order for children to succeed in their academic careers, it is imperative that they start with a strong foundation. Children at this formative stage of their cognitive development greatly benefit from a learning environment that places them on the appropriate path towards essential skill-building (Sosu and Pimenta, 2023; UNESCO, 2022). Education systems are further incentivised to make pre-Primary school access more equitable by the fact that it yields the highest return on investment compared to all other schooling stages, in addition to contributing to a more smoothly running Primary education system by preparing students to meaningfully participate (UNICEF, 2019).

While students should have the opportunity to enter school at the earliest possible stage in order to fortify their path to becoming lifelong learners, education systems must be ready to provide them with high-quality education via strong teacher professionalism and accountability, appropriately levelled curricula, and environments dedicated to learning. Evidence suggests that most LMIC are nearing their goals of universal access to schooling, but they must anticipate the influx of a greater number of students into their education systems and have strategies in place to accommodate them. Keeping enrolled students in school requires ensuring that they achieve expected levels of learning proficiency, and this is the most crucial next step for education systems in order to maintain their current progress and move from increasing schooling to increasing learning (Pritchett, 2013).

d. Literacy rates are used as a measure of education quality, but they fail to present a comprehensive picture of learning outcomes

Literacy, like enrolment, is often used as a measure of education access. Because this foundational skill underpins the student's ability to master content in all subjects and to properly function in everyday life, it is also highly studied as a barometer of the actual learning taking place in schools. On a global scale, literacy rates have dramatically increased — from 42% in 1960 to 86% in 2015. However, there are sizable disparities in the percentages of the literate population within and across countries (Roser and Ortiz-Ospina, 2013), signalling that there is more work to do towards achieving universal competency in this regard. Furthermore, when using literacy as a model, research suggests that insufficient attention has been allocated to education quality in favour of efforts to expand education access (Pritchett, 2013; Nestour et al., 2022).

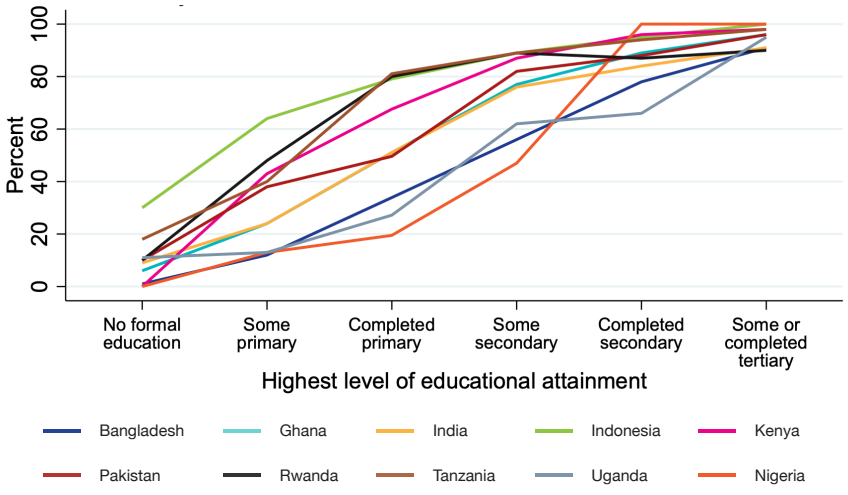
To provide a comprehensive understanding of the trajectory of education systems in LMIC, researchers (Nestour et al., 2022) conducted a study that included 86 countries, 39 of which were concentrated in sub-Saharan Africa. They isolated the growth of education quality from increases in access and measured this growth, using the likelihood that individuals would become literate after five years of Primary-level schooling as a proxy. Ultimately, researchers found that education quality had not improved in any of the evaluated LMIC in the last 50 years. For some, education quality had in fact declined over time, all while the drive for mass enrolment saw higher numbers of students entering formal education systems. Findings also indicated notable gaps in education quality not only among comparatively high-performing and low-performing countries, but within each of the countries as well (Nestour et. al., 2022).

The level of heterogeneity in literacy proficiency to this extent suggests that educational inequities exist in various magnitudes within and across LMIC. It is therefore clear that there is a need for implementation of standardised practices — tailored to the individual needs of each education system's context — in order to ensure broad and effective delivery of high-quality education. If the appropriate measures towards improvement are taken, literacy rates among all shares of the population will continue to rise.

e. Literacy rates in LMIC are often inaccurately inflated by variation in measurement methods

Differences in literacy rates can indicate varying levels of commitment to effectively implementing the necessary characteristics of well-functioning education systems. Taken together, these individual variations point to a large-scale deterioration of academic standards that then diminishes millions of students' opportunities for upward mobility. It is therefore important to consistently collect evidence on contextual literacy proficiency and use this evidence as a basis for applying learning-centric approaches. However, it is equally important to recognise that there are often significant disparities between reported literacy rates and the actual levels of learning achieved in schools.

Literacy Rates at Successive Education Levels, Selected Countries



Source: World Development Report 2018 Data

It is worth examining, then, what exactly constitutes literacy. Some definitions present it simply as a singular threshold to cross, rather than a heuristic model within which students should have the skills to navigate and grow. In this sense, the benchmark aligning with achievement may be too low. In certain cases, observing that students cannot meet or surpass a relatively lenient threshold in literacy can provide beneficial visibility into the extent to which these students require intervening instruction. Conversely, the evaluations may show that students are nominally literate, though they are far from achieving the ultimate goal of literacy: reading comprehension, which incorporates a variety of emergent subskills commonly featured on assessments, such as phonemic awareness and automatic decoding. Combining these contributing subskills into the ability to draw meaning from and apply the purpose of a text, however, is what elevates them from *learning to read* to *reading to learn*.

Before the need for improvement in this particular area of learning can be addressed, its rampancy must first be properly assessed. Currently, self-reported literacy rates across a number of nations reflect a level of optimism that does not match the levels of learning poverty. For instance, in sub-Saharan Africa, the illiteracy rate is said to be 24%, but 87% of children are in learning poverty (World Bank, 2018). In India, data compiled by UNESCO from individual and household reports concluded that the youth literacy rate was 92% in 2018, though India's National Statistical Office surveyed the average overall literacy rate to be approximately 74%. Meanwhile, more than half of children in India were estimated to be in learning poverty in 2019 (World Bank, 2019). From these examples, a clear pattern of dubious accuracy emerges, which will continue to impede educational improvements as long as it remains unremediated.

Moreover, the decision to make foundational literacy and numeracy skills the focal point of education improvement initiatives may be largely predicated on the extent to which policymakers across LMIC understand acute student deficiencies in these domains and the significance of remediation. To assess this, 931 interviews were conducted with officials in the sub-Saharan Africa and Asia-Pacific regions, which revealed a widespread overestimation of student proficiency in foundational skills. On average, policymakers estimated that double the share of students had attained foundational literacy than the actual proportion, which was determined by using the World Bank's Learning Poverty indicator (Crawfurd et al., 2021).

Additionally, the findings of this study have shown that there is an absence of urgency among policymakers to prioritise building foundational skills as the cornerstone of education quality programmes. While as many as four in five interviewed officials (79%) recognised that the learning crisis affected both their own country and the entire globe, only 2% regarded a foundational reading or literacy programme as the most significant, recent educational reform in their context. Further evidence showed that a positive official perception of student skills in foundational literacy and numeracy strongly correlated with reduced motivation to focus on this area of improvement. Therefore, the disparaging response to programmes strengthening core pupil competencies may be due to a falsely optimistic outlook on the state of learning that is, in turn, produced by a lack of visibility into consistent, accurate measurements of learning (Crawfurd et al., 2021). However, it is necessary that students in these contexts have verifiably mastered the most fundamental concepts before policymakers can address other goals in order to preserve education quality.

2. Learning outcomes are weak and urgently require transformative interventions

a. Foundational literacy and numeracy skills are severely lacking among students in all levels of schooling, but especially in Primary grades

While ensuring that children have access to school, start school at a developmentally appropriate age, and stay in school for the expected duration is a massive undertaking, succeeding in any or all of these areas does not guarantee that students are receiving an education that will properly equip them for their future careers and daily lives. Learning, especially when it is not measured for efficacy, is not the natural by-product of school attendance (World Bank, 2018; Pritchett, 2013). In fact, myriad examples of persistently low learning levels exist in all LMIC, where over half of all children (53%) experience learning poverty according to the World Bank,[12] even while 40% of them are attending school. Furthermore, this regional average masks the extent to which learning poverty rates are especially dire, such as in sub-Saharan Africa, where it is estimated to be approximately 90%, and in the Middle East, North Africa, and South Asia, where 6 in 10 children do not approach expected minimum proficiency levels. These shortfalls in learning outcomes among enrolled students speak to insufficient education quality that will inhibit them from mastering increasingly complex curricular expectations, and may lead to their eventual withdrawal from school.

Literacy, the most extensively studied foundational skill, can also be examined among students in LMIC. Competency in this domain is essential for students to follow written directions, engage with learning materials, participate in assessments, and become knowledgeable in every core subject in school. However, evidence points to a widespread lack of proficiency in many of the fundamental, early-grade subskills that ultimately inform literacy. In rural India in 2016, for example, half of students were unable to read sentences in their local languages that were considered appropriate for a grade 2 curriculum. In another scenario, 80% of grade 2 students in Ghana and Malawi were unable to read a single familiar word, such as “the” or “cat”, during assessments conducted at the end of the school year. When using a three-sentence passage for assessment and reducing the defining characteristics of literacy to a relatively lower threshold,[13] 75% of students in Nigeria, Uganda, and Bangladesh did not qualify to be considered literate by the end of Primary school (World Bank, 2018). Therefore, despite the inherent understanding of the extensive advantages of literacy and the detrimental consequences of illiteracy, there is still a pervasive absence of proficiency in this foundational skill among students within and across education systems.

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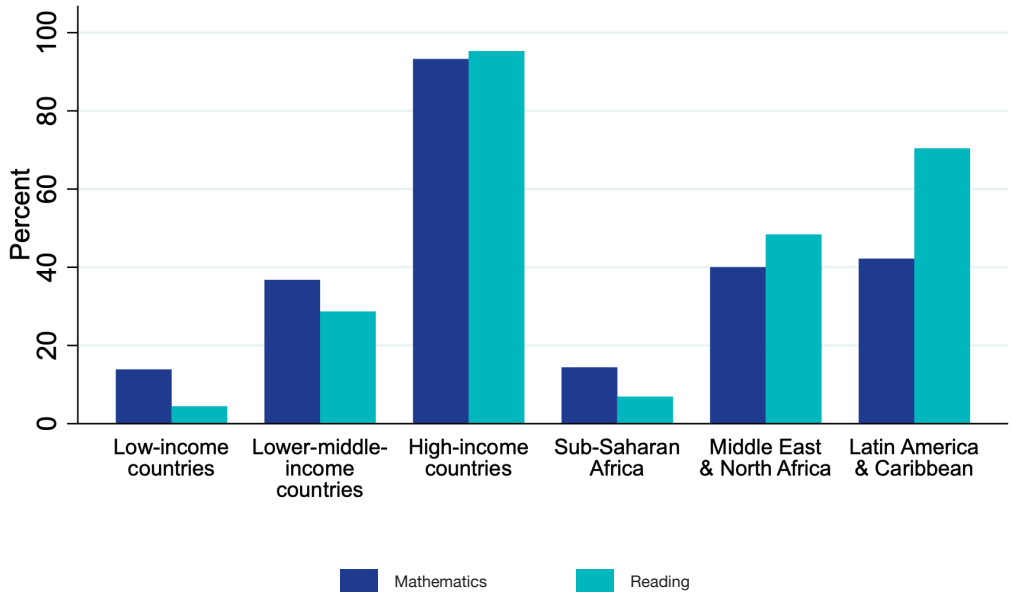
[12] “Learning poverty” is defined as the inability to read and comprehend a simple text by the age of 10.
[13] “Literacy” was defined in this context as the ability to read either “fluently without help”, or “well but with a little help”.

Problematic literacy rates are mirrored by numeracy rates that could also significantly inhibit students' abilities to function in their daily lives. For example, 50% of all third graders in Uganda cannot solve simple subtraction operations. An even higher percentage, 69%, of third graders cannot complete double-digit subtraction in rural India. By grade 5, half of those third graders still cannot solve the same operations (World Bank, 2018). Similarly, only 60% of students in urban Pakistan could correctly perform double-digit subtraction by grade 3, and this percentage dropped to 40% for the same grade level in rural areas. The dearth of numeracy proficiency seen in these contexts extends to broader regions, as well. Across sub-Saharan Africa, the Middle East, and North Africa, for instance, the average share of students who score above the minimum proficiency level on a mathematics learning assessment is between 18 and 42% (World Bank, 2018). Therefore, while the specific interventions that must be implemented to elevate learning in foundational numeracy will vary based on an education system's independent context, the necessity to disrupt stagnating learning gains is clear.

Median Percentage of Students in Late Primary School Who Score Above a Minimum Proficiency Level on a Learning Assessment, by Income Group and Region

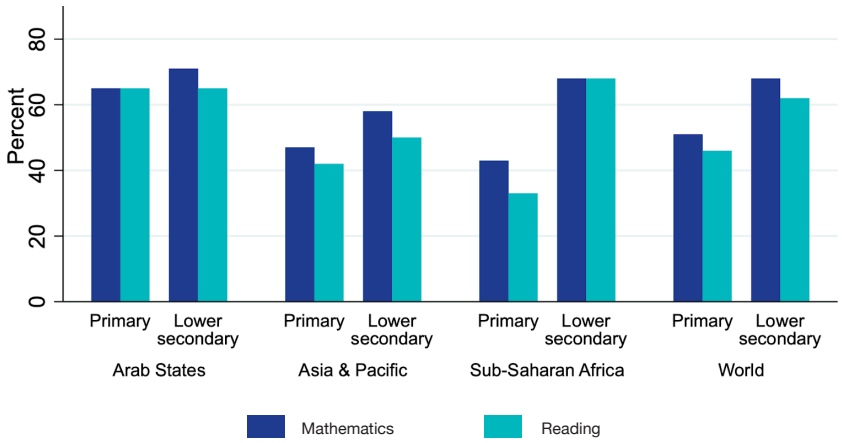


Source: World Development Report 2018 Data

Furthermore, without the implementation of effective policy solutions that drive improved learning outcomes, massive amounts of educational resources will continue to be expended without a meaningful return on the investment. On a global scale, for instance, 125 million students who have successfully completed 4 years of schooling do not have functional literacy or numeracy skills, demonstrating a widespread lack of recompense for schooling efforts. This will require targeted, transformative approaches to prevent the ongoing scarcity of learning, and to preserve the expected output of education funding — which has little room for deviation following the economic downturn incited by COVID-19 (United Nations, 2020).

To complicate the matter, one-third of 121 countries have also been found to lack the data required to report reading and mathematics proficiency levels among children (World Bank, 2018). However, it is pivotal that educational interventions operate with a data-driven core, to not only certify and track their efficacy within education systems, but to also benchmark students' progress against international standards, thereby ensuring that students are prepared to become globally competitive adults.

Percentage of Countries With Data to Monitor Progress Toward the Sustainable Development Goals for Learning by the End of Primary or Lower Secondary School



Source: World Development Report 2018 Data

b. Year-on-year improvement is too slow for students to keep pace with their better-positioned peers

As the evidence pointing to low worldwide learning levels implies, there is a profound need to determine the extent of under-education in foundational skills and target them from Primary grades upwards. In addition to measuring the student learning gains that result from this educational reform, however, stakeholders must also measure the pace at which these learning gains are achieved in order to gain insight into their education system's global competitiveness and thus improve their rate of progress. Currently, data show that high-performing students in middle-income countries would be ranked in the bottom quarter in wealthier countries, while for many education systems in LMIC, the current rate of student learning will not result in globally comparable content mastery in a reasonable number of decades (World Bank, 2018; Pritchett, 2013). For example, a comprehensive number for the Global South estimates 50 years just to halve current learning poverty levels (Azevedo, 2020).

The implications of these findings are that there is a considerable risk of generations of students continuing to lag behind desired learning levels, but that essential rapid improvement on a large scale is attainable through interventions that positively overhaul learning outcomes. For example, if every LMIC in the world were to produce learning gains at a rate that doubles or triples their historical progress, it is possible to reduce learning poverty by almost half by 2030 (Azevedo et al., 2021), which is an 82% reduction in the counterfactual projection of time needed to meet this goal. Therefore, the critical dual objective of education systems in LMIC is to not only set precedents in learning gains achieved, but also in the pace at which they achieve them.

c. The COVID-19 pandemic led to significant setbacks in learning progress

The onset of COVID-19 has drastically increased the prevalence of weak learning outcomes across the globe. Not only did existing deficits in learning worsen in the years during and following the pandemic, but the resultant need for specialised systems that will overturn deteriorating learning from this global event also presents another obstacle to advancement for education systems that are susceptible to low performance. According to the most recent reports provided by UNICEF and the World Bank, the average student in a low-to-middle-income country spent close to two academic years (236 days) out of school (World Bank, 2023), and learning poverty in LMIC was estimated to increase beyond original estimates of 53% to as much as 70% — an increase that would signify three years of pandemic-related learning loss (Azevedo et al., 2022).

While longer school closures were correlated with a more pronounced decline in learning, the availability of distance learning technologies also played a significant role in students' ability to keep pace with academic expectations. However, in nearly all low-income countries, more than half of the population does not have access to the internet (World Bank, 2023). While other at-home learning models were employed by most LMIC that did not require internet connectivity — such as radio lessons, televised lessons, or take-home packages — these did not allow teachers to verify student engagement with lessons via observation, nor did they enable teachers to track student understanding of the subject matter while instructing (World Bank, 2023). In this sense, the tradeoff education systems faced when innovating distance-learning approaches to reach a greater number of students was the inability to manage these students' mastery of lesson content in real-time.

As a result, many students across LMIC learned much less than they would have if participating in conventional, in-person instruction, and therefore, more students demonstrated lower learning levels from 2020 onward. In Brazil, for example, some students participating in at-home learning absorbed only 28% of the content they would typically learn in school (World Bank, 2023), and thus scored over 50 percentage points lower than projected in maths and nearly 40 percentage points lower in language on state exams administered in Sao Paolo in 2021. A similar scenario is observable in South Africa, where second- and fourth-grade students learned only an average of 25–41% of a year's worth of instruction during the pandemic. In India, more than half of second-grade students were already reading fewer than 10 correct words per minute (cwpm) prior to the onset of COVID-19, and this share increased by 42% in 2020 (UNESCO et al., 2021). This disruption to education interrupted the academic trajectory of students on a worldwide scale (United Nations, 2020), with the most significant consequences for students in early grades needing to master foundational skills and for those who were already struggling in their learning. In response, researchers and policymakers have offered and tested a number of solutions involving curriculum restructuring and small-group tutoring, among others, that aspire to reclaim a positive learning trajectory on an accelerated timeline (UNESCO et al., 2021).

To ensure the effectiveness of these solutions, however, it is worth examining how the COVID-19 pandemic hampered the performance of teachers and school leaders, who also experienced significant disorder to the typical execution of their roles. Many teachers did not have access to in-service training relevant to the hard pivot to remote-learning modalities, which would be exacerbated by a pre-existing lack of professional development in regions like sub-Saharan Africa, where more than a third of teachers (36%) had not received training (United Nations, 2020). Across all studied LMIC, two out of three teachers did not receive any special training (68%) in the first seven months of school closures, while nearly half of teachers (48%) had not been trained in the specific use of online platforms for instruction during the initial three months of school closures (UNESCO, 2020). Beyond training in this regard, an outright lack of technological devices and internet connectivity in LMIC impeded teacher participation in remote learning to a similar extent that it affected student participation in these countries, as only 19% of teachers were provided with ICT tools or internet connectivity (UNESCO, 2020).

Furthermore, UNESCO data (2020) show that the school personnel required to continue working was commensurate with the proportion of teachers required to continue teaching in LMIC. However, the evidence (UNESCO, 2020; Vegas, 2020) showing a general lack of support for teachers in these contexts calls into question the extent to which class-time observations by school monitors and teacher performance evaluations were severely limited, if not altogether impossible, during the pandemic, especially depending on the distance-learning methods employed by education systems. This, coupled with the financial hardships endured by many teachers, could have contributed to higher rates of absenteeism — which was already pervasive in LMIC — and a greater number of teachers leaving the profession altogether during and following the pandemic (United Nations, 2020).

In this sense, teachers need the support of impactful tools and resources, and the motivation of effective leadership, in order to implement systemic changes to education systems in their classrooms, which students will require to overturn the severe learning losses incurred in recent years. Education systems in LMIC, which already faced a learning crisis prior to the advent of COVID-19, are now further incentivised to unite key stakeholders in introducing transformative interventions that will standardise high-quality learning opportunities for all students.

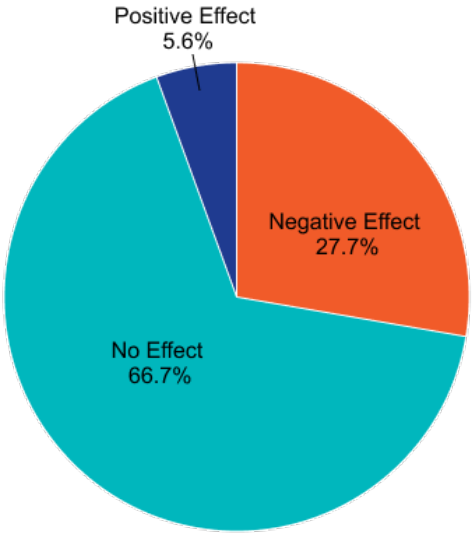
3. The causes for weak learning outcomes are many

a. Visible input-based policies are heavily relied on, but their effectiveness is dubious

Although the ongoing challenges to education systems both during and following the COVID-19 pandemic are severe, there are more global resources currently dedicated to education than ever before. This has created a path for policy interventions to often focus on input-based solutions when education systems are not meeting quality standards. A lack of tangible resources like paper, textbooks, or technological hardware in some schools, for example, have been looked at as hindrances to elevating learning. This is a worthy concern, in some cases. For instance, one study found that less than half of all students in Niger and Nigeria had paper to write on, while there was only 1 maths textbook for every 66 students in Togo (World Bank, 2010–2014). Such inconveniences can bog down the learning process when instructional efficiency is of the utmost importance. In this sense, inputs are necessary to a degree, but they are not nearly sufficient as a standalone improvement effort.

Furthermore, while targeted, scaled investments in education are needed to improve learning outcomes, misguided efforts to enhance schooling can have the unintended consequence of exacerbating already-problematic learning levels. If the specific factors inhibiting learning gains in a school have not been identified or had resources allocated specifically to them, indiscriminate expenditures on ostensibly beneficial changes may have little effect, while existent problems persist. In other words, the mere injection of materials into sparse classrooms has not been shown to result in higher levels of academic achievement, and may even function as a detractor. In 2008, for example, textbooks distributed to Sierra Leone were discovered unused in a cupboard during a follow-up inspection. Speculations indicate a hesitancy to risk damaging a resource such as these when they are a rare classroom feature (World Bank, 2018), but a lack of use in this regard is a lack of advantageous potential for student learning, and signifies non–cost-effective spending on education improvement.

Distribution of the Effects of Hardware Education Technology on Student Learning



Source: World Development Report 2018 Data

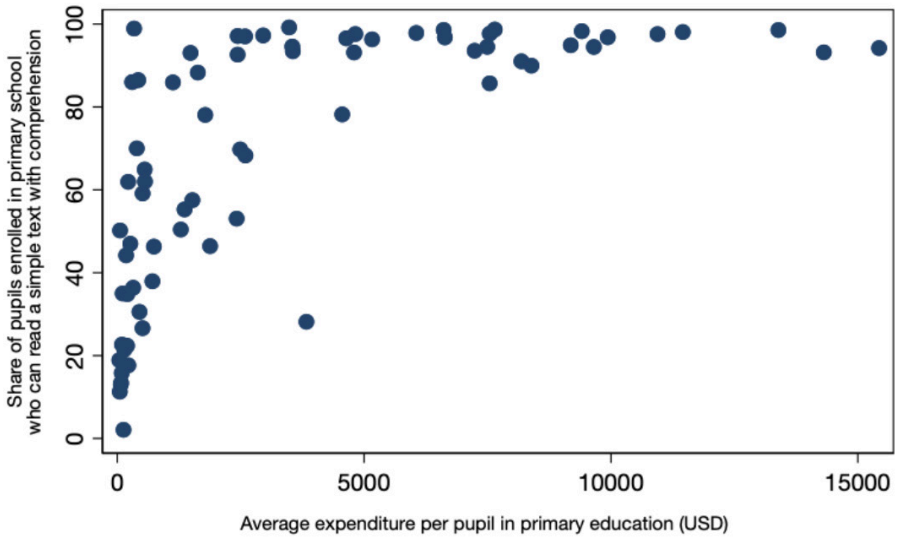
Another, more far-reaching example is the One Laptop per Child (OLPC) initiative, which was a lofty aspiration to enhance learning via technology access in 42+ countries (Yanguas, 2020). One year after successful distribution, however, almost half of teachers reported rarely or never using the laptops in the classroom (World Bank, 2018). A variety of studies across a range of LMIC conveyed neutral or negative results stemming from OLPC on academic outcomes. In some cases, students were spending more time on their computers, but less time on independent study or other learning-based activities (Meza-Cordero, 2017). Further evidence aligns with these findings produced from the OLPC initiative, showing that the introduction of edtech hardware only has a 6% positive effect on student learning, while the other 94% of the effect on student learning is neutral or negative. In response to this, it is imperative for education systems in LMIC to parcel out and maintain momentum with proven-effective approaches, so that gaps in educational achievement do not widen during side-tracked pursuits. Furthermore, curricular design should justify how and why material or technological inputs are used. These resources must fortify pre-existing teacher-learner relationships as a complementary additive, not a substitute (World Bank, 2018).

To accomplish this requires ensuring that resources used by education systems in LMIC are supported by evidence of their confirmed impact on learning gains, which, in turn, ensures that investment in them is cost effective. Framed differently, policy decisions about which resources are allocated to these education systems, and for what purpose, are more pivotal than the amount of resources that are allocated, above a certain threshold. This concept becomes more clear when examining a distribution of per-student expenditures across countries, which also shows a large range of learning outcomes. In the majority of these contexts, high literacy rates exist alongside relatively high per-student expenditures, but this is not a causal relationship. Firstly, It's important to highlight that numerous assessments indicate that high-income countries that have achieved exemplary — or at least, satisfactory — learning outcomes have consistently maintained these outcomes for three-quarters of the past century. Therefore, these countries do not have the same goal of positively overhauling the quality of their education systems as LMIC do (Pritchett, 2013). Furthermore, the value brought to high-income countries' economies by the stronger knowledge base of their citizens contributes to their ability to funnel comparatively larger portions of their budget back into education systems, resulting in higher per-student expenditures that largely perpetuate existing learning levels.

Secondly, there is considerably more variation in learning outcomes when expenditures are below approximately USD 5000. In this sense, poor learning outcomes do not directly correlate with low per-student expenditures. Instead, this variation highlights the possibility and importance of prudent monetary allocations towards initiatives that can transform education quality, which do not need to come at an untenable cost. In these contexts where per-student funding availability is low, there is also increased risk of regression or stagnation in learning resulting from misallocated expenditures. For this reason, cost-effective approaches to transforming education in LMIC must be supported by strong evidence of their effectiveness. Increased investments in education by currently low-spending countries will produce improved learning outcomes for generations of students, who will in turn contribute to the economic growth of their countries.

Although investment in education is correlated with learning outcomes at a national level, how the funds are actually invested also matters:

Especially among the lower levels of per pupil investment, there is significant variance in learning outcomes across countries



Overall, the basis for allocating educational resources must be steered away from prioritising high visibility and instead be directed towards strategies that will yield measurable results. This is the necessary starting point for whole education systems and the students they serve that require a strong learner-centred foundation prior to the accumulation of conspicuous academic inputs. These education systems must, first and foremost, leverage their existing and essential components to facilitate better stakeholder performance and establish a resilient learning environment.

b. Low teacher content knowledge can translate into poorly executed pedagogy

Teachers are at the core of what can be accomplished in any given classroom, and are the single-most influential input across all education systems (Vegas, 2020). The level of competency they possess in professional aptitudes and their cultivated rapport with emerging learners are what equips them to assess learning levels and aid students in fulfilling their academic potential. In some instances, though, teachers in LMIC may lack the content knowledge necessary to sufficiently coach struggling students. In 14 sub-Saharan African countries, for example, teachers performed at the same level on reading tests as their highest-performing grade-6 students (World Bank, 2018). Similarly, in India, two-thirds of teachers (66%) could not correctly solve a grade-5 maths problem. Studies suggest that these deficiencies in teachers' mastery of subject matter can have negative implications for student achievement. In some contexts, as much as a third of students' inability to meet curricular expectations (30%) was found to be due to a lack of teacher content knowledge. Findings such as this are corroborated by evidence showing that large proportions of teachers in Kenya and Togo could not accurately correct at least 80% of student answers on a fourth-grade mathematics test — therefore demonstrating an inability to evaluate whether students are learning or to guide students towards that goal (Brunetti et al., 2021).

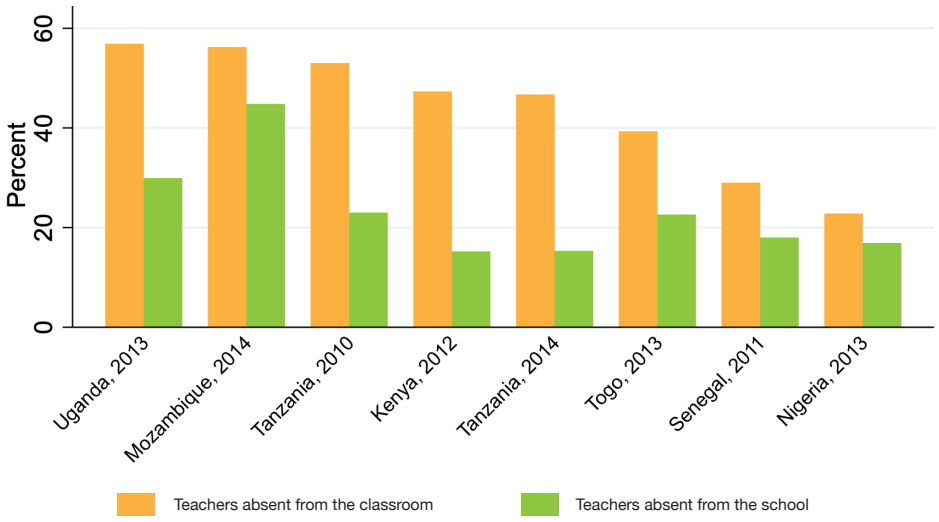
This may lead teachers to cater to higher-performing students in order to maintain instructional flow, or to push through the curriculum without identifying areas in which students need more support. These would be in direct contrast with the classroom approaches that students often need most to succeed, like ability-grouping, and can encourage student dropout (World Bank, 2018). To examine the issue more closely, a variety of studies have assessed the extent to which teachers are lacking pedagogical skills. The World Bank's Service Delivery Indicators report indicates, for example, that the average teacher in Indonesia scored only 25% on a pedagogy assessment in 2019 (World Bank, 2020), while the average teacher in Madagascar in 2014 scored only 23% on pedagogy assessments (Wane and Rakotoarivony, 2017). In Pakistan, among Primary-school teachers who were evaluated on a number of pedagogical skills in areas like lesson facilitation, checks for understanding, and fostering critical thinking using the Teach tool, almost two-thirds of teachers (63%) achieved scores between two and three out of five, with the most teachers earning the lowest scores in the areas of fostering critical thinking, feedback, and social and collaborative skills (Molina et al., 2020).

However, the consequential link between poor content knowledge and unsatisfactory pedagogical performance provides policymakers with the opportunity to address both shortfalls simultaneously. Solutions like structured pedagogy can provide teachers with expertly researched lesson content that will not suffer from low levels of teacher expertise in subject matter, and include essential techniques, like scaffolding, that ensure the teacher properly paces dissemination of the lesson with students' ability to achieve mastery of foundational concepts.

c. Strong governance is essential for encouraging teacher professionalism and accountability

Regardless of whether teachers possess ideal levels of content knowledge and pedagogical best practices or not, it is irrefutable that teachers must value professionalism and accountability to be effective. For that to happen, they must be bolstered by effective governance administered by informed policymakers. However, evaluative reports suggest that these crucial pieces are not always in place. Across eight African nations studied between 2010 and 2014, for example, teachers were often absent from their classrooms, or from school entirely. In Mozambique, Uganda, and Tanzania, the amount of time teachers were absent from school was close to or more than 50% (World Bank, 2018). Absenteeism to this extent reduces actual instructional time from that of a typical school day to approximately two to three hours per day, on average. Instructional time is further compromised by teachers who are present interrupting their class time to check in on other classrooms that are unsupervised due to absenteeism and a lack of substitute coverage (Bashir et al., 2018; World Bank, 2018). Teachers who must integrate these unattended students into their own class are forced to dilute the benefits of ability-grouping and disrupt the appropriate scope and sequence of academic content by imparting it to those for whom it was not intended.

Percentage of Teachers Absent From School and From Class on the Day of an Unannounced Visit, Participating Countries



Source: World Development Report 2018 Data

Effective school-monitoring practices are what is required to mitigate high rates of absenteeism across LMIC, but these are not always effectively leveraged for incentivising teacher or whole-school compliance with consistent attendance. In Tanzania, only 30% of schools reported that a recent visit from ministry of education officials was related to teaching and learning. Across a number of public schools sampled in India, not one of the teachers with a high number of absences had been dismissed by the principal during their tenure (Mbiti, 2016). Additionally, according to UNICEF's Time to Teach Study, school leaders in a number of West and Central African contexts did not issue sanctions against frequent absenteeism due to confusion about the education system's hierarchy or a lack of faith that corrective action would be taken (Karamperidou et al., 2020).

However, regular observation by school leaders and the introduction of programmes that tie professional benefits for teachers directly to academically constructive behaviours can result in reduced absenteeism and time off task, which, naturally, carries positive effects for students. In public schools studied in India, for example, there was a 25% decrease in overall absences and a 40% decrease in unauthorised absences when regular school inspections were conducted (Muralidharan et al., 2017). In another study, learning outcomes were improved by way of better teacher attendance when teachers in India were financially incentivised to take time-stamped photos with their class at the beginning and end of the school day (Mbiti, 2016). In addition to facilitating their most desired effect — a positive impact on student learning gains — initiatives like these can set expectations for education professionals that not only improve current situations, but also carry into the next generations of incoming teachers.

The issue of teacher shortages extends beyond frequent absences, especially when considering daunting student-teacher ratios across South Asia, the Middle East, and Africa. These range from 35:1, on the lower end of the spectrum, up to 90:1 (World Bank, 2018). While this can significantly constrain the teacher to devote more time to classroom management tasks than instruction, which has been found to detract from student achievement (Molina et al., 2020), hiring more teachers to reduce class sizes in western Kenya, for example, did not correlate with improved teacher performance. Instead, the increase in the number of staff reduced the sense of urgency and personal responsibility felt by teachers to optimise their instruction. Although it was intended to provide more capacity for differentiating instruction, the expansion of staff was not accompanied by regular teacher observations and constructive training. Therefore, it led to a diffusion of responsibility among teachers and failed to account for other priorities these teachers may have had, which was evidenced by a significant portion who shifted their focus to seizing employment opportunities for relatives (Mbiti, 2016).

A critical aspect of ensuring the optimisation of student learning opportunities through teachers is to ensure that teachers are adequately supported by the education systems in which they operate. This support should come in the form of relevant, consistent in-service training, as this is a critical component for professional performance that many teachers do not receive (World Bank, 2018). In 21 countries studied across the globe, for instance, between one-third and more than one-half of Primary school teachers were not trained according to UNESCO's 2017 data, and the quality standards that define training differ among these countries (Montoya, 2019). Many teachers also grapple with heavy workloads that include administrative responsibilities not related to instruction, and a dearth of teaching and learning materials to aid them with meeting expectations for their instruction. On these fronts, non-teaching education personnel can also benefit from receiving professional development that better equips them to manage schoolwide responsibilities and provide coaching to teachers. The use of structured pedagogy can alleviate the burden on teachers preparing their own lesson plans when they do not have time to design them well, or design them at all.

d. Important considerations for effective policymaking in low-income education systems

The joint performance of all stakeholders in an education system is pivotal for fostering student success, and is equally capable of undermining said success. The latter is especially plausible when policymaker decisions do not properly leverage all components of the education system towards achieving a clear objective of enhanced student learning. Yet, policymakers seeking to enact change for learning-deprived schools can be inhibited by an absence of metrics providing necessary insight into the state of learning, and may therefore lack the context with which to make viable recommendations. This insufficiency of actionable data is widespread in the parts of the world where such data are needed most. World Bank research has attested to the fact that the vast majority of the countries that represent the global population are low- and middle-income countries, which have historically lacked assessment results that reliably compare learning outcomes on an international scale, but also have the most room for growth in terms of education quality (Angrist et al., 2021). Therefore, it is essential that the decision-making process for improving education quality begins with the system-wide collection of robust, regular measurements of the state of learning.

Even in instances when evidence of student performance is available, policymakers may be inclined to abide by the falsely representative or misleading optics it can present. If, for instance, students who were identified as the lowest performing at a given point in time withdraw from school in higher proportions than mid- to high-performing students, subsequent assessments will appear more favourable on average, but learning gains will not have improved (World Bank, 2018). In this sense, regulatory stakeholders may more accurately gauge the success of the education system by examining the participation and performance trends of these low-performing students. From a broader perspective, it should be recognised that sectionalised data points are not solely representative of an education system's learning-centric achievements; rather, the effectiveness of its strategies must be observable in all measures of accountability.

In an ideal case, struggling students would be equipped with the necessary tools to strengthen their capacities and grow towards keeping pace with their higher-performing peers. A significant hindrance to achieving this goal is that the facilitation of learning gains among low-performing students may not be well-integrated into the academic framework of an education system. Evidence points to curricular design that, in many cases, favours top-performing students rather than the median student (Mbiti, 2016). Research further suggests that overly complex, fast-paced curricula in LMIC are a deterrent to all students' learning (Pritchett and Beatty, 2012), despite being implemented with the intention of setting rigorous expectations for academic achievement. In response to this, policymakers should adopt a gradational approach by first familiarising themselves with the curriculum in a given education system, and then taking the steps necessary to understand if, how, and why certain students are not keeping pace with it, while incorporating the pedagogical factors that will foster achievement in that system's particular context. In doing so, the policy will focus on targeting students at level, thus allowing them to master the foundational content on which they will build schema that will translate into cumulative mastery.

Teachers can collaborate with policymakers to accomplish the goal of elevated student learning via a multi-tiered feedback structure. Such a structure begins with formative assessments conducted in the classroom, which allow teachers to identify struggling students, and expands to national assessments and examinations, which provide insight into the functionality of the education system as a whole, and international large-scale assessments (ILSAs), which evaluate the effectiveness of education systems across countries and over time (World Bank, 2018; Rocher and Hastedt, 2020). In turn, the broad reforms education leaders introduce by discerning core effective principles from this host of information sources will ultimately return the benefit to classrooms and teachers.

Importantly, policymakers and education personnel alike should be prepared to recognise that reforms targeting pedagogical improvement and increased accountability are not always as conspicuous as input-based policy changes or efforts to increase enrolment and attendance. Nonetheless, the appropriate interventions have the ability to drive unprecedented learning, which is the strongest indicator of any initiative's effectiveness. As Rukmini Banerji succinctly summarises it, "Discussions focused on learning are neither easy nor automatic" (Mbiti, 2016). Furthermore, while policies may be adapted for a given education system based on their replicated success in other contexts, it is imperative that education leaders investigate the nuances of the selected education system, in order to ensure that policy implementation is scalable, cost-effective, and aligned with the most urgent learning needs.

4. The case for solving the learning crisis through targeted investment in foundational skills and beyond

a. The projected economic consequences of low education quality far outweigh current investments in education, but there is potential for substantial economic gains through improved education

Students with strong learning outcomes are more likely to achieve higher educational attainment and are subsequently more productive and fulfilled when operating within the labour market. For example, research conducted by the World Bank in 2018, based on observations in 139 countries, found that there is a 9% average increase in wages for every additional year of schooling that an individual receives (Patrinos and Psacharopoulos, 2018). However, the inverse of this situation also applies. Students who are currently learning deprived stand to lose a collective 10 trillion USD in potential labour earnings over the course of their working lives, which will have a broader detrimental impact on the economies in which these former students live and work. Foregone earnings of this magnitude are equivalent to one-tenth of the global GDP, and are twice the global annual public expenditure on Primary and Secondary education (Azevedo, 2018). Additionally, comprehensive research conducted in 2022 via the RISE programme shows that student performance deficits will lead to the loss of 700 trillion USD from the global economy by the year 2100 (Gust et al., 2022). Therefore, the enormity of financial losses that could be incurred as a result of education systems that do not meet the needs of the global student population is clear, which not only precludes those students from personal prosperity, but also detracts from opportunities to invest in education for the generations that follow them.

Still, it should be recognised that the current amount of funding being devoted to education quality improvement is significant. On average, 14% of worldwide government expenditures are devoted to education, according to USAID (2018), and an average of USD 5 trillion is spent on education every year across the globe. A UNESCO report calls for an additional USD 500 billion of yearly education funding from low- and middle-income countries, specifically, to reach SDG 4 by 2030 (2022). While these amounts pale in comparison to what is forecast to be lost if low learning levels and resultant high rates of school dropout continue, it is possible to achieve higher returns on these investments by ensuring that they are strategically allocated to reforms that have been proven effective in elevating student performance, which will in turn contribute to student retention. Therefore, concerted effort towards solving the learning crisis is the foremost proposed action to ensure the cost-effectiveness of education funding and increased opportunity for sustaining these investments over time.

b. Supporting cognitive development in childhood is critical for ensuring a competent knowledge base in adulthood and facilitates improved pedagogy in classrooms

Missed learning opportunities early in life can have a stunting effect on students' learning trajectories as they progress through their education careers. Though the brain continues to adapt to its environment and foster learning throughout life, it functions best when given a strong foundation during childhood on which to sequentially build in increasingly complex ways. In other words, students who lack mastery of fundamental content from the early grades onward are at a greater risk of making detrimentally slower progress due to the cumulative nature of learning, which is particularly consequential in a finite formal education period (World Bank, 2018; Eble and Escueta, 2022). The negative effects of foregone childhood learning are compounded by the fact that the synapses responsible for forming sensory pathways, understanding language, and performing higher cognitive function gradually plateau as children approach early adulthood. For these reasons, a strong skills base is essential for supporting the pursuit of an intensifying, comprehensive education that adequately prepares graduates for participation in larger society (World Bank, 2018).

There is further evidence to support the idea that foundational skills constitute a pivotal building block that encourages students' academic success. A series of observations conducted by researchers (Hwa and Duong, 2021) in high-performing classrooms led to some major conclusions about effective teaching and learning. One of these was that foundational skills should be treated as opportunities to learn more advanced knowledge. It was found that ensuring mastery of fundamental concepts in this way provides more advantage for student learning, according to this study, because it allowed teachers to connect new concepts to those previously learned, and to eliminate rote memorisation in favour of more meaningful practice. Via this approach, students develop a greater capacity to acquire and retain a broader scope of knowledge throughout their education careers. What is troubling, though, is that there are still many examples of curricula in LMIC that do not prioritise student mastery of foundational literacy and numeracy subskills, which will ultimately hinder student participation in subsequent tiers of instruction.

Conversely, students who are able to engage with and apply foundational skills are better equipped to develop metacognitive thinking from the earlier grades onward. Those students who were encouraged by their teachers to analyse their own learning process tended to display better learning performance and expressed more interest in learning, according to the study (Hwa and Duong, 2021). Therefore, the benefits of encouraging cognitive development via a learning-centric environment compound over time and permeate throughout an education system by allowing teachers to refine their instruction and granting students the agency to actively contribute to their own educational achievement, which ultimately results in more high-yielding classrooms.

c. Elevating education quality standards drastically improves educational equity

It is often the case, across LMIC, that students from relatively disadvantaged socioeconomic backgrounds display lower performance in foundational literacy and numeracy competencies, in addition to being less likely to remain in school for the duration of or following their Primary school careers. These disparities increase over time, which highlights the necessity of early interventions that create equitable learning opportunities and foster gains for students from all wealth groups (DHS, 2014, 2015–16; Spaull and Kotze, 2015). Research indicates that improving student mastery of foundational skills in an education system, regardless of the disparate socioeconomic statuses present in the classroom population, narrows gaps in academic performance — which have been attributable to differences in student background characteristics — by providing the appropriate substructure students need before becoming exposed to more rigorous concepts (Crouch et al., 2021; Asim, 2020). The implication of a narrowing learning divide, furthermore, is that a greater number of students become important contributors to a knowledge-based economy from which they otherwise would have been excluded.

Further evidence suggests that even in instances of severe socioeconomic disadvantage, students' demand-side characteristics are neither a determinant nor a deterrent of their level of educational achievement to the extent that the supply-side characteristic — the level of education quality — is. Put plainly, children who are motivated and supported by their households to learn still do not develop crucial foundational literacy and numeracy skills after years of schooling when education quality is poor, while the converse is not true — that is, a lack of fortifying inputs in the households of these children does not detract from their ability to learn at a sufficient pace and to a commendable degree when the quality of education available to them is improved (Eble and Escueta, 2022). In this sense, devoting education resources towards achievement of foundational skills raises performance standards for all students, and therefore promotes the upward mobility of all citizens in a society.

d. Education systems must be improved holistically

Optimising investments in education necessitates the alignment of whole education systems towards the common goal of producing learning in foundational skills and beyond. Given that education systems are composed of distinct components — teachers, students, school infrastructure, school leaders, and so on — reform initiatives are often oriented towards adjusting the quality or performance of one of these components to better match the patterns of those observed in high-functioning education systems (Pritchett, 2013; Spivack, 2021). However, approaches like this fail to consider a critical piece of education systems, which is that their components interact in specifically defined ways. Moreover, these relationships between these systematic elements both elucidate and enforce the objective of the entire education system (Spivack, 2021).

When the objective of one component of the education system is misaligned with those of the system as a whole, or when there is no clear objective being carried out, education quality and learning outcomes suffer (Kaffenberger, 2021). It is not simply the individual components of the education system that must be adjusted in response to this; the processes by which they either support or compromise one another must also be evaluated and shifted towards greater effectiveness in driving meaningful learning.

In recent decades, education systems across LMIC have centred themselves around making schooling more accessible for all children, in order to increase enrolment and attendance, and have achieved widespread success in this regard (Spivack, 2021). In order to address the current, pressing need to increase the learning levels of students — which is not only pivotal for maintaining high enrolment and attainment rates, but also underpins a student's ultimate ability to carry the benefits of their academic careers into the rest of their lives — education systems must be similarly aligned with comprehensive accountability and unified coherence.

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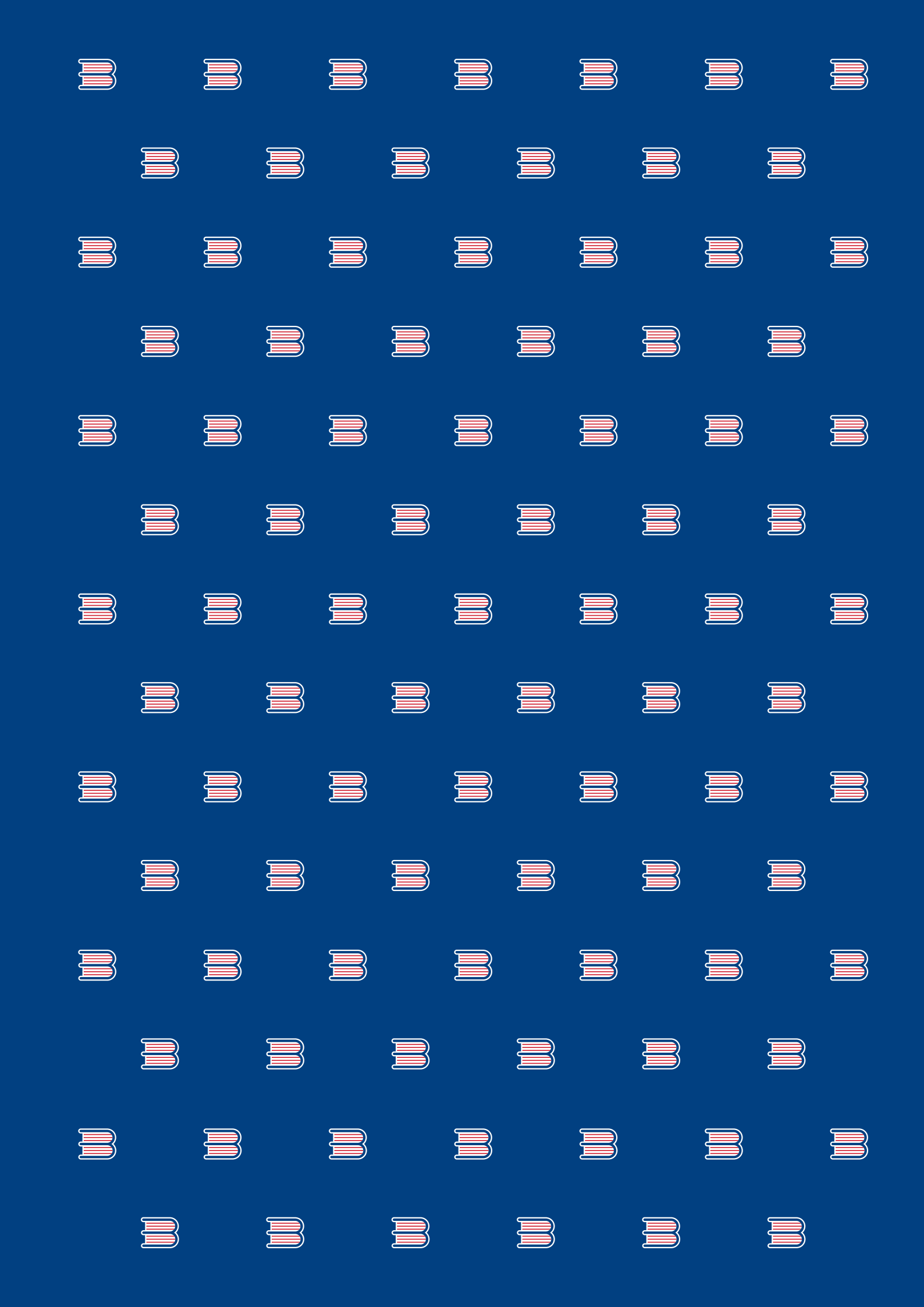
Notes



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