An Edo SUBEB Initiative

Can Data-Informed Management and Structured Pedagogy Produce Equitable Learning Outcomes?

Evidence from Progressive schools in Edo State after 50 weeks of programme implementation

By the end of the 2022–23 school year


Edo BEST
BASIC
EDUCATION
SECTOR
TRANSFORMATION

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By the end of the 2022–23 school year

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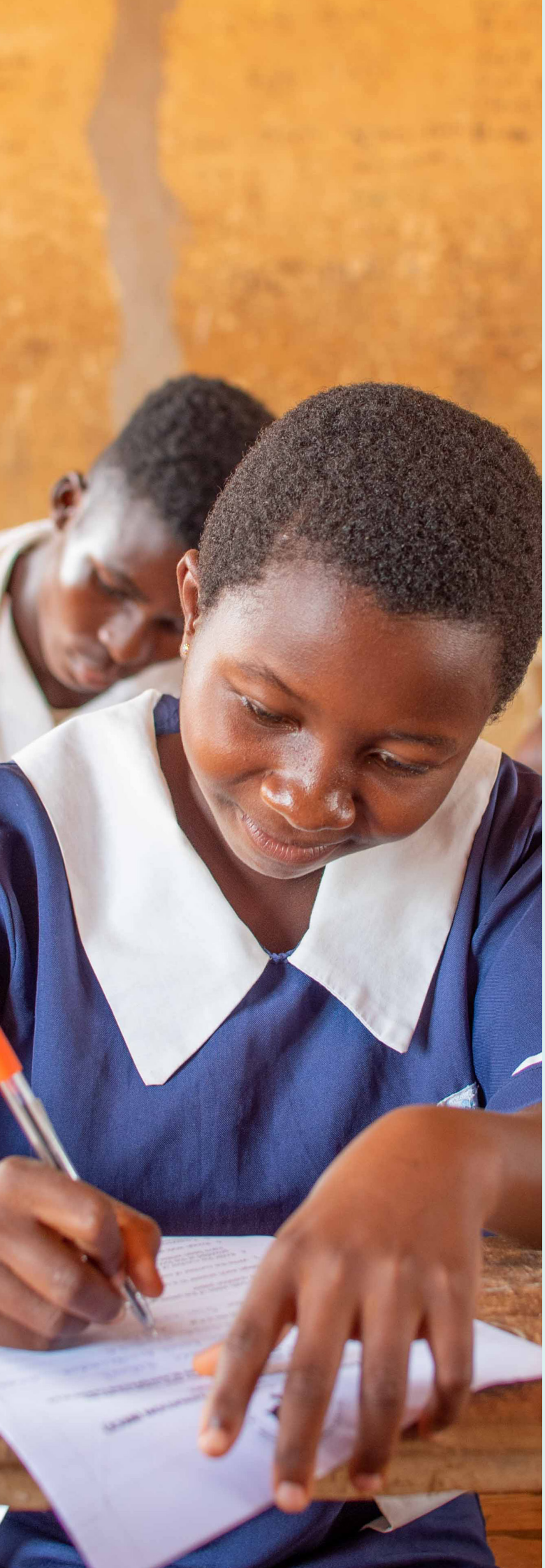
Edo BEST BASIC EDUCATION SECTOR TRANSFORMATION

An Edo SUBEB Initiative



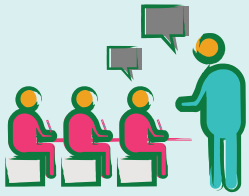
Executive Summary

Prior to the launch of the programme, low-enrolment schools in particular experienced a learning crisis more severe than other Edo State schools before they were supported by EdoBEST. For instance, 45% of Primary 2-6 pupils could not read a single word from a Primary 2-level passage. Likewise, nearly half of Primary 2-4 pupils could not correctly solve a two-digit addition problem in the form of 32+15, even though this skill should have been mastered by Primary 2, according to the NERDC curriculum.

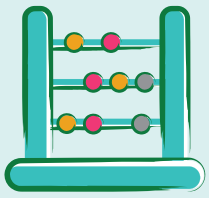
After 50 weeks of programme implementation, pupils experienced dramatic gains in reading fluency. On average, **pupils across Primary 1-5 had more than doubled their reading fluency rate** by the end of the 2022-23 school year. The average **Primary 1 pupil now reads at the same rate as Primary 3 pupils** before the programme. Across all grades, the share of **non-readers decreased by 8 percentage points more than it would have without the programme.**

EdoBEST is helping to close performance gaps between children enrolled in Progressive- and Primary-model schools. For example, before the programme, pupils across grades at Progressive schools were scoring 20% to 45% lower on the ICAN than their peers at Primary-model schools; after 50 weeks, in most grades, they were achieving scores equal to or higher than their peers at Primary-model schools.

The **EdoBEST programme** expanded in February 2022 to **all 148 low-enrolment schools in the State,** implementing the Progressive model and serving **11,000 pupils** and **385 teachers.**



Teacher attendance has increased 43 percentage points from 36% to 79%, signalling substantial improvements to time devoted to quality instruction.



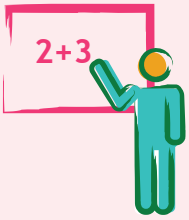
In numeracy, pupils on average achieved a **15 percentage point increase to their ICAN scores;** this is the equivalent of **1.6 additional years of maths progress in only 50 weeks.** Pupils in a typical Primary 3 class are now achieving higher scores than those in Primary 5 were before the programme. On relatively advanced mathematical sub-tasks, **Primary 3-5 pupils gained 24 percentage points more than they would have absent the programme.**

EdoBEST's effectiveness is far greater than what is typically seen in the majority of educational interventions in low and middle-income countries (LMIC). The programme's **impact on reading fluency (0.44 SD)** means that **EdoBEST is more successful than 91% of comparable education interventions.** Its impact on **mathematical proficiency** is even greater, with an **effect size (0.65 SD) larger than that of 97% of education initiatives.**

In Numbers...

One full year of learning progress in only 17 weeks

Twice as many correctly read words per minute after 50 weeks



50% higher foundational numeracy scores due to the programme

80% fewer non-readers across grades

> Improvements have been made, both for the pupils and the teachers as well. Reading comprehension has increased. The teachers now also teach better."
>
> — Head teacher A, Adolo Primary School

> The programme has helped to develop the capacity of teachers, and students' phonetics and reading comprehension have greatly improved."
>
> — Teacher B, Edokpolor Grammar School


ED S.T.A.R

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I. Preamble

Foreword by Governor Obaseki, Edo State

EdoBEST: Transforming Education for a Brighter Future in Edo State

Education is the cornerstone of development for a productive, fulfilled citizenry. In particular, Primary school is a formative period of education in children's lives. At this level of schooling, pupils learn the core concepts they will continue to build on for years to come and develop the viewpoints that allow them to grow as engaged citizens. The education they receive in these early years sets the tone for the rest of their academic careers. This is the time when pupils build the learning foundation they need to prosper in their families, communities, and beyond. For these reasons, providing Primary school children with an educational experience of the highest quality is of the utmost importance. It is the duty of all teachers, school leaders, and decision makers in the State to ensure pupils in Edo receive the learning support they need to be successful. I am proud to have spearheaded an administration that, for the last six years, has dedicated itself to raising educational standards via transformative policy.

Our commitment to delivering powerful educational opportunities, now and in the future, is what led to the launch of the Edo Basic Education Sector Transformation (EdoBEST) programme in 2018. I am pleased to report that as of 2022, this programme has been expanded to include 148 schools under the Progressive model across the State. This means that 97% of the schools in Edo now benefit from the EdoBEST programme, which ensures that all pupils are bolstered by a superior learning-focused environment and ample resources. The EdoBEST programme equips teachers and head teachers with motivating professional development, skillfully crafted lessons, and a sophisticated ecosystem so they are equipped to have a profound positive impact on pupils year after year.

After two years of operation, it is clear that these innovations have led to tremendous results. The following report — which tracks outcomes in schools under the Progressive model from before the expansion of EdoBEST until the end of the 2022–23 school year — details the exceptional achievements of the programme at each stage of its development. I am filled with gratification in seeing that pupils in these schools have been making large learning gains in foundational literacy and numeracy since the first weeks of implementation. Across all grades, these pupils are much better positioned to build on their successes and remain on a virtuous cycle for the betterment of their futures.

For the spirit of excellence that surrounds the programme, I would like to commend and thank Mrs Ozavize E. Salami, the Executive Chairman, Edo State Universal Basic Education Board (SUBEB), and her entire team. They have shown a great resolve to institute all that is required to usher in the most radical changes to Edo State's education system in a generation. My gratitude also goes to NewGlobe, our technical partner, who has availed Edo State of their renowned methods. They have devoted their time and resources to uplifting our schools while demonstrating a tireless faith in our vision. My final thanks go to all the teachers, children, and parents of the EdoBEST schools network for their trust in us. I commend their willingness to work with the Government and our technical partner, quickly putting aside any ambivalence as we pivoted away from the status quo.

After more than half a decade of providing essential educational services via the EdoBEST initiative, we have celebrated many successes and worked through a number of challenges. Rigorously monitoring the progress of the EdoBEST programme will require continued commitment to identifying strengths and areas for improvement. Overall, it is our key responsibility to ensure that this highly beneficial approach is sustainable for the coming generations of pupils. I am confident that all participants in the programme will continue to support exemplary learning and build upon its core pillars for the fulfilment of Edo State's potential.

His Excellency, Mr Godwin Nogheghase Obaseki,

Executive Governor of Edo State

Acknowledgements

The successful completion of this study is due to the support and instrumentality of many people. First, we would like to thank the Executive Governor of Edo State, Godwin Obaseki, for his commitment to the transformation of public education in Edo State and for creating an enabling environment for us to conduct this study. We sincerely appreciate the Honourable Commissioner for Education Dr Joan Oviawe, the Executive Chairman of the Edo State Universal Education Board (Edo SUBEB) Mrs Ozavize E. Salami, and the entire team at the Edo State Ministry of Education and the Edo State Universal Basic Education Board, for the partnership and guidance they provided throughout the planning and execution of this study. Many thanks to the EdoBEST team led by Michael Basanya, Oluwadare Adebisi, Faith Igbokwe and Jessy Efosa for the field support and coordination. We would also like to thank all school head teachers and teachers who welcomed the study teams into their schools and classrooms. We are also grateful for the input and guidance of Dr Shannon May, Sean Geraghty, Tim Sullivan, Baishakhee Sengupta, and Marlee Mullane.

Finally, we owe our deepest gratitude to the field team, the backbone of this project: Kingsley Akademe, Rosemary Umoize, Aiyemoba Godson Godwin, Mercy Onozome Ajayi, Benedicta Shirley Oziofu Jimoh, Nasamu Victor, Samson Otokurin, Mabel Obamila, Ozaveshe Kolawole Bello, Faith Omo Okojie, Precious Odegua Iyase, Ogechi Obaseki, Faith Omogbai, Aimuanmwosa Oghogho Christabel, Idah-Omorodion Itohan Mercy, Evbuomwan Patrick, Audu Nelson, Solomon Iyare Irehvbude, Omosimua Clementina Ekpe, Allude Endurance, Blessing Agbonhese, Blessing Uwayemen Enaholo, Godwin Ehioze Aimuan, Bruno Afekhena Abu, Aimuan Jemima Osetohanmen, Cornelius Erohubie, Famous Okohue, Obeimhen Osoba, Justice Akpesiri Erhiawarien, Clementina Aigbogun, Ibhabe Joy, Violet Elomese Iyoha, Japhet Irobosa Ehikhor, Gloria Emiebenomon Okojie, Endurance Aro, Beauty Agbonmhere Odugun, Maxwell Esoehe Vekeyata, Akinyemi Philip Yaboame, Victoria Atsekeigbe Imonigie, Sede Abraham Egwahede, Clement Tawab Damodu, Christiana Onosholema Eshemokhai, Bose Racheal Oladipupo, Idia Ohkiyaimeh, Friday Ohkiyaimeh, Ranmi Israel Agbetuyi, Victor John Okologo, Ochuwa Barbara Agbaiza, Olaiya-Samuel Osayi, Timothy Glory Imonkhai, Collins Edugie, Ogboko Anthony Omoimie Edugie, Anthonia Omonlodion, Itohan Iselobhor Iyayi, Oluwakemi Esther Adeyemi, Endurance Afeiyodion, Clementina Iriogbe, Victoria Ladi Osawe, Eki Uwaifo, Mac-clifford O. Obamwonyi, Ogedegbe Omoze Agatha, Omenlimhen Joyheart, Osarewinda Joy, Priscillia Aigbogun, Hope Emihian, Adesuwa Peace Imafidon, Maureen Ekiuwa Igbinoba, Grace Iyore Omokwagbe, Ruth Omonemi Chama, Eve Unuigbe, Blessing Aimuenmwosa Osakpolor, Osahon Lucky Uhunoma, Enogheghase Uyioghosa, Cynthia Efe Ehiorobo, Osezua Ozinegbe, Kingsley Mogbolu, Loveth Omogiate, Ruth Onosholema Asuquo, Christiana Okpataku, Osemwonyenmwen Aghahowa, Elizabeth Irabor, Deborah Nnedu, Deborah Oghogho Osazuwa, Johnbosco Uzogu, Oghogho Joy Emokpae, Omonigho Ochigbo, Emmanuel Ugbiagbe, Desmond Uyi, Prescillia O. Osahon, Rosemary Akhigbe, Elliot Uhunoma, Tunde John Omojowo, Kelly Osagiator Osahon, Chioma Harriet Bazuaye, Ifunnaya Onyinye Ohwovoriole, Dayo Foresythe, Ibhafidon Victoria, Martin Ikuobase, Shadrach Ogiriga Lawani, Abigail Stanley Ashuman, Ebenezer Udukhagene Akharamhe, Omolara Yetunde Oni, Cecilia Edogun, Henry Eruanga, Amenaghawon Ikonmwosa, Jethro Omoragbon, Safuratu Sadiq Abubakar, Gloria Ikhazuagbe, Jesuelo Ohwoka, Patrick Atiborokor, Osose Hebrews Ebosetale, Sandra Emiulimhe Eghele, Ehifo Moses Ezomon, Jacob Umosekhaime, Mary Iwegim, Emmanuella Oladipo, Maimunat Ibrahim, Confidence Ojale, Hauwa Momohsanni, Deborah Ikpemosimhe Anamhomhe, Momoh Priscillia Odomiovaze, Uhunoma Lucky Ewere, Osasumwen Excel Omoregbe, Osarimwian Patrick Osamuyi, and Osarobo Micheal.

II. The EdoBEST Programme

Overview of the Programme

The Edo 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. The Edo Basic Education Sector Transformation (EdoBEST) programme launched in 2018 to target these significant investments at high-quality instruction and system management, which led to dramatic learning gains for Primary-level pupils who participated in this transformative educational approach. In 2022, the EdoBEST programme expanded to reach 148 additional public Primary schools that had not yet been supported by this programme. Learning outcomes were particularly low in these schools – likely due, at least in part, to the complexities of teacher staffing (these schools had far fewer teachers than classrooms, contributing to the need for multigrade instruction). To tailor improvements to instructional quality accordingly, EdoBEST augmented its established approach to implement an innovative model — called the Progressive model — that delivers specialised services in addition to providing the core elements of the programme. In total, the programme has reached over 11,000 pupils and 385 teachers across the three districts of Edo State.

This expansion of EdoBEST into these additional schools remains founded on the evidence-based approach that has proven effective across Edo State. It utilises its signature offerings of structured pedagogy, continuous teacher training and coaching, information technology, and whole-system support. The Progressive model builds on this approach by incorporating a multi-grade teaching model, in which a single teacher leads instruction for two grade levels. This ensures that a teacher is available for all pupils and classrooms, even in schools with fewer teachers than classrooms. In addition, multigrade instruction is supplemented by the cross-grade ability grouping method[1], which ensures that instruction is tailored to pupils' actual learning levels. Through EdoBEST, and the Progressive model in particular, school leaders and teachers at these 148 schools are empowered to deliver transformative education to each child. The programme is dedicated to accelerating learning in all subjects, supporting pupils to master grade-appropriate competencies, and where necessary, strengthening the foundational reading and mathematics skills upon which higher level competencies are built.

EdoBEST is anchored in seven core pillars:

1. Scientifically based learning materials aligned to the Nigerian 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
6. Adaptive practices supporting the education system's specific needs
7. Corporal punishment is replaced with positive behaviour modification strategies

[1] Cross-grade ability grouping is a strategy by which pupils are placed in classes based on ability (as measured by an assessment of their literacy and numeracy proficiency), rather than grade level. This strategy is effective in contexts where significant heterogeneity exists within grades, and where grade level is not a strong predictor of ability level. Within their ability groups, pupils receive instruction and feedback that is targeted at their correct learning level, ensuring that all pupils can meaningfully engage with content.

The programme has five central goals:

- To support the Edo 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 increase 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 national curriculum

The Timeline of EdoBEST Implementation in Progressive-model Schools

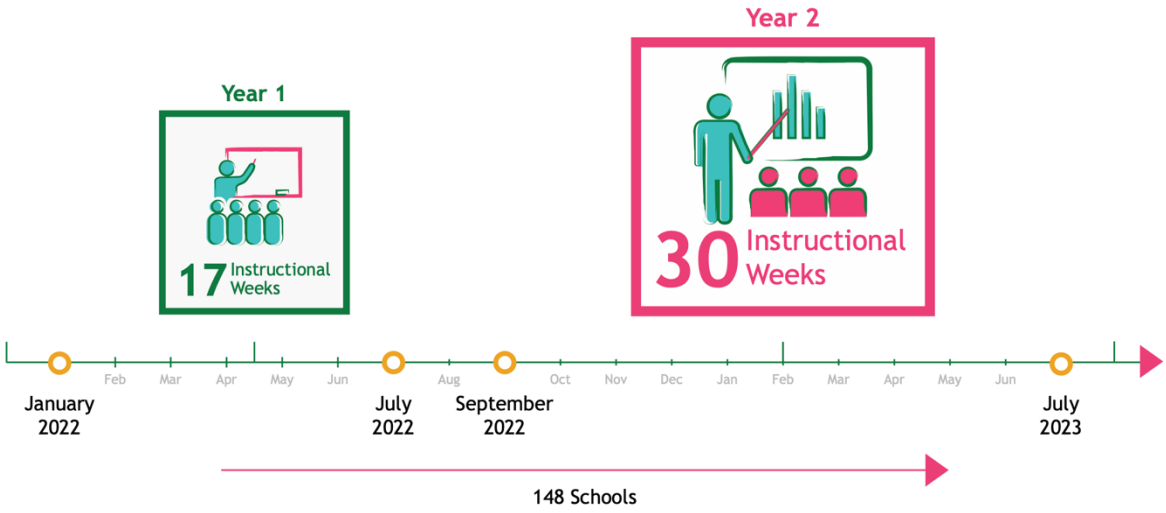


Figure 2.1

EdoBEST: A Holistic Programme With Integrated Features

Academic planning and lesson mapping

EdoBEST 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, EdoBEST 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 system-wide scale. Importantly, EdoBEST schools remain under the purview of the Edo State Universal Basic Education Board (Edo SUBEB). As such, they receive the same level of scrutiny and monitoring with the programme as they would have before the programme.

> [The teacher tablet] enables me to focus on lesson delivery and pupils' understanding. I think the pupils comprehend better now."
>
> - Teacher C, Edokpolor Grammar School

Below, the core pillars that enable the EdoBEST programme to ensure high-quality learning in each and every classroom are highlighted:

1. Scientifically based learning materials aligned with the national curriculum

One key pillar of EdoBEST 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. EdoBEST 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.

EdoBEST enables the teaching of the national curriculum, while also building foundational skills that serve as building blocks for accessing all curricular content. EdoBEST lesson materials cover all curriculum-mandated subjects while including lessons that strengthen the core foundational literacy and numeracy skills necessary for pupils to meaningfully engage with and master the content in this 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. EdoBEST 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, EdoBEST 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

The EdoBEST 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 lesson delivery 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. From the delivery of lesson content to supporting strong pedagogical practices to enabling time management, technology enables the EdoBEST instructional model.

3. Data-driven training, coaching, and 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 EdoBEST is data-driven professional development programmes. Induction training sessions are scheduled ahead of the initial implementation of the programme and at each expansion phase.

EdoBEST induction training has three core objectives:

1. To ensure that every teacher has the **skills and knowledge** to deliver lessons, manage a classroom, assess learning, and motivate pupils.
2. 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.
3. To strengthen the **communication strategies** needed to engage with the school community and beyond.

A teacher's support does not end with induction training. EdoBEST also provides continuous professional development for teachers. This professional development, delivered at the school level by a Learning Development Officer (LDO), reinforces skills from induction training. It encompasses training on new processes, skills, and tools in the EdoBEST programme.

Importantly, EdoBEST empowers school leaders to provide powerful coaching for their teachers. School leaders receive frequent visits from learning development officers (LDOs), 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 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 that help them to become a stronger teacher.

4. 360-degree support teams

EdoBEST 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?). For quality assurance, a team of School Inspection Associates 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 LDOs 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.

> “My head teacher has been very supportive and has encouraged us to implement the programme.”
>
> - Teacher T, Adolo Primary School

5. Technology-driven monitoring and reporting

The identification and resolution of school-based issues does not only occur during in-person visits. EdoBEST 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 EdoBEST’s 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 EdoBEST 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.

6. Adaptive practices supporting the education system’s specific needs

Some schools in Edo have comparatively lower enrolment and are staffed with fewer teachers than others in the State. These “low-enrolment” schools, which currently have an average enrolment of 75 pupils, were not part of the initial rollout of the EdoBEST programme — when, over the course of 2018-2022, 836 schools across the State eventually joined the programme. By comparison, the 836 schools that have been part of the EdoBEST programme since before the expansion have an average enrolment of 334 pupils and nearly three times as many teachers per school relative to these other schools. Although low-enrolment schools may be different on other dimensions from the ones that did join the EdoBEST programme during the first waves of expansion, throughout the rest of this report, these schools will be referred to as “low-enrolment schools” before the programme, or “Progressive schools” once they eventually join the EdoBEST programme in 2022 and implement the Progressive model, as described below.

Before the initial launch of the EdoBEST programme in 2018, these low-enrolment schools were systematically underperforming relative to the rest of the public schools in the State. Then, during the first four years of the EdoBEST programme, this gap widened as EdoBEST schools achieved dramatic learning gains while those schools outside the programme remained stagnant in learning outcomes. A more tailored solution was necessary to support learning in these schools. After thoughtful modification, EdoBEST now implements a unique combination of cross-grade ability grouping and a multi-grade teaching model — called the **Progressive model**. This model allows the EdoBEST programme to address the specific instructional and operational challenges in these schools, and to allow children served by these schools to also benefit from the benefits of the EdoBEST programme.

Multi-Grade Teaching

The first pillar of the Progressive model is multigrade instruction. Multigrade instruction is an approach in which a single teacher delivers instruction to two or more grade levels within the same physical learning space. Multigrade instruction is an invaluable strategy among schools which are either understaffed due to hiring challenges, or which are deliberately staffed with fewer teachers than classrooms based on low enrolment at those schools. In either case, multigrade instruction is a strategy to ensure that every pupil has an assigned teacher for all lessons throughout the day. Specifically, grade levels are combined in the following pairings: Primary 1+2, Primary 3+4, and Primary 5+6. Each grade is taught by one teacher. Employing this model ensures that all pupils can receive high-quality instruction from teachers in their school.

While the combination of two grade levels into a single learning space and taught by a single teacher is not necessarily challenging to set up, facilitating strong instruction in these multigrade classrooms is extremely difficult. Teachers are confronted with the dual-challenge of supporting a wide range of learning levels (across multiple grades) and attempting to cover two or more grade-level curricula. For an individual teacher, this challenge is nearly insurmountable. But EdoBEST Progressive implements an innovative system to support these teachers in particular. This involves a harmonised and unified timetable for each grade-pair teacher, a responsive technology-enabled system that allows for seamless day-to-day teaching and learning (including pupil attendance and assessment across multiple grades), and a structured instructional programme that ensures coverage of the NERDC curriculum during a pupil's Primary school career.

Cross-Grade Ability Grouping

Cross-grade ability grouping is a strategy that places pupils into learning groups based on their learning levels, rather than based on their grade levels. This is based on the notion that grade level is not always a strong predictor of learning levels. Many older pupils require more foundational support. And some pupils are prepared for more rigorous content. By assessing all pupils in English and Maths, and placing them into ability groups based on their individual learning needs, EdoBEST Progressive creates a supportive and tailored learning environment in which pupils are receiving at-level instruction and where teachers can cater to a more narrow range of ability levels in their classroom.

Teachers and head teachers participated in training specifically centred on cross-grade ability grouping. During this training, they learned about the benefits of cross-grade ability grouping, as well as how to set up the system in their schools. This included protocols to assess each pupil's foundational literacy and numeracy ability levels, and also systems to group pupils based on their assessment results. Teachers and head teachers also received training on how to maintain the system over time. This included the use of resources to identify pupils' appropriate ability groups, and also ways to ensure that pupils are transitioning to and attending lessons in their correct groups. The training also ensured that the system was child-friendly, referring to pupil ability groups by neutral names rather than names that suggested any hierarchy in order to mitigate any risk of social stigma associated with being placed into a lower group This training, in combination with core induction training on skills like lesson delivery and classroom management, empowered teachers to manage a supportive and tailored learning environment in their classrooms

7. Corporal punishment is replaced by positive behavioural modification strategies

The EdoBEST programme has leveraged professional development to support teachers in complying with the ban on corporal punishment in schools. This disciplinary method has conventionally been seen as an effective tactic for teachers to manage their classrooms and ensure that pupils remain on task. However, both Edo State and the Nigerian government recognise that this approach can have the opposite effect by demotivating pupils from participating in class, distracting them from the concepts they need to learn during the day's lesson, and in the long term, leading them to consistently underperform compared to their peers and curricular expectations. For these reasons, Edo State has enacted the federal Child Rights Act of 2003. To support the shift away from corporal punishment as a go-to classroom management strategy, the EdoBEST programme has supported teachers and school leaders with alternative disciplinary practices of verbal correction, energetic refocusing, and positive reinforcement.

With this approach, teachers use strategies like lively cheers and regular prompting in order to positively reinforce good behaviour and ensure that pupils are engaged in learning. These strategies facilitate sustained concentration and a sense of individual responsibility in the learning process. They also use positive examples (pupils exhibiting the appropriate behaviours) rather than fear of punishment in order to motivate good behaviour and meaningful participation. Moreover, teachers set a more affirmative example and encourage a healthier relationship with their pupils, who are more likely to conduct themselves properly when their behaviour is redirected via appropriate means. Thus, over time, pupils can become increasingly motivated to regularly attend school, learn during their lessons, and enthusiastically participate in class.

Box1 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 factors (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 programmes 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.

III. Methodological Considerations

Evaluating the Impact of the Programme

The methodological details of this study were internally designed based on the specific context surrounding the programme's operation. For the purposes of this report, an impact evaluation is defined as a study that assesses the change in outcomes that are caused by a particular project, programme, or policy (OECD[2], IADB[3]), and as such, multiple impact evaluation assessments can occur throughout the life cycle of a project (USAID[4]). The EdoBEST team leverages impact evaluations to uphold crucial aspects of the programme, which include maintaining transparency among stakeholders and utilising robust research design to analyse the programme's effect. This allows programme leaders to highlight the milestones that have been reached since the programme's initial implementation, as well as determine appropriate directions for continued improvement in the future.

A descriptive study examining growth over time

Since the EdoBEST programme was implemented in all 148 **Low-Enrolment** schools within Edo State, there is not a natural comparison group that would allow the research team to use an empirical strategy such as the difference-in-differences method or a randomised control trial. Instead, the research team conducted a longitudinal study, assessing learning outcomes at three different points during the 50 total weeks of programme implementation and using descriptive analyses to look at the changes in pupil performance over time.

The introduction of the EdoBEST programme into the group of schools included in the current study occurred mid-year during the 2021-22 school year. As such, this study includes two phases, the first of which is not a full school year. The first phase corresponds to the period between the launch of the programme in February 2022 and the end of that school year, encompassing 17 weeks of instruction taking place during Terms 2 and 3 of the 2021–22 school year. The second phase encompasses the subsequent 33 weeks of instruction taking place throughout the 2022–23 school year. Data were collected in three total rounds: at the start of the programme (February 2022), at the end of the 2021-22 school year, and at the end of the 2022–23 school year (July).[5]

[2] OECD: Organisation for Economic Co-operation and Development. (2006). Outline of Principles of Impact Evaluation. Retrieved from https://www.oecd.org/dac/evaluation/dcdndep/37671602.pdf

[3] IADB: Inter-American Development Bank. (n.d.) Impact Evaluation: Resources. Retrieved from https://www.iadb.org/en/topics-effectiveness-improving-lives/impact-evaluation

[4] USAID: U.S. Agency for International Development. (2018). Guide for planning long-term impact evaluations. Utilizing the Expertise of the Expanding the Reach of Impact Evaluation (ERIE) Program Consortium. Retrieved from https://pdf.usaid.gov/pdf_docs/PA00T9HJ.pdf

[5] For the first phase of the programme, the rate at which the EdoBEST programme accelerates learning takes into account the difference in dosage between 17 weeks of instruction and an entire academic year's worth of instruction.

To understand the programme's impact, it was necessary to compare the learning growth that was actually observed in these schools against the "status quo" – i.e. the growth that would have occurred in the absence of the programme. Status quo learning growth was calculated using baseline scores, taken in February 2022 before pupils had any substantive exposure to the programme, and comparing the differences across grade levels to establish how much growth would be expected year to year. For example, in the "snapshot" of February 2022, if pupils in Primary 1 could read 5 correct words per minute (cwpm) and those in Primary 2 could read 9 cwpm, the expected growth of Primary 1 pupils in the absence of the programme is 4 additional cwpm over the course of that year, so the yearly growth would be prorated to understand what it would be at the end of this school year for each grade. Since the calculations for each grade require data for that grade and the following grade, Primary 6 is excluded from most of the analyses since there is no comparable data for a similar set of schools in the following grades.

Because the baseline data collection round took place roughly midway through the school year while subsequent rounds took place at the end of the school year, and because the growth made over two terms is expected to be different from that made over the course of a full school year, one additional step was necessary to enable meaningful year-to-year comparisons. Baseline data were used to create a projection of what learning levels would have been at the end of the previous school year – i.e. in July 2022 – without EdoBEST instruction[6]. These projected levels serve as an apples-to-apples point of comparison for the actual levels observed at the end of the 2022-23 school year.

Additional Data Collected

Complementing quantitative results with teacher interviews

To complement the quantitative results obtained from 50 weeks of programme implementation, the EdoBEST team also conducted a qualitative follow-up towards the end of the 2022-23 school year (April 2023). Teachers, head teachers, and supervisors were interviewed in-depth on their satisfaction with the programme, parental and pupil engagement, and areas for improvement, among others. These interviews followed a structured approach, using the protocol outlined in Appendix H.

Longitudinal metrics on teacher attendance, pupil attendance, and lesson completion

The programme's data ecosystem allows the EdoBEST team to track teacher attendance and lesson delivery (among other operational metrics) in real-time. Tracking these metrics over time — for example, comparing average network-wide attendance and lesson completion at the beginning of the programme to the same figures observed at the end of the school year — yields insights on longitudinal trends in programme implementation and teacher behaviours. Since these metrics are collected using the EdoBEST ecosystem, the same data from before programme implementation are not available. Therefore, they are helpful in revealing trends in the educational environment that are relevant to the programme's operation, but are not measures of the programme's effect.

[6] By nature, this prohibits visibility into the progress of Primary 6 pupils. The research team is able to analyse year-over-year changes to the learning levels demonstrated by Primary 6 pupils from the baseline round of data collection up until the end of the 2022-23 school year, but is unable to determine whether the gains they achieved during the programme exceed, match, or underperform compared to those that would have been achieved in the programme's absence.

Sampling Schools and Pupils

Schools included in the study

At baseline, pupils across 72 randomly selected schools were assessed (see Appendix D). The original aim was to have 66 schools in the sample, selected using stratified random sampling based on Leadership and Development Officers' (LDOs) groups of schools; that is, after strata were constructed based on LDOs' school cohorts, 3 schools from each cohort were randomly selected. With 22 LDOs (and accordingly, 22 strata), this resulted in an initial target of 66 schools. Within this random sample of schools, the aim was to randomly select 4 pupils (2 boys and 2 girls) per grade at each school, with a final target of 1,584 total pupils assessed.

In practice, enumerators visiting schools to collect data had found that some schools had fewer pupils than expected. Therefore, additional randomly selected pupils from 6 more randomly selected schools were assessed, in order to maintain the pupil sample size originally intended. Because the 6 additional schools came from a randomly selected list, their inclusion does not threaten the representativeness of the sample. In terms of pupils, the EdoBEST team was able to assess on average 20.9 pupils per school — close to our target of 24 pupils per school.

During subsequent rounds of data collection, the number of schools sampled more closely aligned with the study's original sampling goal. These small changes to sample were necessary due to schools being closed (e.g., due to flooding) or an insufficient number of pupils present when the schools were visited. At the end of the first 17 weeks of instruction (July 2022) and after 50 total weeks of programme implementation (July 2023), 68 schools were assessed, of which 65 had also been included in the initial assessments conducted at baseline. Given that this sample was still within the geographic parameters initially agreed upon by the EdoBEST team, and that these 65 schools are a large share of the randomly selected set of schools, this set of schools retained its representativeness of the entire network of Progressive schools within Edo State's education system and as such, become the core sample for this report to ensure comparability across rounds of data collection.

Geographic Distribution of Schools That Were Included in The Baseline Round of Data Collection

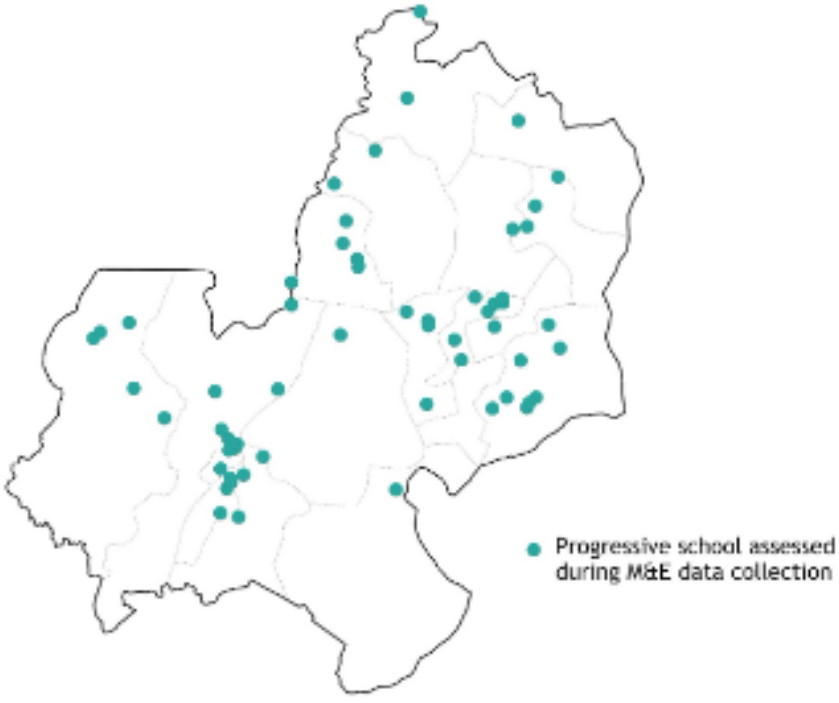


Figure 3.1

Pupils assessed for this study

Within the schools that were sampled for the programme, the EdoBEST team collected data from a representative subsample of pupils. Across all schools that were originally visited at baseline, the plan was to collect data from approximately 24 randomly selected pupils per school — 4 pupils (2 boys and 2 girls) from each grade. In reality, this proved to be challenging, as some of these schools had fewer than 4 pupils in attendance for a given grade (and in some cases, no pupils at all). As expected, fewer pupils could be assessed in Upper Primary grades (3 pupils per grade) compared to Lower Primary grades (4 pupils per grade). As a result, during the first round of data collection, an average of 20.9 pupils per school were assessed, yielding a total of 1,506 pupils in the sample. During the three rounds of data collection that followed, approximately 1,200 pupils were assessed in total. Given that both pupils and schools were randomly selected from the broader pool of potential candidates, and that the target number of pupils assessed per school was nearly achieved, it can be concluded that this is a strong sample from which valid conclusions about Progressive schools across Edo State can be drawn.

Learning Assessments Used

This report documents relevant information on the learning outcomes in Edo schools that implemented the Progressive model of the EdoBEST programme. In order to understand the impact of the EdoBEST Progressive model — and any educational intervention targeting foundational learning, for that matter — it is critical to understand changes in pupils' English and mathematics proficiency levels throughout the programme. This information sheds light on whether the programme is producing the desired educational outcomes. In order to measure learning gains achieved, this study assessed foundational skill areas in English literacy and mathematics.

English literacy

Literacy is a lifelong skill that pupils must possess to achieve mastery in all subjects, to fulfil their potential throughout their academic careers, and to lead productive lives beyond school completion. Multiple, cumulative subskills comprise this foundational skill, all of which are imperative for children to learn in order to emerge as proficient readers. Reading fluency is one of the key subskills that supports overall literacy. This study measures pupil competencies in reading fluency via a validated assessment, which informs hypotheses on how equipped pupils are to read for understanding and draw meaning from their texts.

Reading fluency

Reading fluency describes whether a pupil can read quickly, accurately, and with expression. Previous research has shown that this is one of the components of early literacy that is most correlated with other essential subskills on the path towards reading proficiency. In other words, if a pupil does well in this domain, it is a strong signal that they have also mastered more fundamental subskills (e.g. letter recognition), and that they are capable of completing increasingly advanced tasks, like reading with some degree of comprehension. To quantify this skill, the most common metric used is "correct words per minute" (cwpm).

This study relies on two types of passages to measure English reading fluency: The first type of passage is a Primary 2 text that all pupils read, which was drawn 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). The purpose of this text is to allow for comparison of performance across grade levels. The second type of passage is a selection of grade-level passages excerpted from NERDC-approved English textbooks, which allows for assessment of the degree to which pupils can appropriately engage with the grade-level NERDC curriculum.

Mathematics

Pupils' mathematics skills were assessed using the International Common Assessment of Numeracy (ICAN). ICAN is an internationally validated tool that measures learning across a range of five core mathematics competencies: number recognition, addition, subtraction, multiplication, and division. Within each of these domains, there are 2 sub-tasks. Sub-task 1 is a simple application of the concept (for example, addition without carrying). If the pupil answers sub-task 1 correctly, they attempt sub-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 sub-task 2. ICAN appropriately targets the set of numeracy subskills relevant for the age group in this evaluation.

Box 2 The Value of Universal, Early, Conceptual, and Procedural Mastery of Foundational Skills

Over the last few decades, educational enrolment in 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 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 (United Nations Children's Fund, 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 ethnic group, or whether the child is in school. It is 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 nationwide and global equity gaps with more impactful educational investments.

IV. The State of Education in Low Enrolment Schools Before the EdoBEST Programme

Reading Fluency Levels Were Critically Low

Reading fluency scores in low-enrolment schools pointed to a learning crisis across all grades. For example, the average pupil in Primary 1–4 was consistently reading below 5 cwpm one term into the school year. Even by Primary 6, the average pupil could only read 34 cwpm of a Primary 2-level passage in English (Figure 4.1) — approximately half of the fluency rate that is necessary to achieve reading with comprehension, according to the most lenient thresholds in education research[7]. The average reading fluency rate was even lower for Primary 5 pupils, who could only read 18 cwpm (Figure 4.1). While these numbers may initially suggest that pupils in these schools are making considerable progress as they move from Primary 5 to Primary 6 – ostensibly gaining 16 cwpm over the course of that year – this is likely an overestimation of the actual progress made, given that pupil composition in Primary 6 is typically very different from that in earlier grades, with an overrepresentation of those who persisted in formal education and were higher-performing than their peers who dropped out.

Given that a fluency rate of 45–60 cwpm is recognised as the minimum benchmark for pupils to begin to comprehend the text they are reading[8], a pupil reading at a slower pace than this is considered a non-proficient reader. In schools that were eventually to become Progressive schools, before the EdoBEST programme, there were no Primary 1 and 2 pupils who reached the proficient reader threshold. Even by Primary 4, proficient readers were rare; only 5% could read more than 45 cwpm. By Primary 5 and 6, there were more proficient readers than in the earlier grades, though still a small minority. For example, by Primary 6, one term into the school year, only 23% of pupils could read a grade-appropriate text at 45 cwpm or higher. This means that more than three-quarters of all Primary 6 pupils still could not read passages from their own textbooks proficiently, and likely struggled to engage with the content.

[7] Abadzi, H. (2008). Efficient learning for the poor: New insights into literacy acquisition for Children. *International Review of Education*, *54*(5-6), 581–604.

[8] Ibid.

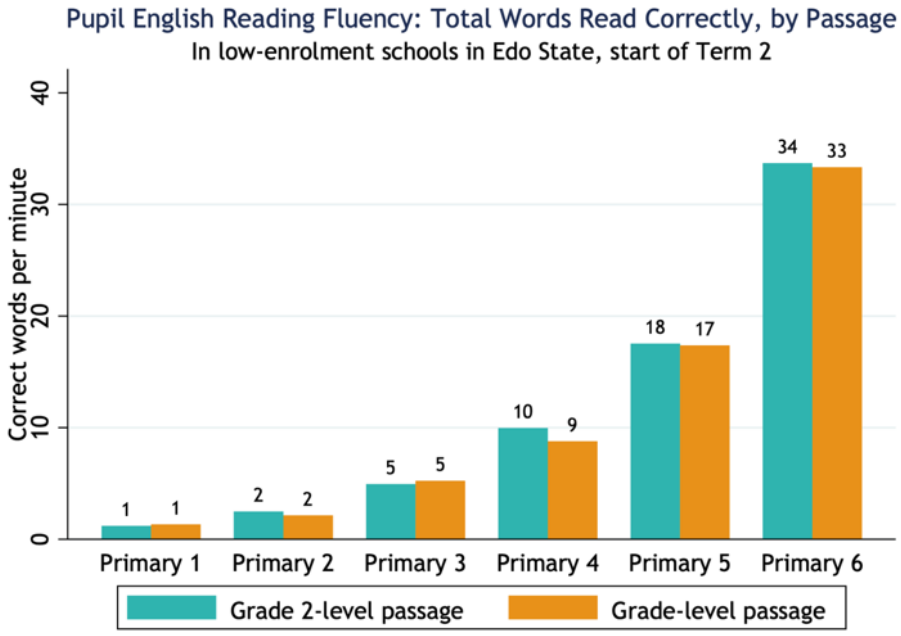


Figure 4.1

Low average reading scores seen among pupils in all Primary grades also reflect the large number of these pupils who were zero-word readers — 55% of the entire subsample could not read a single word from a Primary 2 passage one term into the school year. Even by Primary 3, the median pupil could not read a single word. This lack of early-stage literacy competencies in Edo State schools persisted into Upper Primary as well: Nearly half of all Primary 4 pupils and 1 in 6 Primary 6 pupils were non-readers (Figure 4.2).

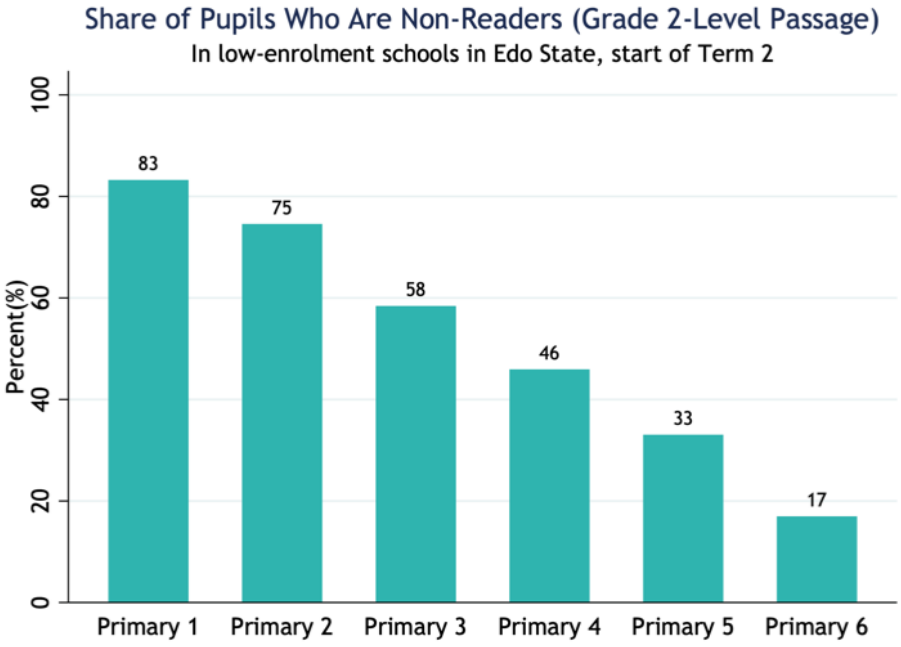


Figure 4.2

Similarly to Reading Fluency, Pupils Did Not Meet Even a Low Performance Threshold in Mathematics

Pupils displayed low achievement levels on the foundational sub-tasks of the ICAN that should be mastered in the early part of Primary school. In Primary 2–4, for example, fewer than two-thirds of pupils (64%) could correctly complete an addition sub-task in the form of 32 + 15 (Figure 4.3), which is designated by both the NERDC and global performance standards as a skill pupils would learn by Primary 2 to remain on track with curricular expectations. Across sub-tasks that are relatively more advanced, pupil performance was weaker across all grades. For example, only half of all Primary 5 pupils could perform one-digit multiplication in the form of 2 x 4 (Figure 4.4) one term into the school year, and less than three-quarters of Primary 6 pupils could do so.

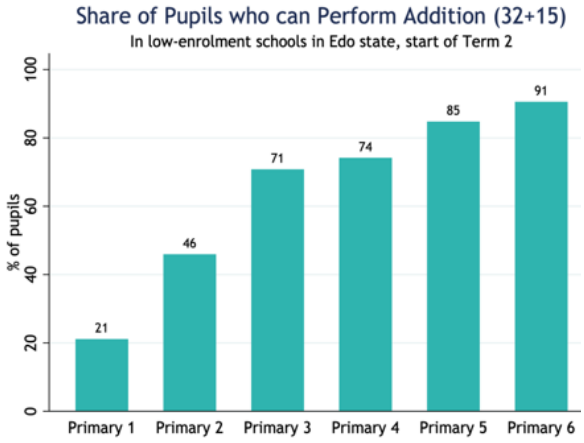


Figure 4.3

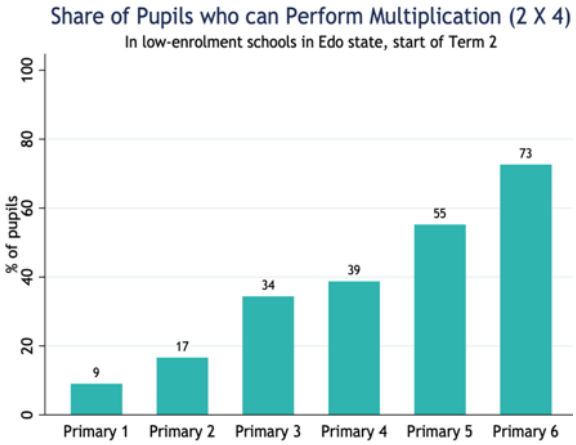


Figure 4.4

Moreover, even the few pupils who could correctly solve numeracy sub-tasks in operational terms lacked the ability to apply their computational skills to real-world situations. On average, the proportion of pupils who could correctly solve word problems requiring subtraction or division was very low. Less than half (48%) of Primary 6 pupils could solve a computational problem involving subtraction, and among them, only two thirds were able to solve a word problem requiring the same computation (Figure 4.5). Results were even bleaker for division problems, where fewer than 1 in 5 Primary 6 pupils could solve the computational problem, and among them, only one third could solve the corresponding word problem (not shown). This level of performance is not surprising, given that these pupils' overall numeracy and literacy levels were both low, making it difficult for pupils to read and understand the prompt in addition to solving the computational element of the problem.

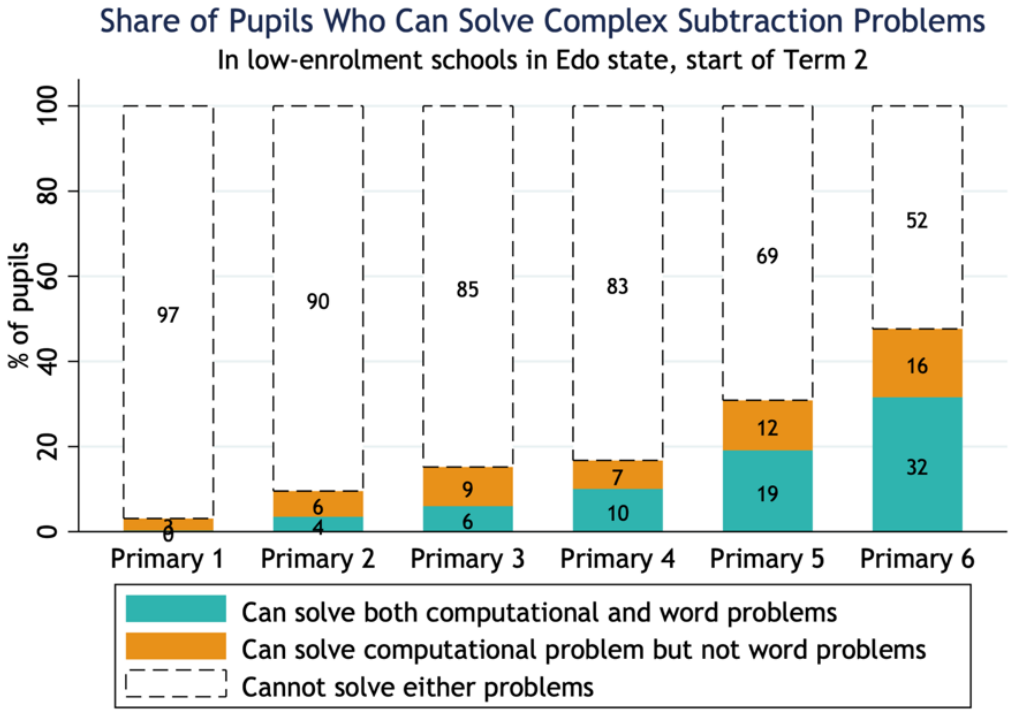


Figure 4.5

Pupils in EdoBEST Primary Schools Showed That Higher Learning Levels Are Possible Within Edo State, Charting the Path Forward for Pupils in Low-Enrolment Schools

Pupils in the group of schools that would eventually adopt the Progressive model, before adoption of the EdoBEST programme, displayed lower learning levels than pupils in schools that were already implementing the programme under the Primary model. Specifically, in February 2022, one term into the 2021-22 school year, pupils in would-be Progressive schools were reading at only 10–25% the reading fluency rate seen in pupils in the EdoBEST Primary programme at the start of the 2021-22 school year (Figure 4.6). When looking at numeracy skills among Primary 4–6 pupils in particular, EdoBEST pupils ranked 4th among 15 different worldwide territories with similar data. On the other hand, pupils in schools not yet supported by the programme ranked 12th — much closer to the bottom of the group.

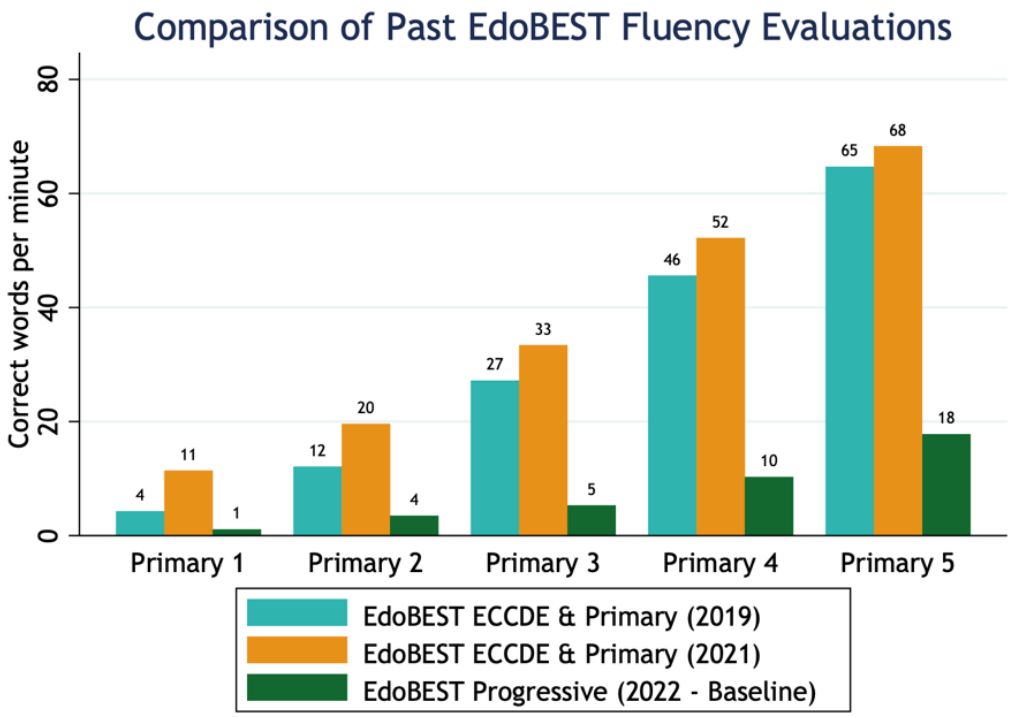


Figure 4.6

Ranking on P4-P6 numeracy skills	Territory
1	Toba Tek Singh, Pakistan
2	Mwala, Kenya
3	Arusha Rural, Tanzania
4	EdoBEST Primary
5	Xalapa rural, Mexico
6	Ikorodu, Nigeria
7	Jhenaidah, Bangladesh
8	Mubende, Uganda
9	Betul, India
10	Tivaouane, Senegal
11	Matagalpa, Nicaragua
12	EdoBEST Progressive
13	Makwanpur, Nepal
14	Segou, Mali
15	Larde, Mozambique

The comparison between pupils in EdoBEST Primary schools and those in prospective Progressive schools is important. Before the programme, prospective Progressive schools displayed significantly lower learning levels than their counterparts (see Figure 4.6). Although prospective Progressive schools differ from EdoBEST Primary schools in important ways — for instance, having fewer staff and fewer pupils — they are located in the same state. Therefore, it is crucial to understand the pre-programme gap between these two groups of schools to gauge the potential for improving equity outcomes through the EdoBEST programme before its expansion into this final group of schools. Thus, while the challenges faced by the two groups of schools may not be identical, the strong results seen in EdoBEST Primary schools set an aspirational benchmark for what is possible in Edo State.

Despite the severity of the low learning levels prevalent in would-be Progressive schools before they received the EdoBEST programme, the situation was not irreversible, nor was it the case that these pupils would not learn, provided they were equipped with the right tools and instruction. Every child is deserving and capable of learning and, given the previous success of the EdoBEST Primary programme, sizeable learning gains were possible for pupils in low-enrolment schools soon joining EdoBEST as well.

There Was a Need for Low-Enrolment Schools to Implement a System Ensuring Adequate Teacher Coverage

As anticipated, the average school joining the EdoBEST programme under the Progressive model had fewer staff than their counterparts that had joined under the Primary model, with 2-3 teachers and 74 pupils across grades. Importantly, in some of these schools (10%), there was only a single teacher per school who was tasked with teaching an average of 107 pupils across all grades. Since these schools have fewer pupils than Primary schools in more densely populated areas of Edo State, it makes sense that they have fewer teachers on staff. However, this landscape underscores the significant challenges that teachers in these schools encounter, tasked with teaching multiple grade levels of pupils with a wide range of learning levels and curricular needs.

V. Achievements From Each Phase of the 50 Week Study

Promising Learning Gains Were Observed After the First 17 Weeks of Instruction

Pupils' foundational English literacy skills significantly improved

In only 17 weeks, pupils receiving EdoBEST instruction made strides in reading fluency. In particular, Primary 3-5 pupils were reading between 4 and 9 cwpm more than they would have absent the programme (Figure 5.1). This means that pupils in these grades improved their reading fluency rate 139% faster, on average, than they would have with status quo education (see Appendix Table B.1). Given that pupils receiving status quo instruction typically gain 9 cwpm in an entire school year, these reading fluency gains **are equivalent to more than an entire year's worth of progress in reading fluency**. In other words, in each grade, **pupils were now reading at a level expected for those who are one grade above**.

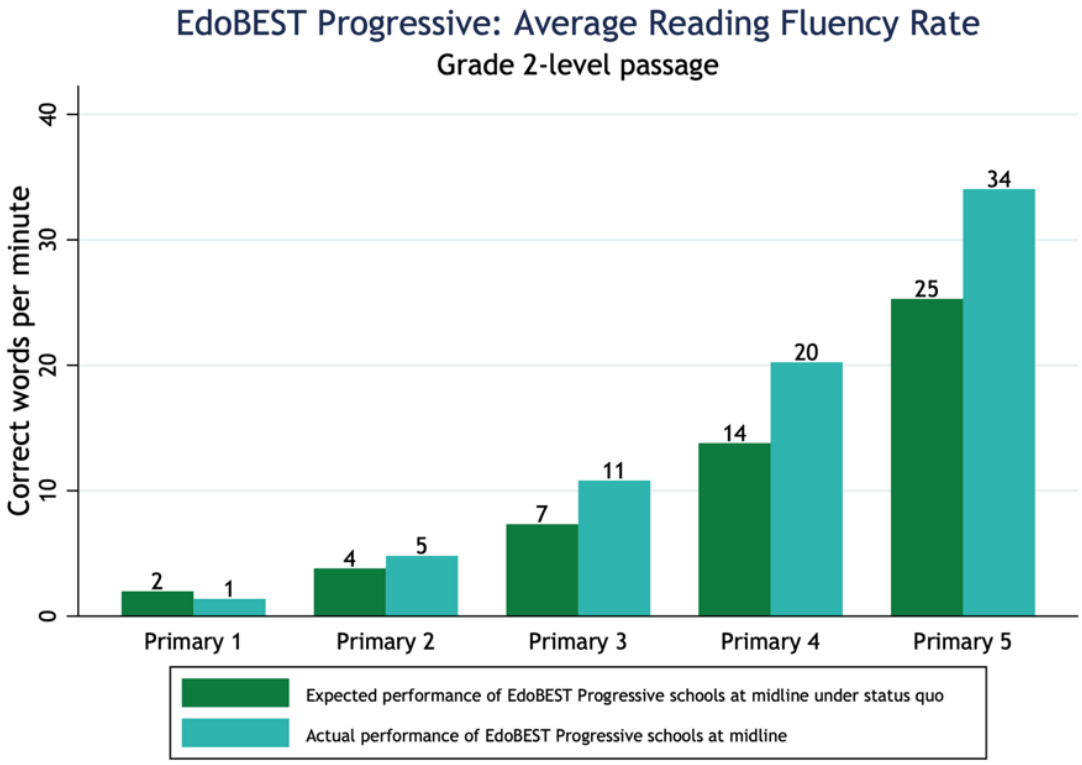


Figure 5.1

Additionally, the share of non-readers was rapidly reduced across most grades. The most significant reductions were observed in Primary 2, 3, and 5 (see Appendix Table B.2). The proportion of Primary 3 pupils reading 0 cwpm, for example, decreased by 21 percentage points since the start of the programme, which is 118% faster than it would have with status quo instruction (Figure 5.2). **In each grade, there are now roughly the same number of non-readers as there would be one grade above in the absence of the programme**; this also marks more than an **entire academic year's worth of progress in just 17 weeks**.

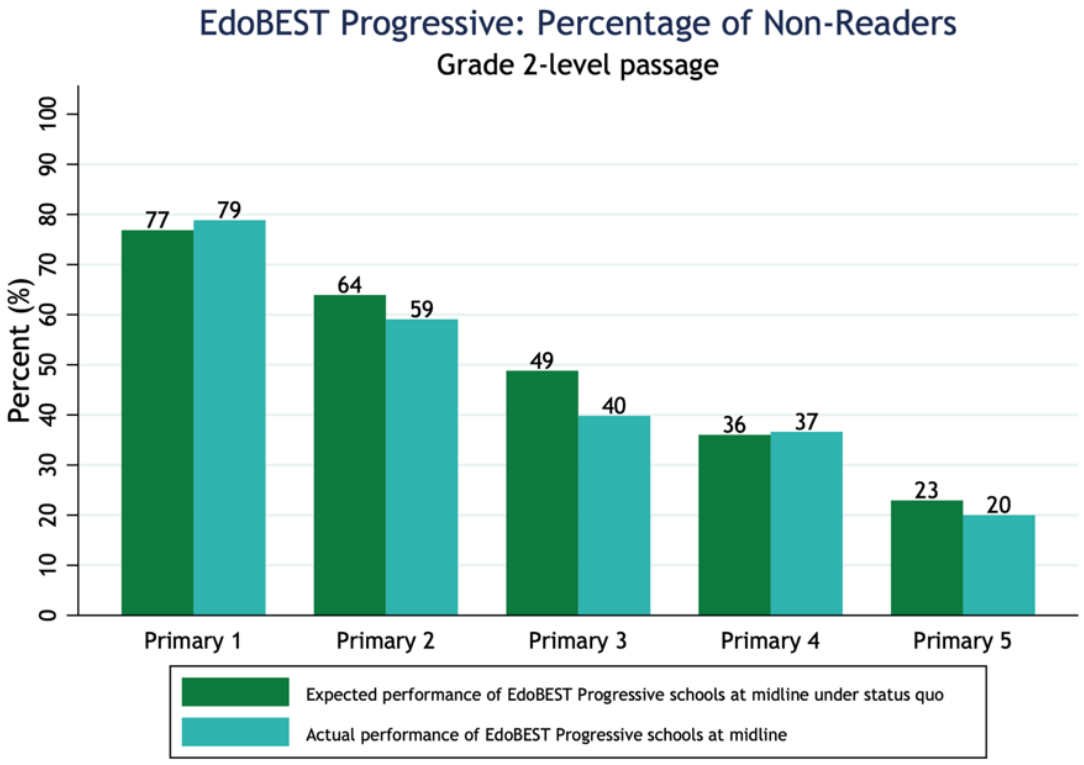


Figure 5.2

Box 3 The Relationship Between Reading Fluency and Reading Comprehension

Being able to read with comprehension is the ultimate goal of literacy. Yet, 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. Furthermore, 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, as evidenced by a randomised controlled trial conducted internally by NewGlobe. However, 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," is typically measured in units of "correct words per minute" (cwpm), enabling a simpler comparison across contexts. It refers to the efficient, effective word recognition skills that allow a reader to derive meaning from the text. Fluency is typically comprised of three major components: accuracy, which is 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).

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. This is because it involves many of the same processes that make up reading comprehension. Additionally, fluency is easy to measure, comparable, and there are well-known benchmarks (Pikulski & Chard, 2005; Rodriguez-Segura et al., 2021). Hence, the value of measuring fluency lies not only in its intrinsic significance but also in its role as a signal for other literacy sub-constructs like reading comprehension.

Pupils' mathematical skills improved rapidly

Across nearly all of the sub-tasks included on the ICAN, pupils achieved progress far beyond what they would have achieved without the programme (Figure 5.3). After 17 weeks of instruction, **the average Primary 1-5 pupil made gains across core operations (addition, subtraction, multiplication, and division) that were three times as large as those that would be expected without EdoBEST.** The largest learning gains were observed among pupils in Primary 2-5. For instance, Primary 3 pupils made 6 times the gains they would have without the programme (see Appendix Tables B.3-7). The only area in which progress did not exceed status quo expectations was in word problems, which is not surprising given that improvement in this area requires both stronger computational skills as well as literacy.

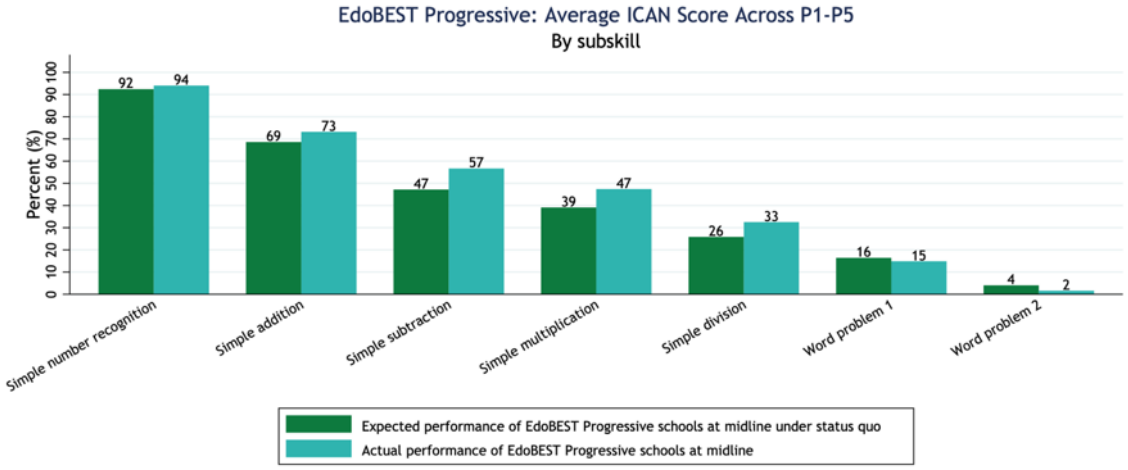


Figure 5.3

Learning Levels Continued to Improve Dramatically Throughout 50 Weeks of Programme Implementation

Pupils continued to make gains, more than doubling their reading fluency rate

Building on the encouraging progress seen during the first 17 weeks of programme implementation, sustained progress was observed in the subsequent 33 weeks (Figure 5.4). In reading fluency, pupils made sizeable gains when assessed with a Primary 2-level passage; o**n average, Primary 1-5 pupils**[9] **are now reading almost twice as many correct words per minute than they would be without the programme** (see Appendix, Figure C.1)**.** Results were similar when pupils were assessed using grade-level passages. The growth observed among pupils in a typical Primary 1 classroom is particularly promising, and signals the programme's ability to remediate learning gaps early in

[9] Results for pupils in Primary 1-5 are presented, and for Primary 6 are not shown, due to the methodology used to establish the benchmarks for comparison. The expected yearly gain for a pupil in a given grade — for example, in Primary 1 — is calculated by looking at the "snapshot" at baseline of all grades, and taking the difference between the levels of Primary 2 minus the levels of P1 at that point in time. Since there are no baseline data for the following grade (the EdoBEST programme has some data about JSS1, but the change from P6 to JSS1 is arguably not a linear trajectory on which we can base extrapolations due to the differences in schools and pupil composition), the "expected performance" for P6 cannot be calculated. Therefore, treatment effects (actual vs. expected) for P6 are not shown in the main body of the report. Instead, levels achieved by P6 at the end of the 2022-23 school year are shown in comparison to observed levels at baseline in Appendix C.

pupils' academic careers. These pupils are reading nearly 4 times what they would be without EdoBEST instruction, and are now at a similar reading fluency level as Primary 3 pupils did at the start of the programme.

The progress made by Primary 5 and 6 pupils, who will need to take on increasingly advanced subject matter in Junior Secondary school, is also noteworthy. **Primary 5 pupils gained 15 cwpm more than they would have without the programme** — results that indicate an effect size (0.60 SD) in the 95th percentile of all international education interventions studied. Their reading fluency rate - now nearly 40 cwpm - means they are approaching the minimum fluency rate needed for reading comprehension (e.g. ≥ 45 cwpm). **Pupils in a typical Primary 6 classroom gained 22 cwpm since the start of the programme and are now reading 54 cwpm** (see Appendix Figure C.3). Having reached this reading fluency level, the average Primary 6 pupil can now begin to comprehend and engage with written learning materials.

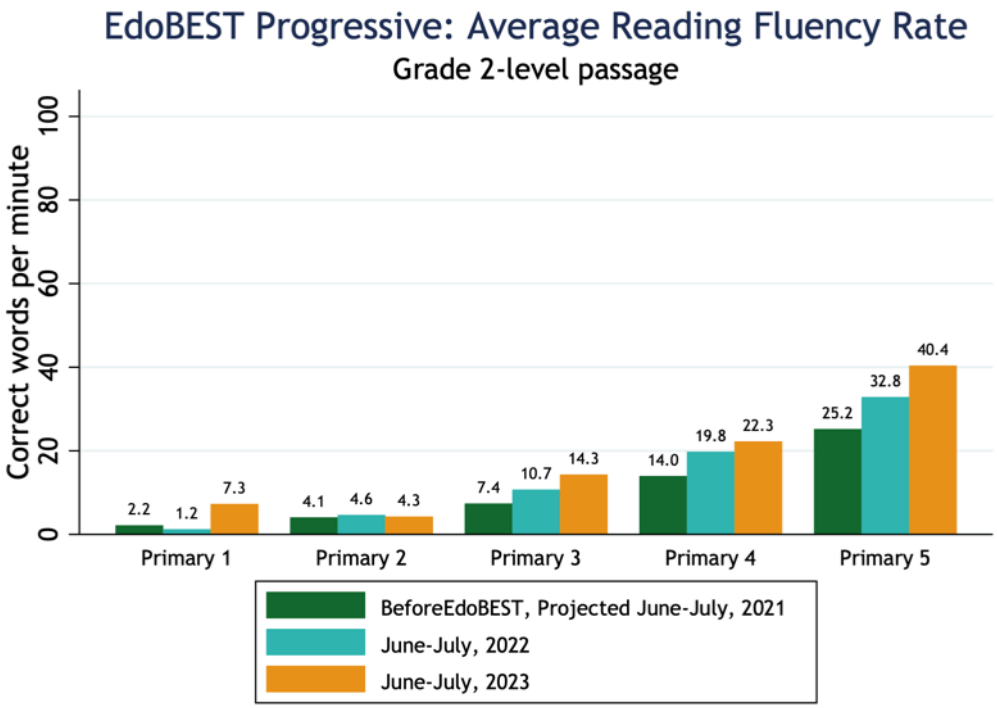


Figure 5.4[10]

[10] Any slight differences between the numbers shown in Figure 5.4 and those shown in Figure 5.1 are due to the fact that these represent snapshots at different points in time that include only the subset of schools that are present in all rounds of data collection. That is, in Figure 5.1, which represents results from February 2022 to July 2022, the sample includes 65 schools for which data are available at those timepoints. For Figure 5.4, which represents results achieved by July 2023, the sample includes 58 schools for which data are available for all three timepoints.

The proportion of non-readers significantly decreased

Across most grades, the share of pupils who cannot read a single word decreased by an average of 8 percentage points more than it would have without the programme. **In Primary 3-5, pupils are now almost an entire grade level ahead of where they would have been with status quo instruction** (Figure 5.5; for results on grade-level passage, see Appendix Figure C.2). For example, more than 1 in 3 Primary 4 pupils would be non-readers (34%) absent the programme, but after 50 weeks of programme implementation, about 1 in 4 pupils (26%) in a typical Primary 4 classroom remained non-readers. This is roughly similar to the expected proportion of non-readers in Primary 5 without the programme. **In a typical Primary 6 classroom, non-readers decreased from almost 1 in 6 (16%) to fewer than 1 in 20 (4%) after 50 weeks of programme implementation** (see Appendix Figure C.4). The steady decrease in the number of non-readers over the 50 weeks is an indication of the programme's sustained impact on literacy, and confirms that the initial gains seen during the initial 17 weeks of the launch period were not merely a temporary spike, but rather laid the foundation for ongoing progress.

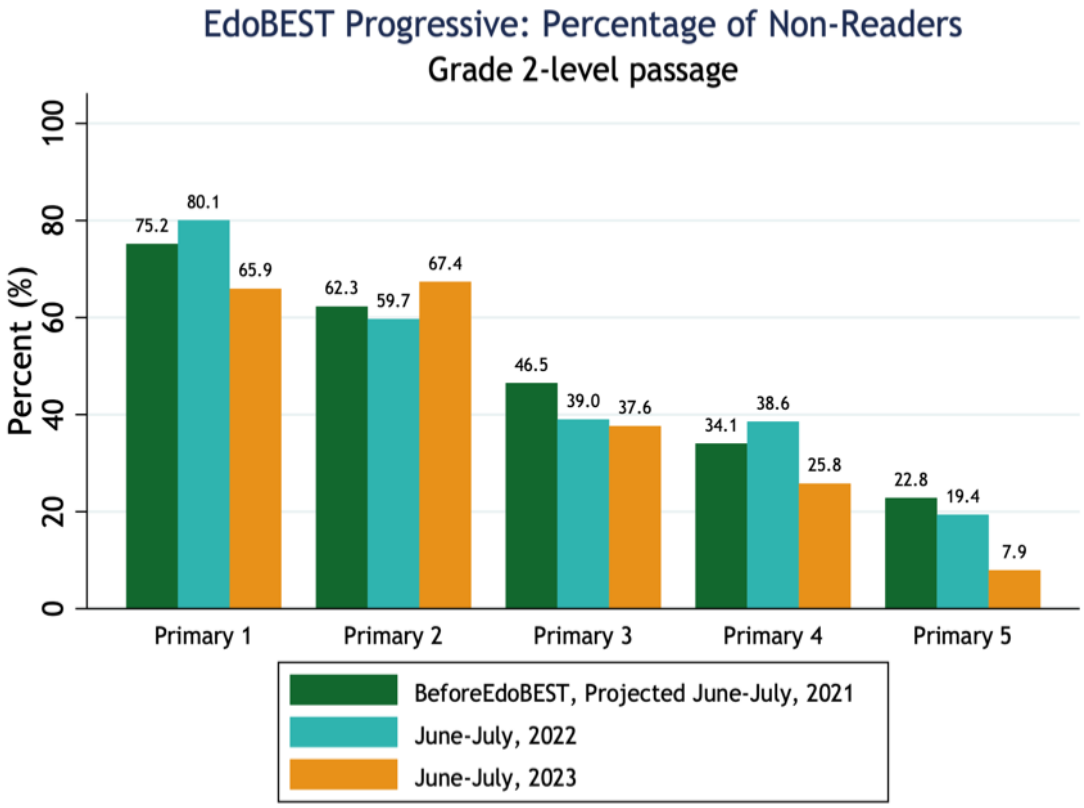


Figure 5.5

A metric akin to learning deprivation has decreased

The learning gains in foundational literacy achieved through the EdoBEST programme are substantial, both in absolute terms and relative to other interventions in similar contexts. Importantly, these gains also translate into meaningful and tangible effects on policy-relevant metrics, such as "learning deprivation." Learning deprivation is defined as the proportion of children who fall below a minimum proficiency level, as outlined by the Global Alliance to Monitor Learning (Azevedo, 2021). By aligning learning deprivation metrics with Sustainable Development Goal (SDG) 4.1.1.b, which measures the proportion of children unable to read a simple passage by the end of Primary school, one can further contextualise these gains. Using this metric, **schools in the**

EdoBEST programme experienced a reduction in a metric akin to learning deprivation[11] from 82% to 66% in 50 weeks (Figure 5.6). This change means that these schools' performance now approaches that of lower-middle-income countries, such as Ghana and Kenya, and moves away from low-income countries like Mali and Burkina Faso.

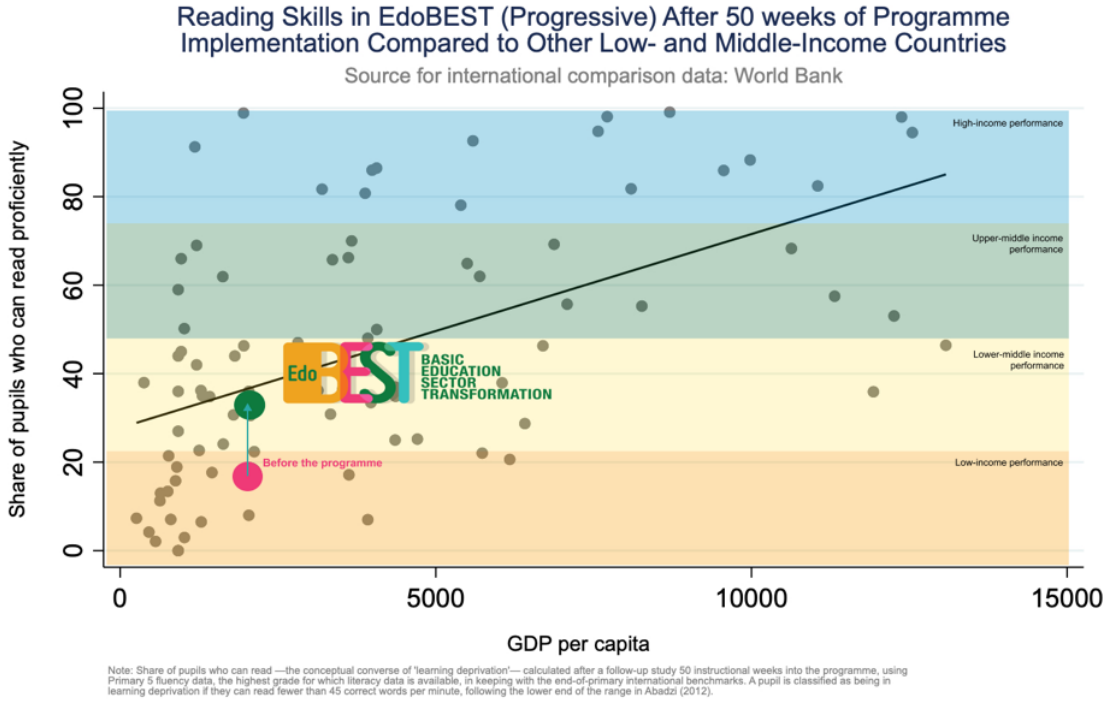


Figure 5.6

Mathematics scores are much higher for all assessed pupils

Across all grades, pupils in EdoBEST Progressive schools achieved higher scores at the end of the 2021-22 school year than they did before the programme. Pupils in Primary 1–5 – for whom expected scores can be calculated if they were to have received status quo instruction – achieved ICAN scores that are 13 percentage points higher than they would have without the programme (Figure 5.7). This is equivalent to 1.4 additional years of learning[12]. Indeed, pupils in a typical Primary 3 classroom are now achieving the same total ICAN scores as those in Primary 5 were before the programme. The programme's large effect on mathematical learning outcomes (0.58 SD) places it above the 95th percentile of all education interventions. For example, pupils in a typical Primary 5 classroom raised their average ICAN score 17 percentage points, from 54% before the start of the programme to 71% after 50 weeks of programme implementation (Figure 5.7).

[11] "Learning deprivation" is a metric created by the World Bank and defined as the proportion of children who cannot read a simple passage with comprehension by the end of Primary school. To develop a metric aligned with this and calculate how it has reduced due to the EdoBEST programme, the research team calculates the share of Primary 6 pupils who have a reading fluency rate of 45 cwpm or higher, but reading comprehension was not specifically assessed during this study. Reading fluency is the subskill most strongly correlated with reading comprehension, and research defines 45 cwpm as the minimum threshold needed to achieve comprehension (Abadzi, 2011).

[12] Additional years of learning are calculated by dividing pupils' learning growth in one year of the EdoBEST programme by their growth in one year of "status quo" instruction. Regarding ICAN scores, pupils achieved 2.4 years' worth of growth in their maths performance, which is 1.4 additional years beyond what would be expected during a single school year.

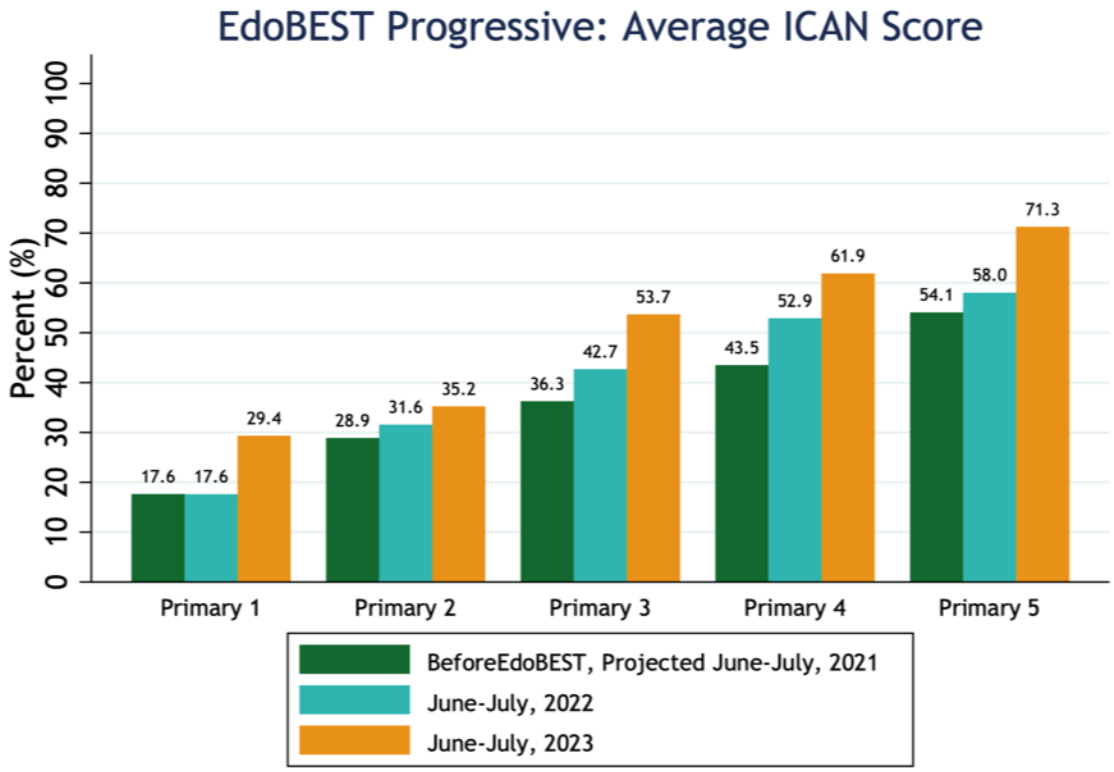


Figure 5.7

Increases in total ICAN scores were mainly driven by large increases on individual sub-tasks, in both the "simple" and "complex" categories[13]. In the areas of addition without carrying, subtraction without borrowing, multiplication without regrouping, and exact short division ("simple" operations), pupils in a typical Primary 1 classroom earned scores that are 15 percentage points higher than they would have been without the programme (Figure 5.8). Primary 3–5 pupils increased their scores by an average of 25 percentage points more than they would have absent the programme on the "complex" versions of these operations (addition with carrying, subtraction with borrowing, multiplication with regrouping, and division of a two-digit number by a one-digit number with a remnant) (Figure 5.9).

[13] Within the ICAN, there are two iterations of sub-tasks that pupils complete. The "simple" iteration requires a basic understanding of the given operation, while the "complex" iteration requires a comparatively more advanced understanding.

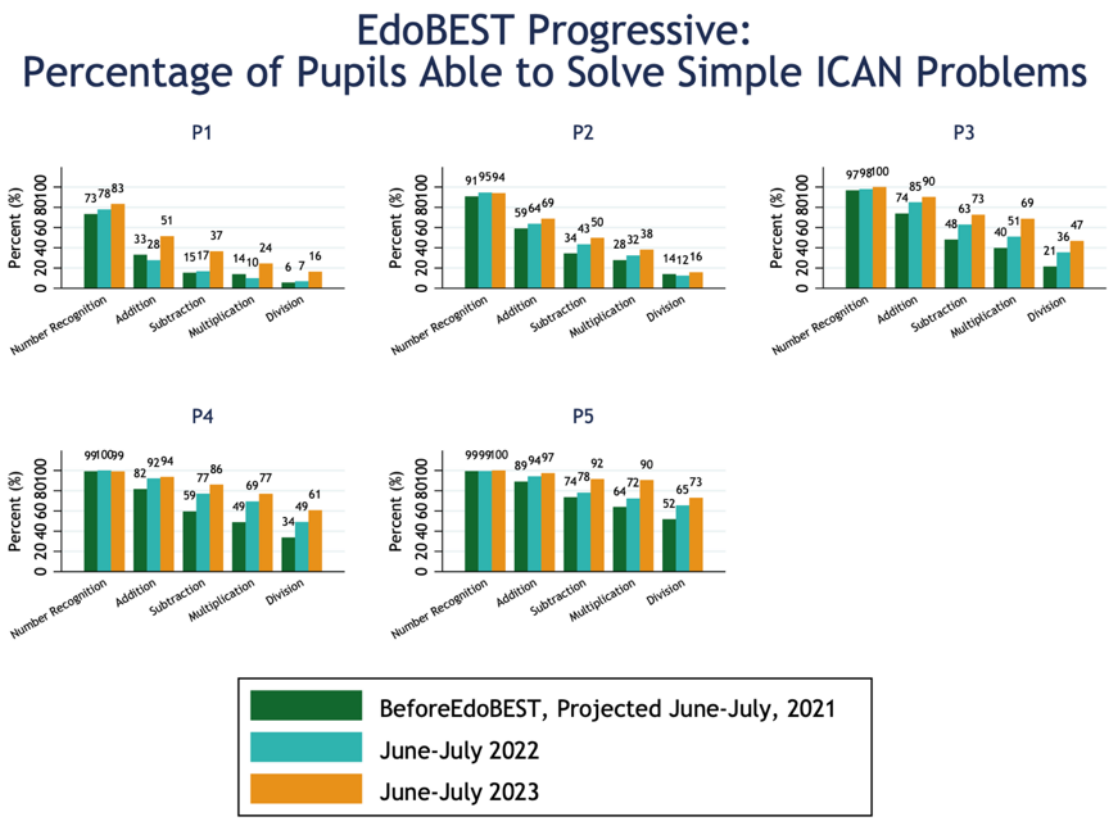


Figure 5.8

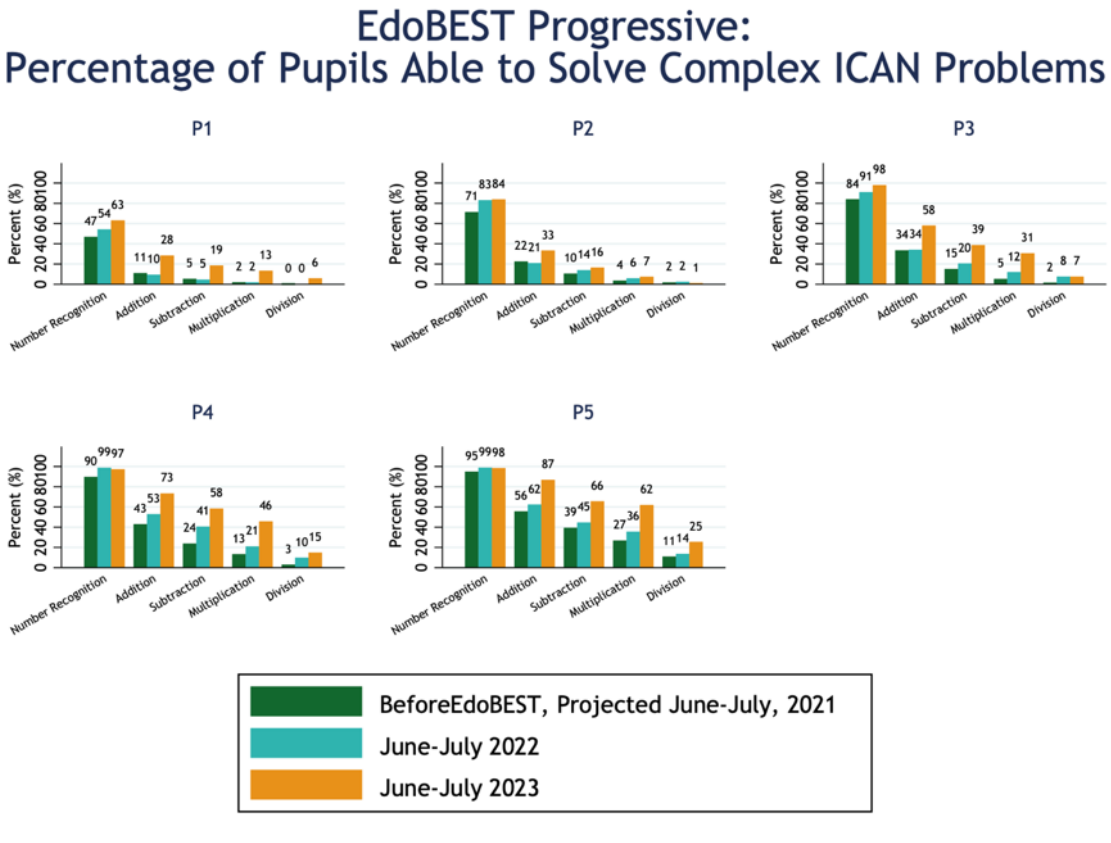


Figure 5.9

Correctly solving maths problems in computational form is an essential building block for pupils to solve word problems that mirror real-life situations, which they face both in and out of school. After 50 weeks of programme implementation, pupils are beginning to show improvement on subtraction-based word problems. **Primary 3-5 pupils are scoring an average of 13 percentage points higher on subtraction word problems than they would have without the programme** (see Figure 5.10). Although pupils are not yet demonstrating improvement on division-based word problems, and although in absolute terms, only a small share of pupils are correctly solving word problems of any type, these results are a positive early sign that more improvement is yet to come. Given that word problems require both the ability to solve mathematical problems operationally as well as the literacy skills to read and understand the problem, it is to be expected that improvements in pupils' ability to solve word problems would manifest later than improvements in operational maths and in reading. Also, given that subtraction should be mastered earlier than division, it is not surprising that small improvements in subtraction-based word problems are being seen before any tangible improvements in division-based word problems. Continued strengthening of foundational mathematical and literacy skills will be needed so that pupils can make measurable progress on word problems.

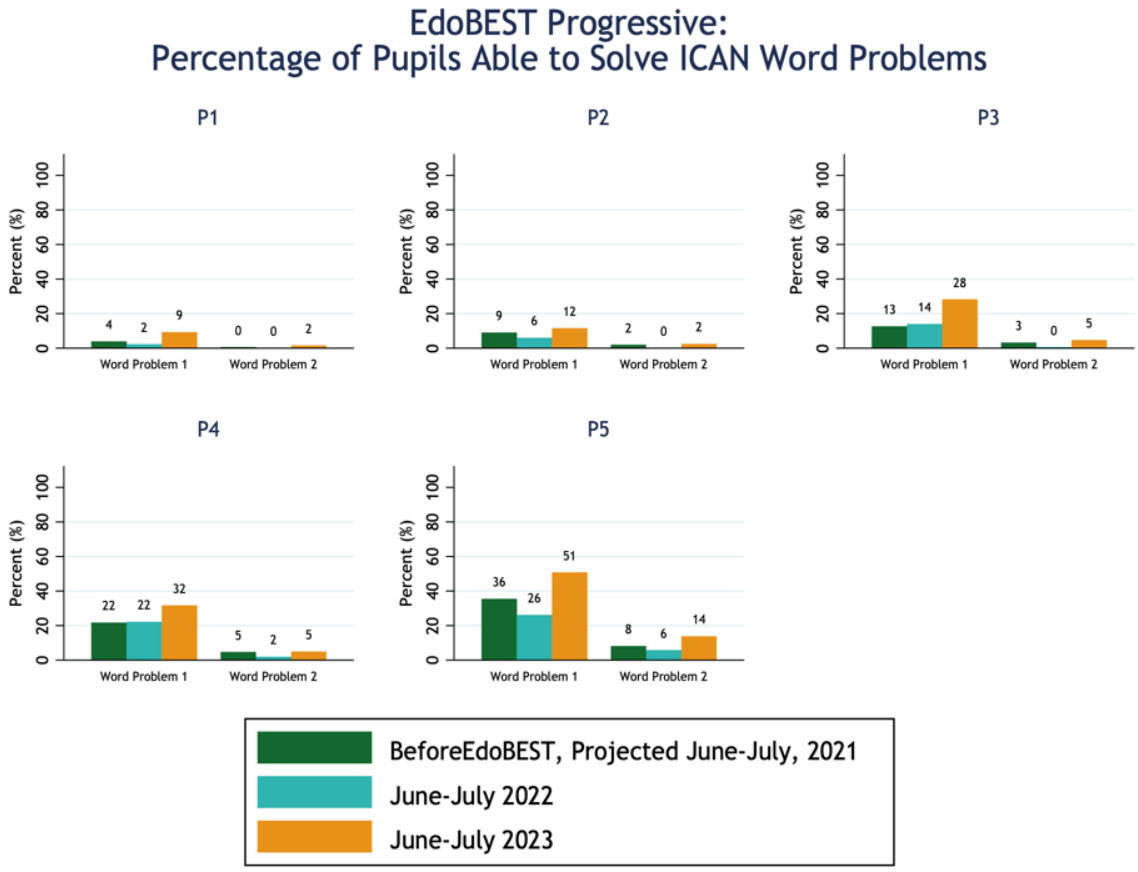


Figure 5.10

The EdoBEST Programme is helping to close the gap between Progressive- and Primary-model schools

The schools that adopted the Progressive model of the EdoBEST programme in February 2022 – that is, those that had initially been identified as not yet ready to implement EdoBEST when it was rolled out to schools under the Primary model – differ in important ways from schools implementing the Primary model. Progressive schools have an average enrolment of 75 pupils, whereas those implementing the EdoBEST Primary model have an average enrolment of 334. Primary-model schools also have nearly three times as many teachers per school as Progressive schools. Most notably, Progressive-model schools began with lower average learning levels than did Primary-model schools, both in reading fluency as well as in mathematics. Given that the EdoBEST programme is designed based on educational research about what is effective for all pupils regardless of external factors such as location or socioeconomic status, the expectation is that prolonged and faithful implementation of the programme will produce equitable outcomes – i.e. help Progressive-model schools close the gap with Primary-model schools. Indeed, after 50 weeks of the EdoBEST programme being implemented in Progressive-model schools, results are already beginning to bear this out.

Figures 5.11-12 compare the learning levels at Progressive-model schools – both the observed levels at the end of the 2022-23 school year (i.e. after 50 weeks of the programme; yellow bars) as well as where levels are projected to have been at an equivalent time of year before adoption of the programme (green bars) – with learning levels in Primary-model schools from the latest round of data collected for most of the state where EdoBEST operates (red bars).

In reading fluency, pupils in Progressive-model schools have made strides, and are catching up with their peers in Primary-model schools. For example, before the programme, pupils in a typical Primary 5 classroom of a would-be Progressive school could read 25 cwpm when tested on a grade-level passage – 46% of the rate of their Primary-model counterparts. By the end of the 2022-23 school year, this had increased to 37 cwpm, or 69% of the rate at Primary-model schools (Figure 5.12). Results varied slightly across grades, but the trend was consistent – Progressive schools are closing the gap. Similar results were seen when pupils were tested on a Primary 2-level passage (Appendix, Figure C.6). Importantly, the levels shown for Primary-model schools (red bars) represent achievements at the end of nearly five years of EdoBEST programming; the fact that Progressive schools are already closing this gap after just 50 weeks (one year and two terms) of programme implementation is a strong indication that EdoBEST is helping to produce more equitable outcomes for Progressive and Primary schools.

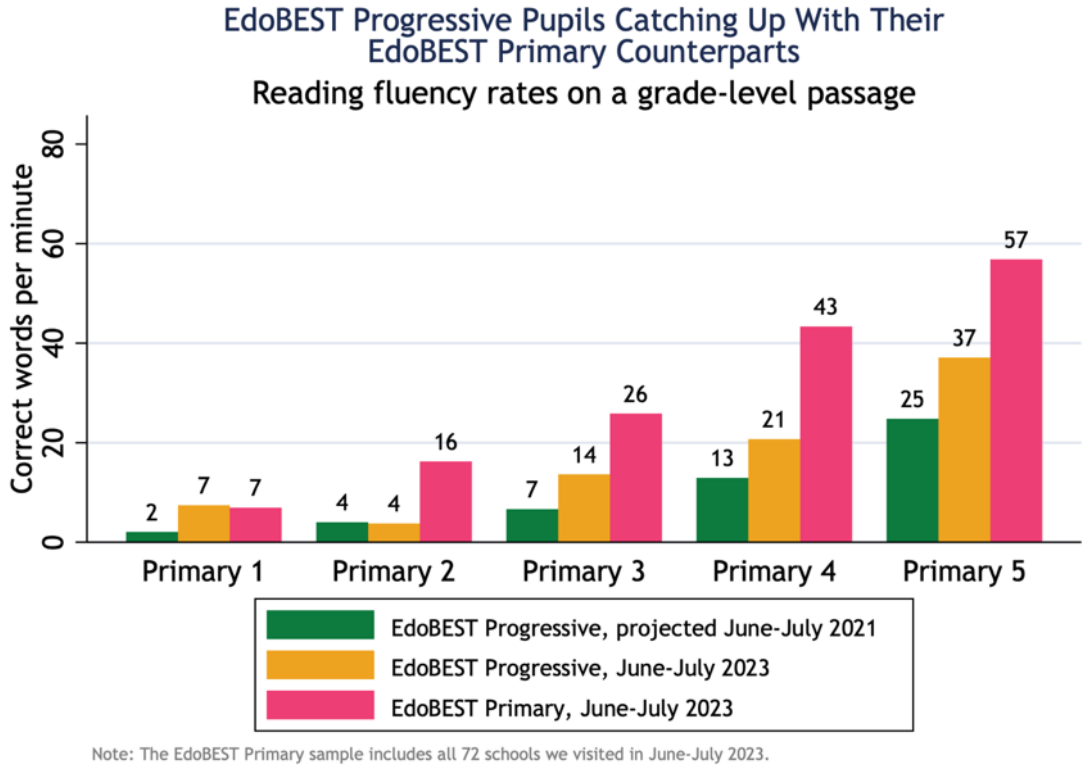


Figure 5.11

In mathematics, the results are even more impressive; after 50 weeks of the programme, **Progressive-model schools have completely closed the gap with Primary-model schools.** Pupils in Progressive-model schools, despite having begun with total ICAN scores that were 20% to 45% lower than those of their Primary-model counterparts, ended the 2022-23 school year with scores that were, for most grades, equal to or higher than those achieved by their peers in Primary-model schools (Figure 5.12). Thus, not only did the EdoBEST programme successfully support pupils in Progressive schools to make as much (or more) growth in maths over just 50 weeks relative to that made by their peers in Primary-model schools over the course of nearly five years, but it completely eliminated any disparities, in absolute levels of maths achievement, between these groups. This extraordinary result affirms the success of the EdoBEST programme in producing positive outcomes regardless of external factors such as location or socioeconomic status, effectively advancing educational equity.

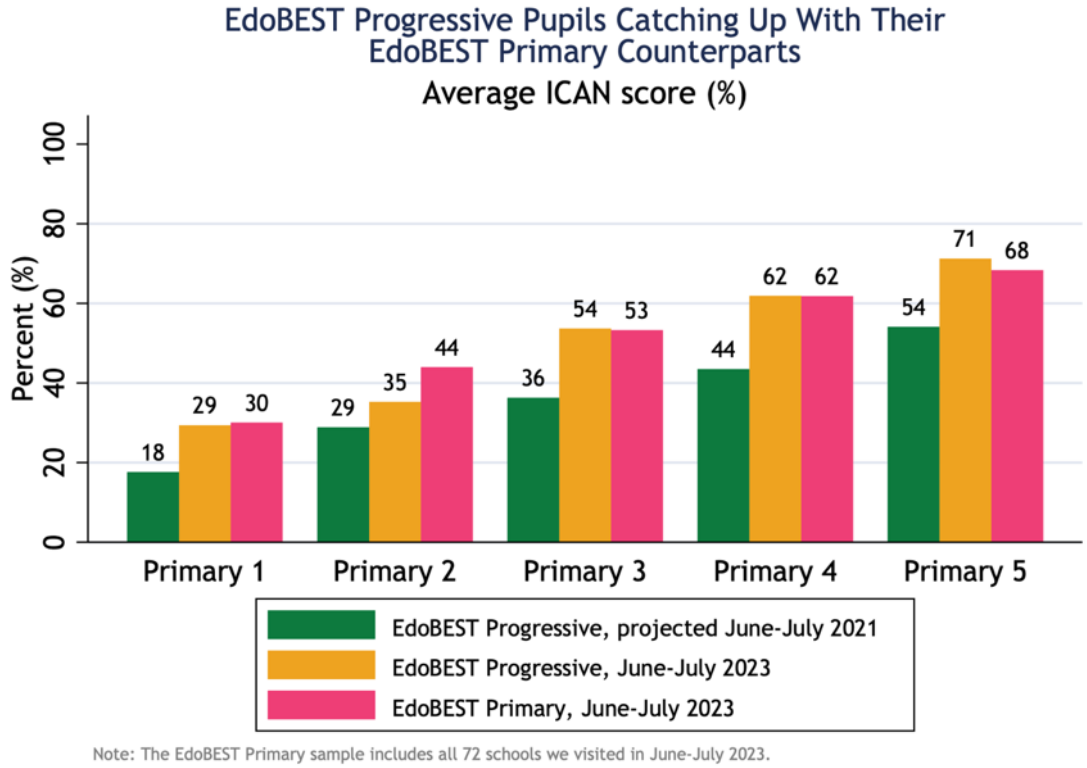


Figure 5.12

Improvements to Programme Implementation

Teacher attendance has soared throughout the 50 weeks of the programme

Teacher attendance has more than doubled from 36% at the beginning of the programme to 79% at the end of 50 weeks (Figure 5.13). Teachers must be present in schools and classrooms in order for the programme to drive improvements in pupil learning, and this massive improvement in teacher attendance is not only a direct indication of increased teacher accountability and professionalism, but likely played a role in driving the learning gains observed among pupils.

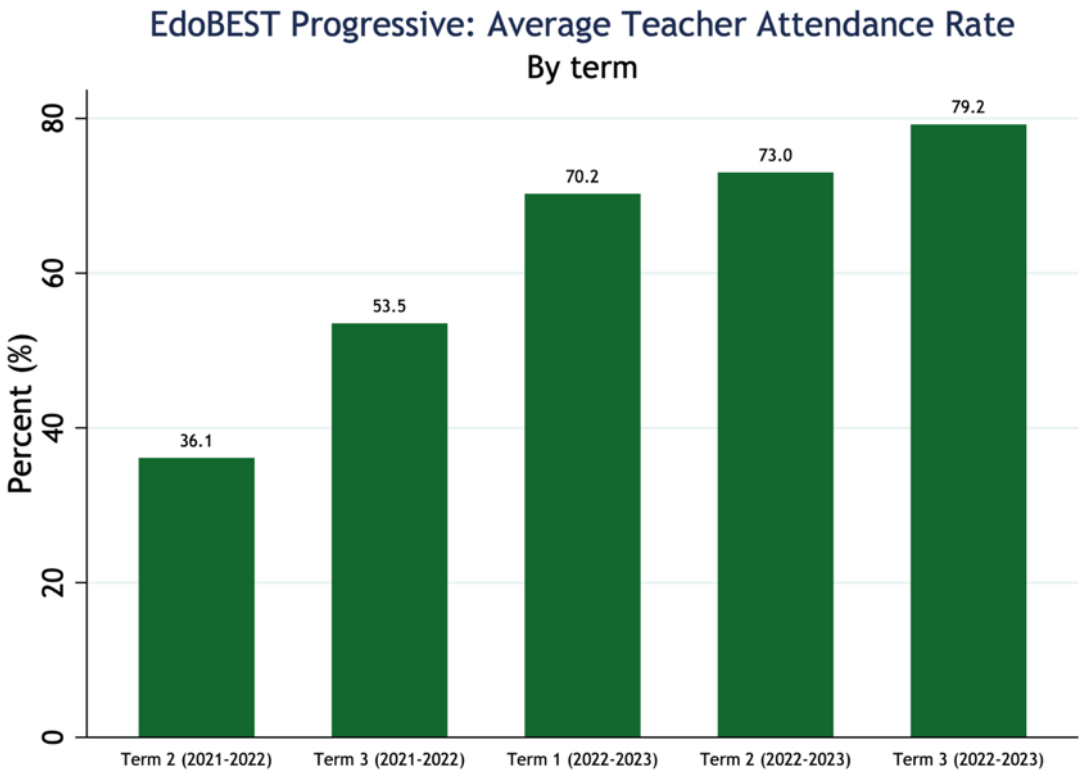


Figure 5.13

The marked increase in the rates of teacher attendance throughout this study also translates to a reduction in wasted fiscal resources; the large amount of government funds that were being foregone due to low teacher attendance are now being effectively spent on education.

Box 4 Teacher Absenteeism in Low- and Middle-Income Countries: Challenges, Implications, and Effective Solutions

Teacher absenteeism is a deep and widespread challenge that jeopardises returns on substantial investments in pupil learning outcomes and enrolment outreach (World Bank Group, 2017). Teacher salaries in low- and middle-income countries (LMIC) often represent a significant portion of the public education budget. For instance, in Uganda, Tanzania, Nepal, and Namibia, 60–95% of the government budget that is earmarked for education is invested in teacher salaries. Yet, high rates of teacher absenteeism have been consistently recorded across many LMIC: In a global study, teachers were not in school 16% of the time in Bangladesh, 18% of the time in Togo and Senegal, and 45% of the time in Mozambique (Chaudhury et al., 2006). Even among the teachers that were present in school across 8 sub-Saharan African countries, less than half of them were found to be in their assigned classrooms during instructional time when measured by the World Bank via drop-in visits (World Bank Group, 2017). Hence, the large shares of fiscal resources spent on teacher salaries, coupled with the ingrained prevalence of teacher absenteeism, indicates that the fiscal and educational repercussions of this issue are a serious policy concern that deserve immediate governmental action.

From a fiscal standpoint, one study in India found that an unauthorised teacher absence rate of 23.6% cost the government an estimated 1.5 billion INR in 2017 alone (Muralidharan et al., 2017). The World Bank has estimated that teacher absences also cost Senegal, Mozambique, and Tanzania over 300 million USD each in 2013 (World Bank Group, 2017). This financial loss not only correlates with diminished learning gains due to inadequate instruction time and quality, but also with the payment of salaries using limited government funds in contexts where public budgets are particularly constrained.

From an academic perspective, for the pupils in the system, the most direct consequence of teacher absenteeism is significantly reduced instructional time, which, in turn, translates into weaker learning outcomes. According to The World Bank's Service Delivery Indicators, out of the 8 LMIC that were surveyed in sub-Saharan Africa, including Nigeria, Kenya, Uganda, and Togo, an average of 2 hours and 46 minutes of instructional time was lost daily due to teacher absenteeism (World Bank Group, 2017). Teacher absenteeism not only detracts from total learning time, but also negatively impacts the quality of learning that takes place in school (Vargas & Patricia, 2016). When classes are combined to compensate for inconsistent teacher attendance, pupils experience disruptions in their lessons. Furthermore, chronically absent teachers were found to be less productive in school when compared to their peers (Utami & Vioreza, 2021). This lack of consistency and quality contributes to parents' and pupils' poor perceptions of the public education system, which leads to lower rates of enrolment and attendance among pupils, therefore permanently stunting their positive educational trajectories (World Bank Group, 2017).

High rates of teacher absenteeism are symptomatic of inadequate management systems and data tracking, which fails to facilitate accountability and motivation. Investment in increased teacher attendance can lead to more efficient national education systems that yield greater learning outcomes. By not targeting educational management systems and data collection, national governments are continually funnelling funds into an ineffective system that produces increasingly diminished returns.

Despite the severity of the challenges around teacher absenteeism, cost-effective, evidence-based solutions have been shown to yield high-impact results that mitigate this systemic issue. Studies done by entities like the World Bank and UNICEF suggest that funds should be directed towards improving accountability systems and to the oversight of teachers, rather than towards other applications, such as increasing staffing where shortages are not prevalent, or unconditional salary increases. For example, one study in Chile found that increasing teacher salaries by 4–30% decreased instructional time per pupil by an average of 1 hour a week, and another study in Indonesia found that the unconditional doubling of teacher salaries did not lead to better self-reported attendance or, most importantly, improved pupil learning outcomes (Vargas & Patricia, 2016; Utami & Vioreza, 2021). Conversely, cost-effective interventions that have been shown to significantly decrease teacher absenteeism include in-person or technological accountability systems, supportive and competent management, and increased data tracking. When studied in India, attendance tracking systems that relied solely on self-reporting among teachers were found to be ineffective. Instead, randomised, unannounced drop-in visits and daily check-ins to monitor both attendance and curriculum progression were found to produce substantial improvement, and ultimately increased the productivity of the existing workforce (Muralidharan et al., 2017). Therefore, investing in these systems that improve visibility of stakeholder behaviour and allow policymakers to better support teachers on a national level yields increased teacher attendance, performance, and, consequently, greater returns in pupil learning outcomes.

VI. Lessons Learned and Recommendations for the Programme's Enhancement

After 50 weeks of programme implementation, the EdoBEST programme has gained momentum in continuing to transform the educational landscape within the State, effectively adapting its approach to meet the specific needs of both pupils and school staff among Progressive schools. In turn, the quality of instruction and pupil learning outcomes continue to improve year-on-year. Between the 2021–22 school year and the 2022–23 school year, teacher attendance increased 119%. During this time, pupils made tremendous strides in foundational literacy and numeracy. Non-readers have reduced by 80% across grades, and Upper Primary pupils are scoring 15 percentage points higher on the ICAN, which is equivalent to 1.6 additional years of learning in maths. These findings, among other improvements, demonstrate the positive impact of the continued educational investments made by the State Government.

Despite the improvements observed by the end of the 2022–23 school year, further work is still required in order to sustain these positive trends — and build upon them — in the coming years of the programme. For instance, three-quarters of pupils still cannot solve a division problem in the form of 93 ÷ 7 by Primary 5, and pupils in this grade are reading only 37 cwpm on average — roughly equivalent to that of a Primary 2 pupil reading at grade-level. Therefore, for the 2023–24 school year and beyond, the EdoBEST programme is working to address deficits in lesson completion, pupil attendance, the availability of instructional materials, and pupils' learning outcomes alongside improving the efficacy of the multi-grade teaching model.

Lesson Completion Rates Must Increase To Accelerate Learning

Lesson completion rates remained low throughout this study. Although collection of these data rely on the EdoBEST ecosystem and therefore cannot be compared to the lesson completion rates before the programme, they were weaker than those seen in the other EdoBEST Primary schools (outside of the Progressive model). These rates fluctuated slightly, but the average termly lesson completion rate by the end of the 2022-23 school year was just over 30%[14]. This rate is not sufficient to fully capitalise on the availability of high-quality digital and printed learning materials, which must be available but also consistently used in order to facilitate the dramatic learning gains pupils need to fulfil their potential. Learning gains will likely improve significantly if this percentage substantially increases, given that improving lesson delivery leads to more productive learning time informed by high-quality teacher guides and printed learning materials. By investing in this pillar of the programme — alongside other key operational areas like ensuring textbook availability and usage — EdoBEST can ensure more productive learning time in schools and improve the learning experience of pupils.

[14] The method used to determine this figure employs a stringent criterion for "lesson completion", stipulating that at least 80% of the content must be covered within a time frame that deviates no more than 10% from the allocated duration. Consequently, the stated lesson completion rate may be a slight underestimate of the total instructional time pupils actually received, as it does not capture other lessons that might have commenced and even concluded, but fell short of meeting this benchmark for any number of reasons.

High Rates of Pupil Attendance Are Necessary for Improved Learning Outcomes

The EdoBEST programme and its government stakeholders must also continue working together to ensure high levels of pupil attendance as it progresses into the 2023–24 school year and beyond. Pupils must be physically present in school in order to enjoy the benefits of improved instructional quality and school management. The highest average rate of pupil attendance, 79%, was observed in Term 2 of the 2021–22 school year, and data on pupil attendance show that the attendance rate has gradually decreased over subsequent school terms (Figure 6.1). Various factors could account for this trend, including the possibility that changes in the rate at which teachers marked attendance (Figure 6.2) affected how well the attendance data reflect actual attendance. Nevertheless, low pupil attendance harms pupil learning; as such, sustaining high levels of pupil attendance will be critical for maximising pupils' opportunities to learn and engage with high-quality instruction. Moving forward, ensuring high levels of pupil attendance remains a priority in the ongoing implementation of the EdoBEST programme in order to maximise the programme's potential to enhance learning. To do so, sustained participation and continued buy-in from all stakeholders, including teachers, parents, and pupils, are necessary so that pupils in Edo State can continue to build stronger foundational skills and achieve greater learning outcomes.

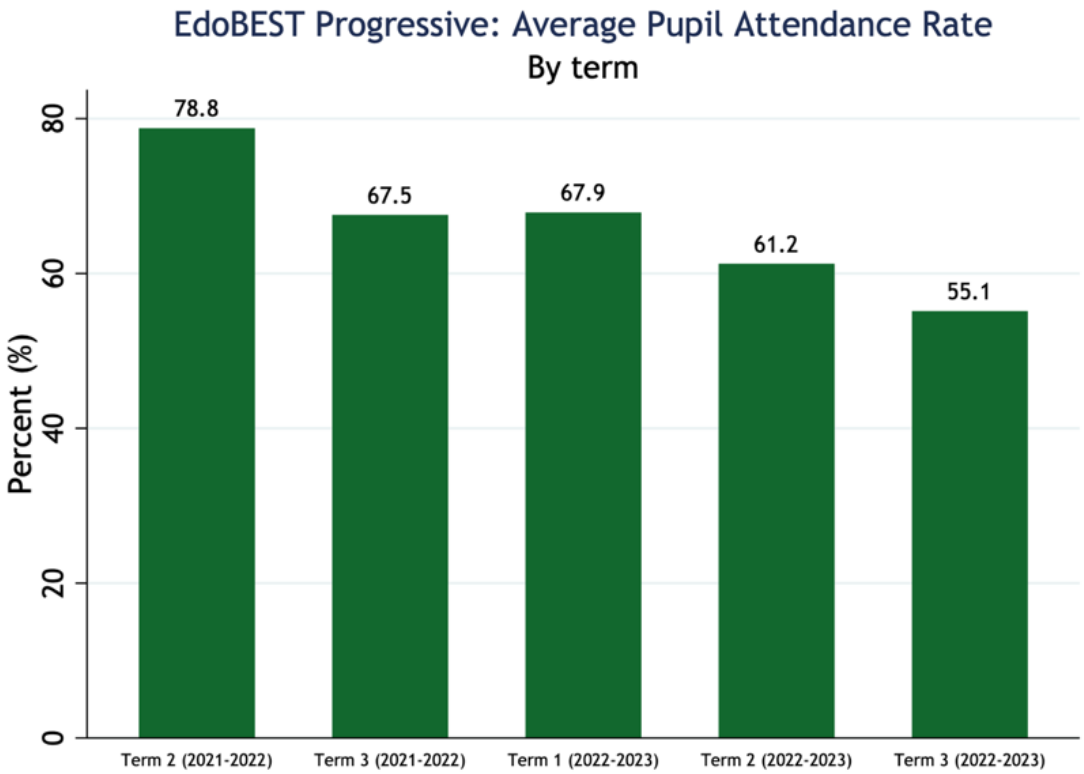


Figure 6.1

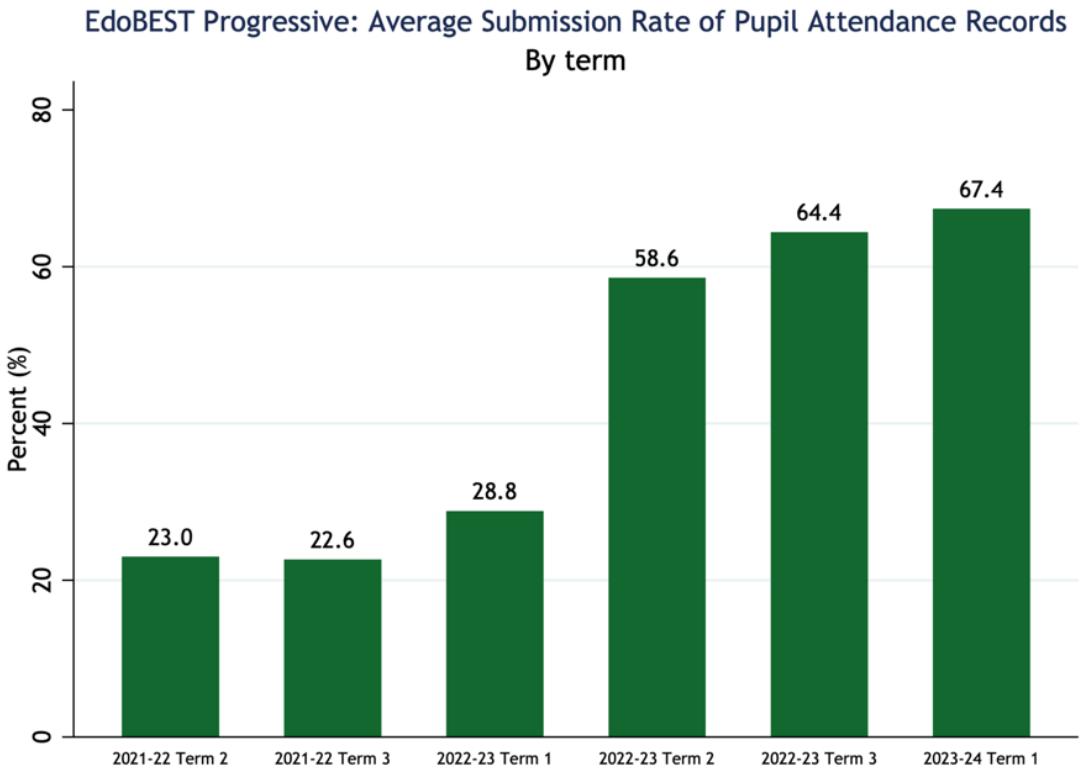

EdoBEST Progressive: Average Submission Rate of Pupil Attendance Records
By term
Percent (%)
0
20
40
60
80
23.0
22.6
28.8
58.6
64.4
67.4
2021-22 Term 2
2021-22 Term 3
2022-23 Term 1
2022-23 Term 2
2022-23 Term 3
2023-24 Term 1

Figure 6.2

Box 5 The Problem of Out-of-School Children Worldwide

The world has made great strides towards increasing educational access, with currently nine out of every ten children enrolled in Primary school (UNICEF, 2022). Yet, achieving the Fourth Sustainable Development Goal (SDG4), which aims for universal enrolment by 2030, remains distant, with 244 million children still out of school worldwide (UNICEF, 2022). The situation is particularly acute in low- and middle-income countries (LMIC), where one in every six children is out of school (UNESCO, 2019). This group likely represents children living in extreme poverty and/or remote areas with poor access to schools. Therefore, enrolling them is the first step towards guaranteeing learning outcomes for some of the most marginalised children in society, bringing them a multitude of benefits such as improved health and lower poverty rates (UNICEF, 2023).

The consequences for out-of-school children are severe. Although it is common across LMIC for children who regularly attend school to still be subject to low learning outcomes, those children who are missing from school and not learning at all, and will quickly fall even further behind their peers (Bau & Das, 2021). Moreover, the gaps between those participating in formal education and those excluded from it grow year over year, further decreasing the likelihood that out-of-school children will ever be in alignment with the performance standards set by the education system.

Traditionally, poverty and violence have been viewed as the two of the most significant barriers preventing a child's participation in education. The poorest Primary school age children are 4 times more likely to be out of school compared to their peers from the richest households (UNICEF, 2018), as they are often not able to meet costs associated with education, such as school fees, uniforms and textbooks (Rueckert, 2019). Violence can destroy school infrastructure and displace populations, making accessing school more difficult (World Bank, 2018). Efforts towards eliminating poverty and violence remain crucial, and progress in this area will go a long way to increasing enrolment worldwide. There exists however a third, and often overlooked, factor keeping children out of school that must be addressed if the world is going to achieve the promise of universal enrolment: the 'learning crisis'.

The learning crisis refers to the chronically weak learning outcomes still present across global education, with a particular concentration in low- and middle-income countries. If the perceived value of education is low, parents will be less likely to enrol and send their children to school. This is an expected response, as in a context of limited resources, parents have to make difficult decisions on where to allocate their scarce resources (Rivken et al., 2005), and will be more likely to put these towards education if they believe this investment will indeed reap rewards. While there are a variety of ways to improve parents' perception of an education system, increasing learning outcomes has been consistently cited as the most effective (Alderman et al., 2001), and therefore represents an effective route to increase enrolment worldwide. For each year of learning a child receives, their future earnings will increase (World Bank, 2018), helping those newly enrolled pupils, who typically come from marginalised communities, to lead healthier, wealthier, more productive lives. This in turn will reduce poverty, another factor suppressing enrolment, creating a positive cycle of educational enfranchisement uplifting the world's most vulnerable learners.

Addressing the problem of out-of-school children requires tackling its root causes. Though progress has been made in the global fight against poverty and violence, these are incredibly complex issues, and remain difficult to solve. Addressing low learning outcomes on the other hand, through smart investments in educational quality (GEEAP, 2023), represents an achievable step that visionary governments can take towards increasing enrolment in education, and make progress towards solving the problem of out-of-school children worldwide.

Cross-grade Ability Grouping Must Continue to be Strengthened Through Greater Operational Efficiency

According to observations made by the EdoBEST team, stakeholders required more support in managing the ability-grouping process at the school level. Specifically, schools need support in grouping pupils, based on precise assessment, in such a way that groups have sufficient enrolment and accurately reflect pupils' learning levels. Schools also require resources to facilitate pupil movement into English and maths groups based on the most up-to-date assessment scores. By ensuring that pupils are in appropriate groups and that transitions are managed effectively, Progressive schools can ensure that the largest number of pupils are receiving instruction in English and maths aligned to their learning levels - meeting them where they are and accelerating.

In addition, the instructional programme at schools under the Progressive model will continue to be fine-tuned to best meet the needs of pupils in those schools. Specifically, this includes the ongoing levelling of English and maths instruction based on learning levels specifically in schools under the Progressive model (given that these often differ from median levels in schools using a single-grade teaching model). It also entails course design updates to ensure that the instructional programme is both cohesive and maximally beneficial for pupils. Teaching and learning materials will be updated within each given grade-pair in order to ensure that no pupil repeats the same instructional programme for two consecutive years, and also that all pupils master the comprehensive syllabus over the course of their Primary school career.

Printed Learning Materials Must be Available to Amplify the Efficacy of Structured Pedagogy

Structured pedagogy is a critical pillar of the EdoBEST programme. Although this method is largely driven by digitally distributed teacher guides, its efficacy is mediated by the availability of printed learning materials. Larger concerns around the lack of textbooks and exercise books — and the challenges this posed within and outside the classroom — surfaced during qualitative interviews. Out of the 21 teachers interviewed, 8 mentioned this problem.

Without printed materials during all of the 2021–22 school year and up until April 2023.[15] The programme relied on "contingency" teacher guides, which are specifically designed to allow for the teaching of concepts without the use of textbooks. Although learning gains have significantly increased over 50 weeks of programme implementation, pupils still require further support in order to close grade-level achievement gaps, and textbooks will play a central role in this process.

In order to close the gap between current performance levels and grade-level expectations, it is critical to ensure that physical teaching and learning materials — especially those targeting foundational reading and mathematics — are regularly printed and available for use. Otherwise, the programme will be forced to teach English, mathematics, and syllabus-aligned subjects without textbooks or exercise books. This approach will undoubtedly cause the programme to fall short of the monumental task ahead of it — ensuring that every pupil in Progressive schools can read and comprehend grade-level materials with mastery. Furthermore, this issue also hampers learning beyond the classroom. The scarcity of these materials restricts pupils' ability to solidify their understanding of in-class instruction and to study independently. It is important to consider, then, that ensuring printed materials are available on time and in full will require careful coordination across a wide range of stakeholders. The government of Edo State delivered on their strong

[15] Materials were printed in April - May of 2023.

commitment to printed learning materials, distributing a large number of textbooks during the 2022-2023 academic year. This has clearly contributed to these large learning gains in English and maths. A sustained effort to maintain sufficient quantities of these textbooks in schools, and also to deliver new textbooks to support the introduction of new courses that will further drive learning gains, will be a critical area of focus in 2023-2024 and beyond.

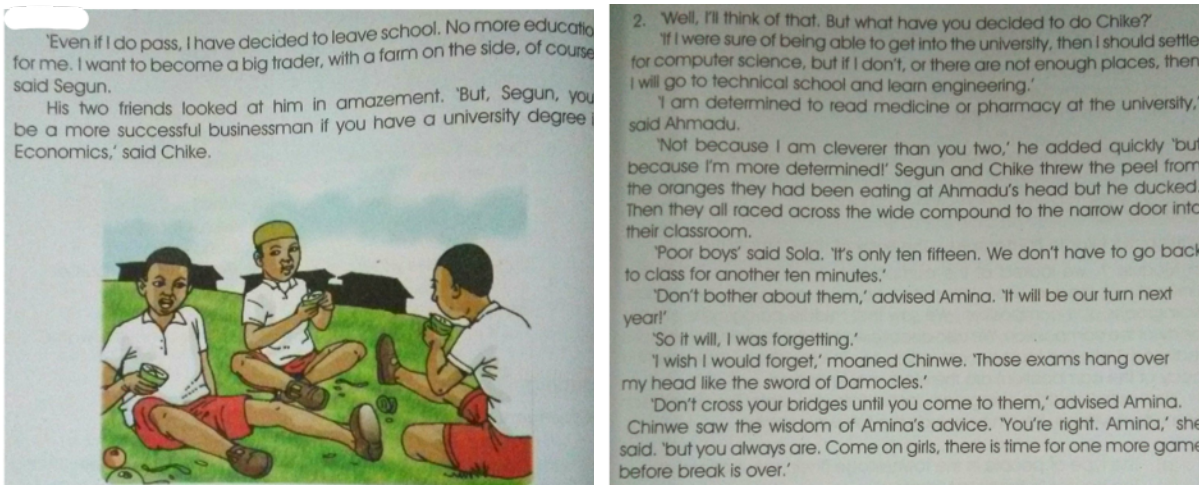
> “Due to insufficiency of books, the pupils cannot refer to the instructions from the [teacher] tablet.”
>
> — Teacher E, Olua Primary School

Learning Gains Must Accumulate for Pupils to Reach Grade-Appropriate Proficiency

Large gaps still remain between pupils’ current learning levels and grade-level standards. These gaps are particularly large in higher grade levels, where many pupils are still reading and doing maths far below grade level.

In Primary 6, for example, the average reading fluency rate is still 54 cwpm (see Appendix Figure 7.1), which is just below the reading fluency rate of the median Primary 1 pupil in a high-performing, English-speaking context (60 cwpm); it is not sufficient to meet NERDC curriculum standards. Given that pupils are just beginning to approach the reading fluency levels necessary for comprehension, it would be challenging for them as they transition to junior secondary school, where they will need to engage with even more complex reading materials.

Taken from pages 54-55 of *English Studies for Primary Schools: Book 6,* UBE Edition, used for P6 English Studies Lesson 22



'Even if I do pass, I have decided to leave school. No more educatio for me. I want to become a big trader, with a farm on the side, of course said Segun.

His two friends looked at him in amazement. 'But, Segun, you be a more successful businessman if you have a university degree Economics,' said Chike.

2. 'Well, I'll think of that. But what have you decided to do Chike?'

'If I were sure of being able to get into the university, then I should settle for computer science, but if I don't, or there are not enough places, then I will go to technical school and learn engineering.'

'I am determined to read medicine or pharmacy at the university,' said Ahmadu.

'Not because I am cleverer than you two,' he added quickly 'but because I'm more determined!' Segun and Chike threw the peel from the oranges they had been eating at Ahmadu's head but he ducked. Then they all raced across the wide compound to the narrow door into their classroom.

'Poor boys' said Sola. 'It's only ten fifteen. We don't have to go back to class for another ten minutes.'

'Don't bother about them,' advised Amina. 'It will be our turn next year!'

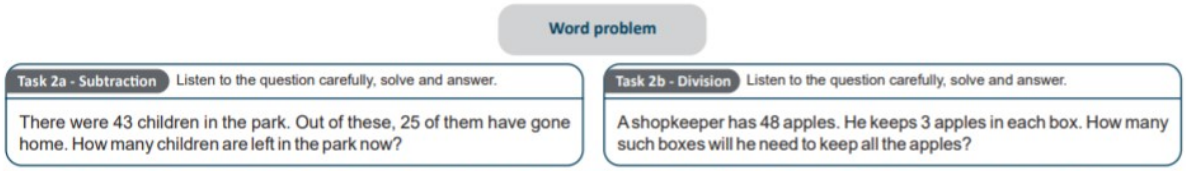
'So it will, I was forgetting.'

'I wish I would forget,' moaned Chinwe. 'Those exams hang over my head like the sword of Damocles.'

'Don't cross your bridges until you come to them,' advised Amina.

Chinwe saw the wisdom of Amina's advice. 'You're right. Amina,' she said. 'but you always are. Come on girls, there is time for one more game before break is over.'

Similarly, by Primary 4, pupils are still scoring below 60% on subtraction in the form of 78 - 29, despite this being a subskill that should be mastered by Primary 2 to align with the NERDC curriculum (Figures 5.12–5.13). Virtually no pupils were able to solve a world problem requiring division, and even Primary 5 pupils scored only 50% on the word problem requiring subtraction (Figure 5.10). As long as these gaps persist, pupils will struggle to meaningfully engage with grade-level content in their Primary school careers and beyond.



Subtraction-based and division-based word problems on the ICAN

In order to ensure that all pupils are learning at grade level, EdoBEST will continue to maximise the time that each pupil spends learning in English and maths each day. This means that each pupil will receive 10 English Reading lessons, 5 English Language lessons, and 10 Mathematics lessons each week. During these lessons, teachers will be supported to deliver high-quality instruction that builds mastery of foundational skills, offers significant opportunities for memory recall to ensure that pupils retain what they learn, and accelerates learning in order to close learning gaps. By ensuring a high frequency of English and maths instruction over time, pupils will receive sufficient learning and practice opportunities to reverse learning deprivation and to achieve true proficiency in foundational skills. This proficiency, in turn, will unlock pupils' potential to successfully participate in more rigorous grade-level content, especially in upper grades.

Looking Ahead to the 2023–24 School Year and Beyond

The impressive progress of the EdoBEST programme since its expansion to schools under the Progressive model in February 2022 has validated the ongoing investments made by Edo State in transforming its education system. Recent analyses of the EdoBEST programme have reinforced the central importance of the programme to parents and pupils in Edo State communities[16]. The evidence in this report confirms that children who had not yet received the high-quality education provided by the EdobEST programme - those in the 148 public Primary schools joining in 2022 - can quickly and significantly advance their learning when provided with the proper support. Pupils receiving the Progressive model have drastically improved their reading fluency and foundational mathematical proficiency. In addition to the main findings about learning outcomes, supplementary data collected as part of the monitoring of programme implementation – such as teacher attendance, lesson completion, and pupil attendance – provide strong signals of even greater educational success to come as the EdoBEST programme matures.

[16] Saavedra, J., & De Simone, M. E. (2023). Improving education in Edo state, Nigeria: Time to focus on learning and sustainability. [World Bank Blogs]. https://blogs.worldbank.org/education/improving-education-edo-state-nigeria-time-focus-learning-and-sustainability

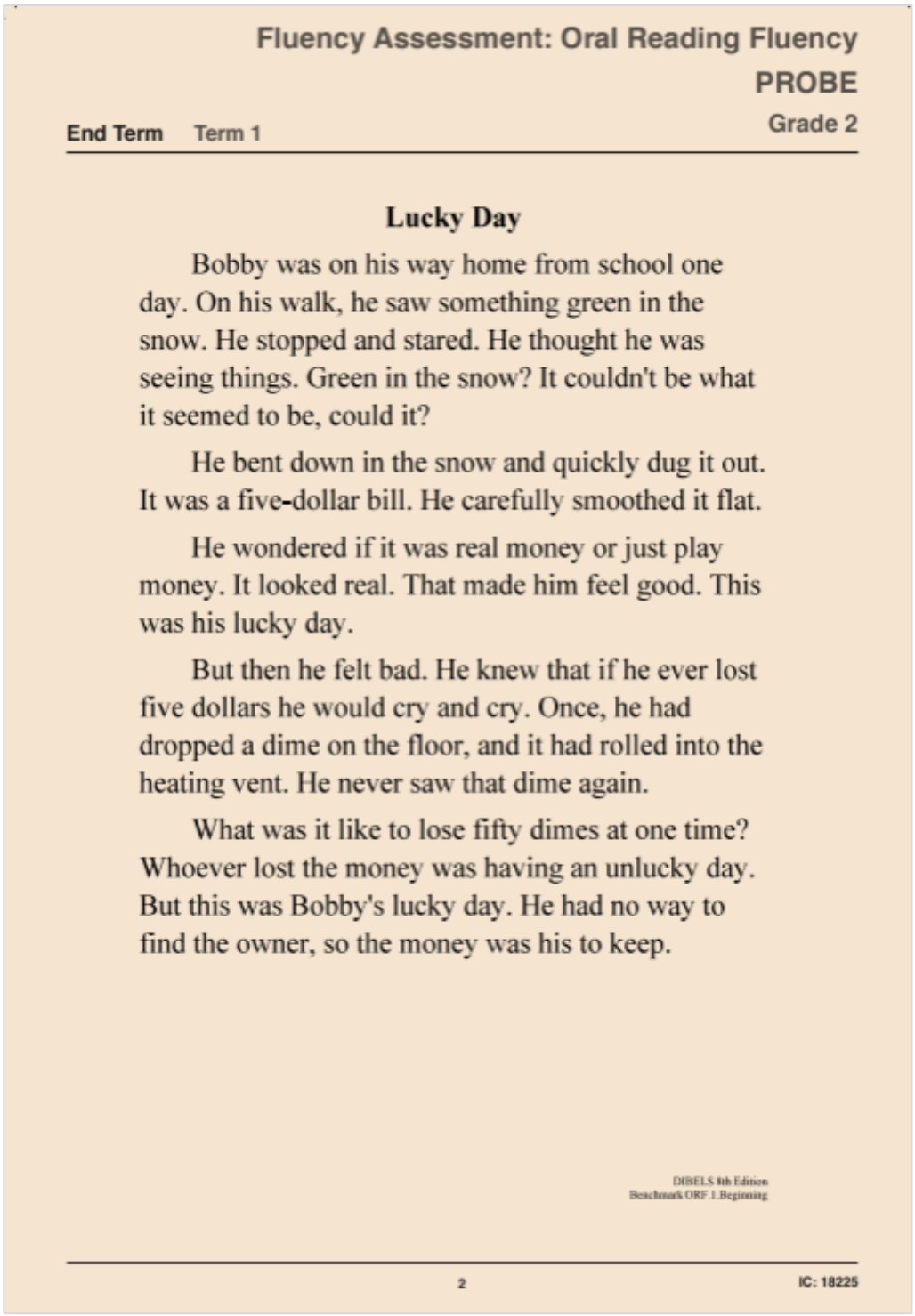
Despite the improvements observed by the end of the 2022–23 school year, more work is required to sustain these positive trends — and build upon them — in the coming years of the programme. As a data-driven programme, EdoBEST will continue to conduct similarly large-scale, rigorous evaluations for the upcoming school years as well. These rounds of data collection will give the Edo State Government further insights into the impact of the programme: what is going well, and what needs to be strengthened. Continued investments to raise lesson completion rates, pupil attendance, and learning outcomes will drastically improve the quality of teaching and learning across Edo State.

The EdoBEST programme is a bold initiative from the Government of Edo State. During its second year of operations among Progressive schools, it has enabled pupils to be on faster, higher learning trajectories than what they could have expected from non-EdoBEST 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 EdoBEST programme, Edo State will continue to provide rich, nurturing learning environments across the State, where pupils of all backgrounds will have the unprecedented opportunity to actually learn in school and thrive academically.

VII. Appendix

Appendix A: Learning Assessments Used

Primary 2 DIBELS All Pupils Passage



Fluency Assessment: Oral Reading Fluency

PROBE

End Term Term 1 Grade 2

Lucky Day

Bobby was on his way home from school one day. On his walk, he saw something green in the snow. He stopped and stared. He thought he was seeing things. Green in the snow? It couldn't be what it seemed to be, could it?

He bent down in the snow and quickly dug it out. It was a five-dollar bill. He carefully smoothed it flat.

He wondered if it was real money or just play money. It looked real. That made him feel good. This was his lucky day.

But then he felt bad. He knew that if he ever lost five dollars he would cry and cry. Once, he had dropped a dime on the floor, and it had rolled into the heating vent. He never saw that dime again.

What was it like to lose fifty dimes at one time? Whoever lost the money was having an unlucky day. But this was Bobby's lucky day. He had no way to find the owner, so the money was his to keep.

DIBELS 8th Edition
Benchmark ORF 1 Beginning

2 IC: 18225

Primary 1 Grade-level NERDC Passage

Our House

Our house is built on one plot of land in Ijede, Ikorodu. It is a bungalow. In our house there are four rooms, one living room, one kitchen, one bathroom and one store.

My parents' room is next to the living room. In their room, they have a giant-size bed and a reading table. Their wardrobe is behind the windows.

My room is next to theirs. I have a desk near the window. I keep my laptop on the desk. There are posters of my favourite singers on the wall.

My sister's room is next to mine. She has her bed in the middle of the room. On her bed is a giant-size teddy bear which she uses as a pillow.

The living room is the largest in our house. There is a complete set of furniture, with a centre table and six stools. There is also a cabinet where we put a 45-inch television and a DVD player.

The kitchen is on the other side of the living room. In the kitchen, there is a big freezer and a cabinet where dishes are kept.

Primary 2 Grade-level NERDC Passage

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.

Primary 3 Grade-level NERDC Passage

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.

Primary 4 Grade-level NERDC Passage

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.

Primary 5 Grade-level NERDC Passage

The Stone Cutter

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!'

Primary 6 Grade-level NERDC Passage

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.

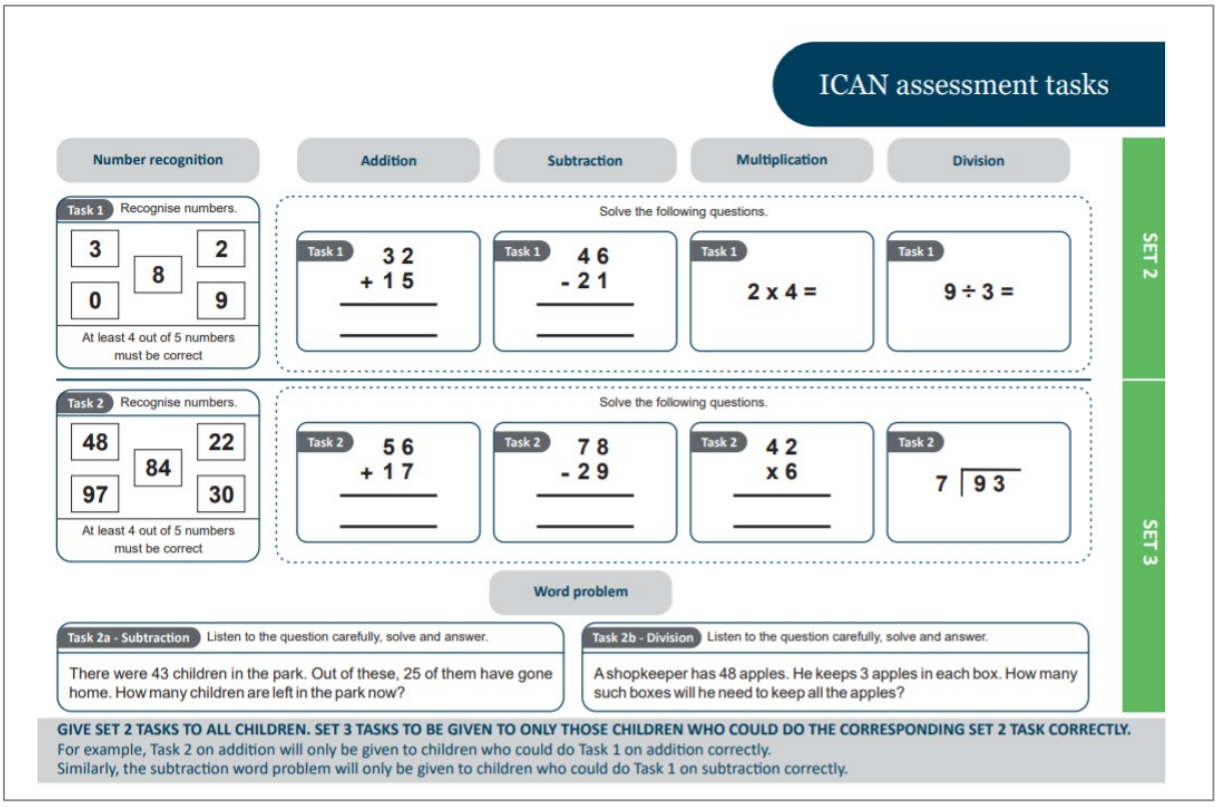
'Yes sir,' replied Chike, hanging his head. 'Then you know what it is about. It is about your mathematics results, which, according to your father, is not up to your usual standard, although it is a pass mark.' He turned a stern eye upon the boy standing before him.

'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.

All Pupils Numeracy Assessment (ICAN)



Appendix B: Tables

Table B.1: Change in fluency scores from before the start of the programme to the end of Year 1

Outcome: CWPM, Primary 2-Level Passage	Baseline Score	Endline Score	Status Quo Growth Until Next Grade	Growth From Baseline to Endline	Observed Growth During EdoBEST Progressive, Relative to Status Quo Growth in Year 1	Rate of Pupils' Progress Relative to the Status Quo
Primary 1	1.17	1.38	1.62	0.21	13%	-74%
	(4.29)	(5.94)				
Primary 2	2.79	4.81	2.04	2.02	99%	98%
	(7.11)	(11.21)				
Primary 3	4.83	10.81	5.01	5.98	119%	139%
	(8.77)	(17.48)				
Primary 4	9.84	20.24	7.92	10.40	131%	163%
	(17.75)	(34.47)				
Primary 5	17.76	34.05	15.07	16.29	108%	116%
	(25.36)	(41.1)				
Primary 6	32.83	38.48		5.65		
	(36.65)	(41.66)				

Table B.2: Change in share of pupils who are non-readers from before the start of the programme to the end of Year 1

Outcome: Non-Readers, Primary 2-Level Passage	Baseline Score	Endline Score	Status Quo Growth Until Next Grade	Growth From Baseline to Endline	Observed Growth During EdoBEST Progressive, Relative to Status Quo Growth in Year 1	Rate of Pupils' Progress Relative to the Status Quo
Primary 1	0.82	0.79	-0.10	-0.03	30%	-40%
	(0.38)	(0.41)				
Primary 2	0.72	0.59	-0.16	-0.13	81%	63%
	(0.45)	(0.49)				
Primary 3	0.56	0.40	-0.15	-0.16	107%	113%
	(0.5)	(0.49)				
Primary 4	0.41	0.37	-0.10	-0.04	40%	-20%
	(0.49)	(0.48)				
Primary 5	0.31	0.20	-0.16	-0.11	69%	38%
	(0.46)	(0.4)				
Primary 6	0.15	0.12		-0.03		
	(0.36)	(0.33)				

Table B.3: Share of questions answered correctly by pupils on the maths assessment from before the start of the programme to the end of Year 1

Outcome: Total Maths Score, (Answers Correct)	Baseline Score	Endline Score	Status Quo Growth Until Next Grade	Growth From Baseline to Endline	Observed Growth During EdoBEST Progressive, Relative to Status Quo Growth in Year 1	Rate of Pupils' Progress Relative to the Status Quo
Primary 1	0.13	0.18	0.11	0.05	45%	-9%
	(0.14)	(0.17)				
Primary 2	0.24	0.32	0.12	0.08	67%	33%
	(0.19)	(0.19)				
Primary 3	0.36	0.43	0.02	0.07	350%	600%
	(0.2)	(0.2)				
Primary 4	0.38	0.53	0.11	0.15	136%	173%
	(0.19)	(0.2)				
Primary 5	0.49	0.57	0.10	0.08	80%	60%
	(0.22)	(0.21)				
Primary 6	0.59	0.67		0.08		
	(0.23)	(0.22)				

Table B.4: Pupil numeracy assessment scores in the domain of simple addition from before the start of the programme to the end of Year 1

Outcome: Addition, Simple	Baseline Score	Endline Score	Status Quo Growth Until Next Grade	Growth From Baseline to Endline	Observed Growth During EdoBEST Progressive, Relative to Status Quo Growth in Year 1	Rate of Pupils' Progress Relative to the Status Quo
Primary 1	0.22	0.30	0.27	0.08	30%	-41%
	(0.42)	(0.46)				
Primary 2	0.49	0.65	0.24	0.16	67%	33%
	(0.5)	(0.48)				
Primary 3	0.73	0.86	0.04	0.13	325%	550%
	(0.45)	(0.35)				
Primary 4	0.77	0.92	0.10	0.15	150%	200%
	(0.42)	(0.27)				
Primary 5	0.87	0.93	0.04	0.06	150%	200%
	(0.34)	(0.25)				
Primary 6	0.91	0.95		0.04		
	(0.29)	(0.23)				

Table B.5: Pupil numeracy assessment scores in the domain of simple subtraction from before the start of the programme to the end of Year 1

Outcome: Subtraction, Simple	Baseline Score	Endline Score	Status Quo Growth Until Next Grade	Growth From Baseline to Endline	Observed Growth During EdoBEST Progressive, Relative to Status Quo Growth in Year 1	Rate of Pupils' Progress Relative to the Status Quo
Primary 1	0.09	0.17	0.17	0.08	47%	-6%
	(0.29)	(0.38)				
Primary 2	0.26	0.46	0.22	0.2	91%	82%
	(0.44)	(0.5)				
Primary 3	0.48	0.63	0.03	0.15	500%	900%
	(0.5)	(0.48)				
Primary 4	0.51	0.78	0.17	0.27	159%	218%
	(0.5)	(0.41)				
Primary 5	0.68	0.78	0.1	0.1	100%	100%
	(0.47)	(0.42)				
Primary 6	0.78	0.9		0.12		
	(0.41)	(0.3)				

Table B.6: Pupil numeracy assessment scores in the domain of simple multiplication from before the start of the programme to the end of Year 1

Outcome: Multiplication, Simple	Baseline Score	Endline Score	Status Quo Growth Until Next Grade	Growth From Baseline to Endline	Observed Growth During EdoBEST Progressive, Relative to Status Quo Growth in Year 1	Rate of Pupils' Progress Relative to the Status Quo
Primary 1	0.1	0.11	0.09	0.01	11%	-78%
	(0.3)	(0.32)				
Primary 2	0.19	0.35	0.19	0.16	84%	68%
	(0.39)	(0.48)				
Primary 3	0.38	0.51	0.03	0.13	433%	767%
	(0.49)	(0.5)				
Primary 4	0.41	0.69	0.16	0.28	175%	250%
	(0.49)	(0.47)				
Primary 5	0.57	0.71	0.16	0.14	88%	75%
	(0.5)	(0.45)				
Primary 6	0.73	0.88		0.15		
	(0.44)	(0.33)				

Table B.7: Pupil numeracy assessment scores in the domain of simple division from before the start of the programme to the end of Year 1

Outcome: Division, Simple	Baseline Score	Endline Score	Status Quo Growth Until Next Grade	Growth From Baseline to Endline	Observed Growth During EdoBEST Progressive, Relative to Status Quo Growth in Year 1	Rate of Pupils' Progress Relative to the Status Quo
Primary 1	0.05	0.06	0.03	0.01	33%	-33%
	(0.21)	(0.24)				
Primary 2	0.08	0.12	0.14	0.04	29%	-43%
	(0.28)	(0.33)				
Primary 3	0.22	0.34	-0.01	0.12	-1200%	-2500%
	(0.42)	(0.48)				
Primary 4	0.21	0.47	0.25	0.26	104%	108%
	(0.41)	(0.5)				
Primary 5	0.46	0.63	0.12	0.17	142%	183%
	(0.5)	(0.48)				
Primary 6	0.58	0.66		0.08		
	(0.5)	(0.48)				

Table B.8: Average fluency gains in correct words per minute and average foundational numeracy gains in percentage points year-over-year, by grade

Grade	P1	P2	P3	P4	P5
Fluency	1.8 cwpm/yr	0.4 cwpm/yr	2.6 cwpm/yr	3.2 cwpm/yr	7.3 cwpm/yr
Numeracy	4.7 pp/yr	2.9 pp/yr	6.1 pp/yr	6.9 pp/yr	6.3 pp/yr

Table B.9: Learning gains from projected baseline (June/July 2021) to Endline 2 (June/July 2023)

Outcome	P1	P2	P3	P4	P5	All
Correct Words Per Minute (CWPM) (Grade 2 Passage)	5.12	0.18	6.93	8.30	15.18	5.93
	(1.14)	(0.02)	(0.77)	(0.5)	(0.6)	(0.37)
Share of Non-Readers (Grade 2 Passage) (Percentage)	-9.23	5.08	-8.86	-8.26	-14.89	-5.95
	(-0.23)	(0.11)	(-0.18)	(-0.17)	(-0.33)	(-0.12)
Correct Words Per Minute (CWPM) (Grade Level Passage)	5.39	-0.27	7.00	7.78	12.32	5.39
	(1.28)	(-0.05)	(0.63)	(0.5)	(0.43)	(0.32)
Share of Non-Readers (Grade Level Passage)(Percentage)	-8.97	3.11	-8.83	-9.78	-12.52	-6.22
	(-0.22)	(0.06)	(-0.18)	(-0.2)	(-0.28)	(-0.13)
Simple Addition (Percentage)	18.24	9.70	16.31	12.01	8.38	12.96
	(0.46)	(0.19)	(0.36)	(0.28)	(0.25)	(0.27)
Simple Multiplication (Percentage)	10.63	10.55	28.95	28.05	26.52	18.95
	(0.36)	(0.27)	(0.6)	(0.57)	(0.53)	(0.41)
ICAN Total Score (Percentage)	11.73	6.35	17.39	18.38	17.18	13.13
	(0.8)	(0.35)	(0.89)	(0.99)	(0.76)	(0.58)
Foundational Numeracy (Percentage)	19.60	12.72	32.20	31.15	23.20	22.36
	(0.8)	(0.32)	(0.66)	(0.62)	(0.49)	(0.48)

Notes: The first row for every outcome is the treatment effect in absolute units, and the second row (number in parentheses) is the treatment effect in SD units.

Appendix C: Additional Figures

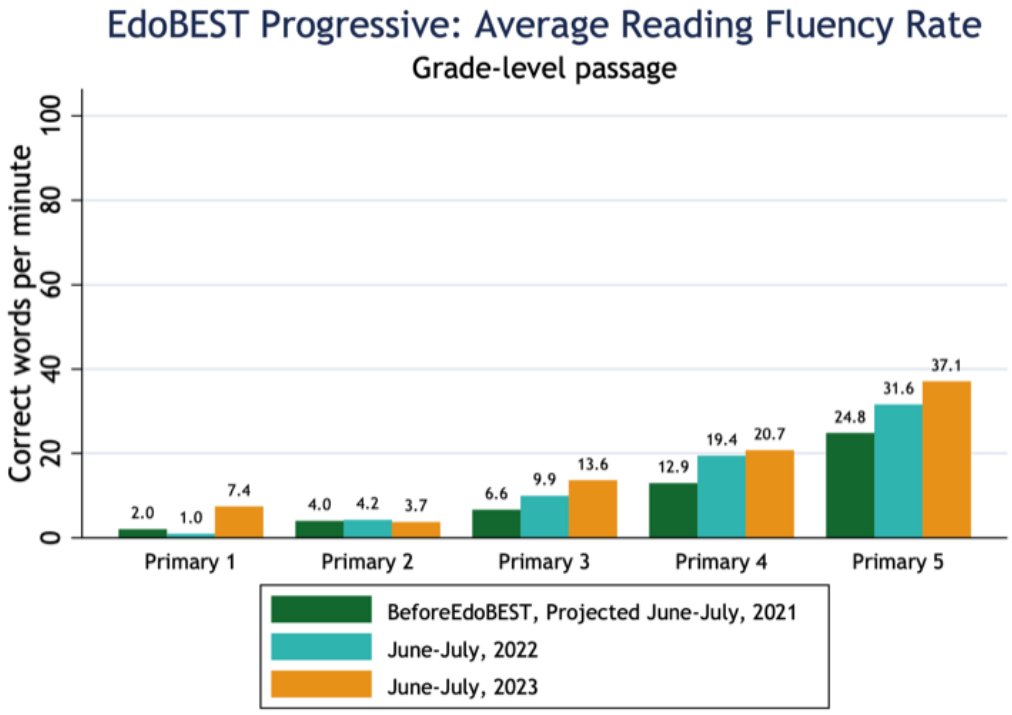


Figure C.1

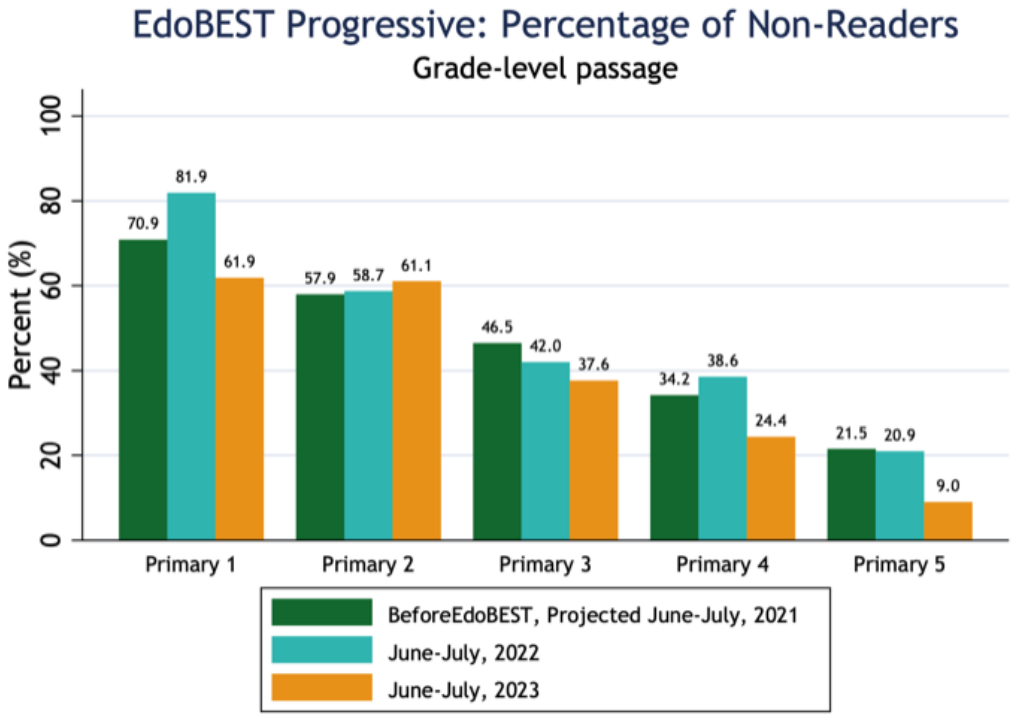


Figure C.2

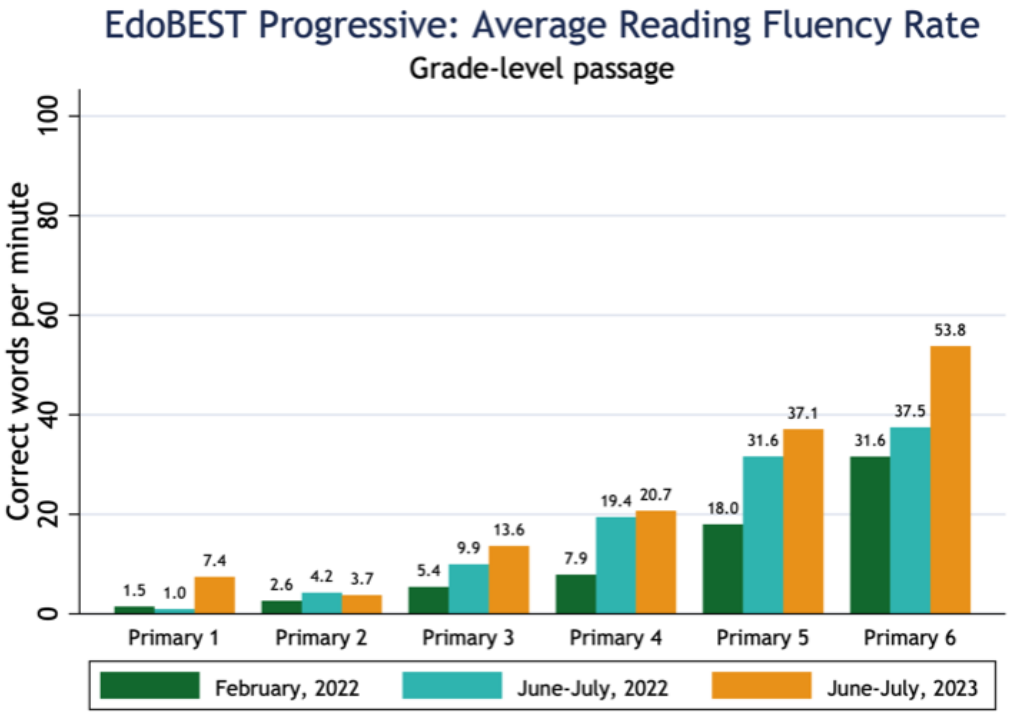


Figure C.3

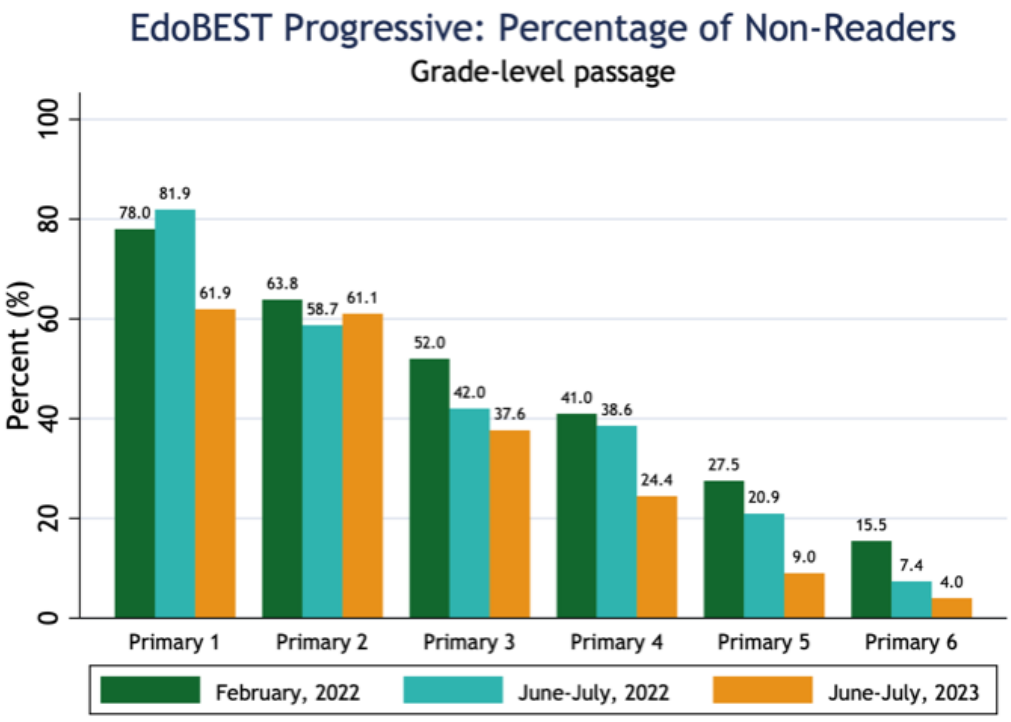


Figure C.4

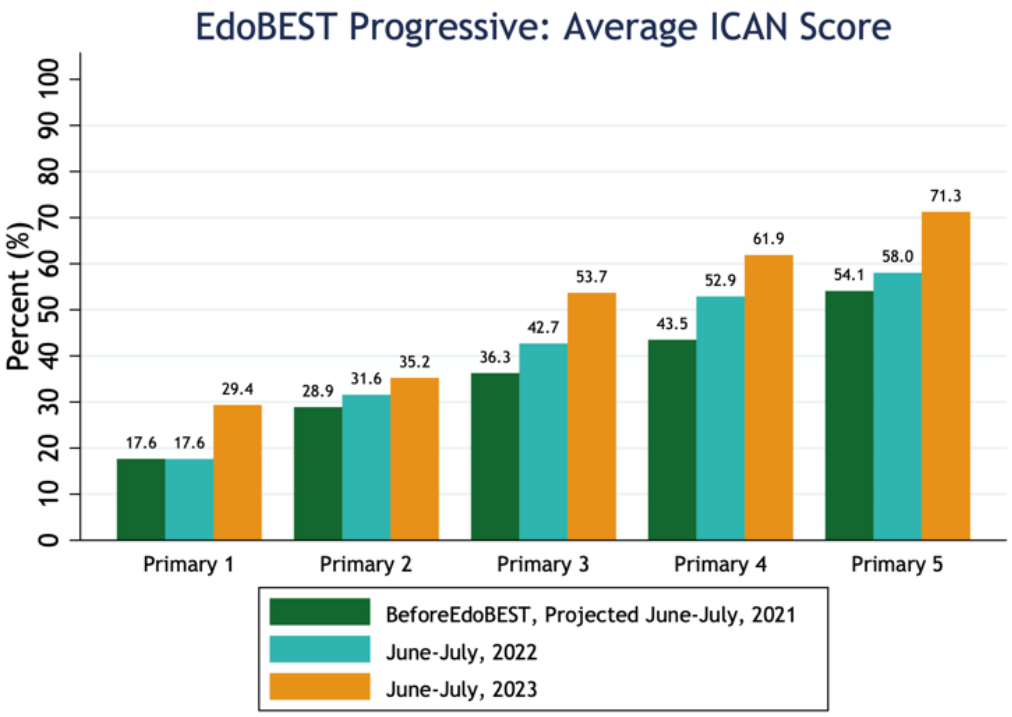


Figure C.5

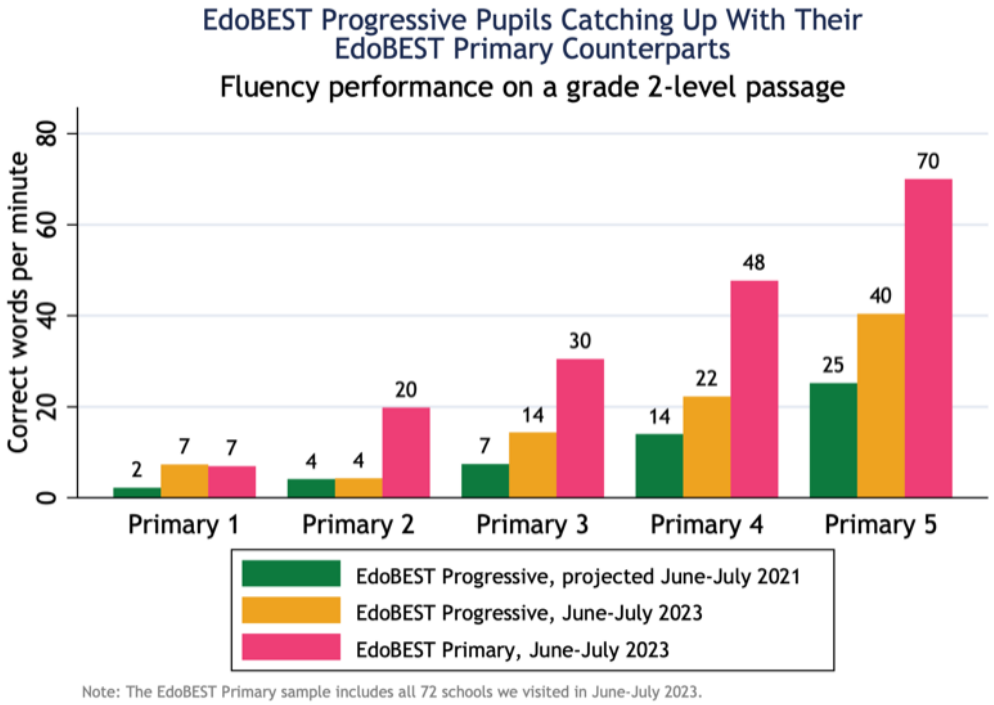


Figure C.6

Appendix D: Lists of Assessed Schools

List of Randomly Selected Sample Schools

LGA	School Name
Etsako Central	Agbazi School
Etsako Central	Migrant Fishermen (Udochi) School
Etsako Central	Odame School
Etsako Central	Utsuko School
Esan Central	Ekilor School
Esan Central	Idumosa School
Esan Central	Oghagbo School
Esan Central	Ujosanlen School
Akoko Edo	Agbaneshumu School
Akoko Edo	Akpiasa School
Esan North East	Alhaji Camp. Mig. School
Esan North East	Unuwazi School
Ovia South West	Binidodogha, Binidodogha School
Esan South East	Eko-Oghenyen, Ubiaja School
Esan South East	Ibhiadan, Ohordua School
Esan South East	Idumijie, Ewehimi School
Esan South East	Island, Ifeku School
Esan South East	Migrant Pfc, Alla-Ojielayi School
Esan South East	Odoh, Ugboha School
Esan South East	Pastoral, Osuan School
Ovia North East	Ehiaghe, Isuwa School
Ovia North East	Obanosa, Iyekeze School
Ovia North East	Omozogie School
Ovia North East	Osunde, Egboha School
Owan West	Atoruru School
Owan West	Crin School
Owan West	Ebira Nomadic Peasant School School
Owan West	Ekweran Nomadic Peasant School School
Owan West	Owara School
Owan West	Ugbedu Nomadic Peasant School School
Owan West	Ukato Nomadic Peasant School School
Ovia South West	Aifesoba (Iguobazuwa) School
Ovia South West	Bakpolor School
Ovia South West	Iguosa School
Ovia South West	Obahiagbon School

LGA	School Name
Ovia South West	Obobaifo School
Ovia South West	Ogboe School
Ovia South West	Oha, Evbareke School
Esan South East	Iselu, Ewehimi School
Esan South East	Migrant Pfc, Okpatawa School
Esan South East	Uokhen, Ohordua School
Egor	Ukpera School
Esan West	Ebute School
Esan West	Oraede-Ole School
Esan West	Uke School
Owan East	Agolawani School
Owan East	Eaka Nomadic School
Owan East	Ekhaese Nomadic School
Owan East	Otuajabor School
Owan East	Ugbada Nomadic School
Owan East	Yisa Camp Nomadic School
Oredo	Eweka, Egbiri School
Oredo	Ogiso (Oredo) School
Oredo	Okunbor, Evbuoekhae School
Etsako East	Amughe School
Etsako East	Ikpeli School
Etsako East	Itinerant Noom School
Ovia South West	Ofumwengbe, Iguokakhen School
Orhionmwon	Abe School
Uhunmwode	Ebuehi School
Uhunmwode	Ekhoniro School
Uhunmwode	Erhiborhibo School
Uhunmwode	Oba Ewuare 2 (Uhunmwode) School
Etsako West	Ikiroda School
Ovia North East	Ewudu School
Ikpoba Okha	Oketia School

List of Back-up Sample Schools

LGA	School Name
Ovia South West	Dauyomo, Ejide Waterside School
Esan West	Ukhun School
Igueben	Ujielu School
Igueben	Ijieduma School
Esan South East	Uriwa, Ohordua School
Ovia South West	Okhoro School
Akoko Edo	Eshawa School
Akoko Edo	Ipaala School
Akoko Edo	Iretutu School
Esan South East	Orowa, Oroma School
Ovia South West	Izide-Noke School
Ovia South West	Uba School
Ovia South West	Okoro School
Oredo	Oroma-Amagba School
Esan South East	Idumuguokha, Ewehimi School
Esan Central	Normadic School
Ovia South West	Igbinoba, Asamara School
Ovia South West	Akugbe, Igueze School
Esan South East	Uzebu, Ewehimi School
Oredo	Umegbe School
Esan South East	Ukhanlen, Ubiaja School
Akoko Edo	Ayanran (Annex) School
Ovia North East	Osaro (Igbekhue) School
Etsako Central	Naboya School
Esan Central	Udomi School

Appendix E: Hasbrouck-Tindal Reading Fluency (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 during their Primary experience[17]. 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.

Oral Reading Fluency Norms (Correct Words per Minute)				
	25th percentile	50th percentile	75th percentile	Median average weekly improvement
Primary I	34	60	91	2.0
Primary II	72	100	124	1.6
Primary III	91	112	139	0.9
Primary IV	105	133	160	1.2
Primary V	119	146	169	0.8

[17] Hasbrouck, J. & Tindal, G. (2017). *An update to compiled ORF norms* (Technical Report No.1702). Eugene, OR, Behavioral Research and Teaching, University of Oregon.

Appendix F: 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 pupil 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"[18] threshold. 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:

[18] By design, this threshold is formed from a lenient definition of the level of proficiency pupils 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 pupils would achieve this skill by the grade level designated by the GPD. Since the GPD describes the minimum level of skill a pupil can demonstrate that is still considered sufficient, it is likely that a significant proportion of pupils at this grade level would have stronger proficiency.

ICAN Skill	Sample Problem	Grade-Level Expectation According to GPF	Rationale[19]
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	G1-2	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 = ____	G2	G2: N1.3.1_M Add and subtract within 20 (i.e., where the sum or minuend does not surpass 20), and epresent 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 = ____	G3	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 =____	G2	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 = ____	G3	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 = ____	G3	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 = ____	G5	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 = __).
Simple division: Exact, one-digit short division with no remnant	9 ÷ 3 = ____	G3	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 = ____	G6	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	G5	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 =____	G6	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 = ____	G6	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 = ____	G7	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?	G4	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?	G5	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?	G5	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).

[19] 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

Appendix G: A Detailed Overview of the Cross-Grade Ability Grouping Protocol for EdoBEST Progressive 2023-'24

What are ability groups?

EdoBEST Progressive schools place pupils in ability groups, which allows them to learn at the right level. These ability groups help teachers provide differentiated support to pupils with similar learning levels. It also helps pupils to be more successful in their syllabus-aligned afternoon lessons through the building of fundamental competencies that prepare them for grade-appropriate material. Pupils who are struggling receive more foundational literacy and numeracy support, while pupils who are excelling are challenged with more rigorous literacy and numeracy instruction.

Schools assign pupils to 3 groups or fewer for Preparatory English and Preparatory maths lessons. Each group has a name that indicates the performance levels of pupils within that group. Head teachers, teachers, and Learning Development Officers (LDOs) are trained to always refer to groups by their name and not by "low-", "middle-", or "high-performing". Removing the stigma associated with identification by ability level is imperative for maintaining pupil morale and positive community perception.

The following are the names of each group:

Levels: Preparatory English

Lowest-performing: Aspire group

Middle-performing: Succeed group

Top-performing: Flourish group

Levels: Preparatory Maths

Lowest-performing: Orange group

Middle-performing: Yellow group

Top-performing: Green group

Teacher Assignment	Class Group	Preparatory Maths	Preparatory English
P1	Primary 1 and 2	Orange	Aspire
P3	Primary 3 and 4	Yellow	Succeed
P5	Primary 5 and 6	Green	Flourish

LDO, teacher, and head teacher training

All Learning Development Officers (LDOs) will receive a single-session training on how to administer a diagnostic assessment in order to group pupils. To ensure programmatic buy-in and sustainability, the LDOs will cascade this training to the head teachers on how to administer the diagnostic test, group pupils, create the master list, communicate to the teachers who are expected to teach each group, and determine what the daily timetable entails.

Together, the LDOs and head teachers will assess pupils, sort pupils, and monitor the programme. If the LDO is unable to visit the school in person because of accessibility or security issues, the head teacher will conduct the assessment and group the pupils while the LDO supports the head teacher virtually.

The diagnostic assessment and grouping schedule

During the first weeks of school, the LDO and the head teacher will implement the grouping process over the course of two days. After the sorting process is complete, the LDO and head teacher will explain the groups and which pupils go where using the Group List.

Any pupil who joins an EdoBEST Progressive school after the diagnostic period during the 2023–24 school year, or who was absent on the day of the assessment, will need to take the Preparatory Maths and Preparatory English assessment to determine their level. The LDO and head teacher will administer these assessments and decide which groups the pupil should be assigned to. Once this assignment is done, the Master List, Group List, and Leaving Lists will be updated (see the steps to take in the sections below).

Dissemination of the master list

All LDOs will be supported by the Progressive schools' head teachers in creating a new Master List in Term 1, 2023–24. Each LDO will share a photo of the Master List from their schools. Photos will be shared within the first two weeks of resumption of the academic year. The collation of the photos will be coordinated by the Progressive schools' Senior Regional Manager.

Drafting and sharing the teacher assignment sheet

Also within the first two weeks of the new school year, all LDOs will fill out the teacher assignment sheet for each of the schools in their cohorts. The numeracy lessons on the daily timetable will be updated using the teacher assignment sheet within the third and fourth weeks of the year. The filling of the teacher assignment sheet will be coordinated by the Progressive schools' Senior Regional Manager, while the Regional Academics department will be responsible for updating the daily timetable.

Support provided by field officers

Field Officers will help to ensure that teachers are teaching pupils in their different ability groups and that pupils are learning in their right groups. LDOs and Quality Assurance Officers (QAOs) will do a roll call for pupils in both the Preparatory maths and Preparatory English groups in every Progressive school they visit. They will use the Master List to call on and check to ensure that pupils are learning in their assigned groups. LDOs and QAOs will also support the practice of ability grouping by ensuring that pupils transition to their various groups when expected.

Criteria for preparatory English assessment and grouping

The LDO and head teacher, or only the head teacher (if the LDO is unable to visit the school because it is hard to reach), will administer a fluency assessment to each pupil to determine their placement in 1 of these groups:

Preparatory English	
Aspire	≤ 10 CWPM
Succeed	11-30 CWPM
Flourish	≥ 31 CWPM

Pupils will read a passage for 1 minute while the assessor tallies errors. A pupil's score is the number of words read correctly in 1 minute. Correct words per minute (cwpm) is a universal metric for determining fluency. Low cwpm scores indicate that pupils are still decoding individual sounds or lack decoding strategies altogether. High scores demonstrate that pupils can recognise words instantaneously. Automatic word recognition is a strong predictor of comprehension and indicates that pupils can read at the level of the passage or higher.

In many other contexts, assessors collect fluency scores with a passage via the Early Grade Reading Assessment. This passage is levelled at Primary 2, as is the passage selected for the EdoBEST Progressive schools fluency assessment. A passage written at this level employs basic sentence structure (limited clauses and no complex sentences), simple syntax (predictable word order), high-frequency vocabulary (no obscure words), and an array of phonemes and irregular words that pupils are expected to have learned by Primary 2. For this reason, a Primary 2-level passage is a reasonable threshold for discriminating between pupils who still need foundational phonics instruction, and pupils who have enough skills to access the text and who can improve without remediation.

The NewGlobe fluency assessment text is an adaptation of a passage from the Primary 2 literacy textbook that pupils with the highest scores will use this term. If pupils can read a text from this Primary 2 book to a high-enough degree of fluency (31+ cwpm), they will be placed into the group "Flourish" and use this Primary 2 book.

Pupils who score lower than 31 cwpm and therefore cannot use the Primary 2 book will be placed into either the "Aspire" or "Succeed" groups. Pupils who score 10 cwpm or lower lack basic decoding strategies and need foundational phonics support at its earlier stages, indicating their placement in the "Aspire" group is optimal. Pupils who score between 11 and 30 cwpm also need foundational phonics support, but have enough letter-sound correlation knowledge that it is not necessary to start them with this introductory skill. Instruction for all three groups will target the most critical skill sets (phonemic awareness & phonics, fluency, vocabulary, and comprehension) and generate marked improvement in each one by the end of the term.

Criteria for preparatory maths assessment and grouping

For Preparatory Maths, the LDO and head teacher will administer a print-based assessment. The first assessment is the "Yellow Test" and covers topics of counting and addition. If a pupil misses any question on the Yellow test, they are placed into the Orange group. If a pupil answers all the questions correctly on the Yellow Test, they move on to the "Green Test". The Green Test covers more complex counting concepts, mental maths, number words, and subtraction. If a pupil answers all the questions correctly on the Green Test, they are placed into the Green group. If a pupil misses one question, they are placed in the Yellow group. The following is a more precise breakdown:

Preparatory Maths Group	Level	Placement Decision
Orange	Low	Fails Yellow test
Yellow	Medium	Passes Yellow test, fails Green test
Green	High	Passes Green test

Preliminary list-making

The LDO and head teacher will put together a preliminary list while assessing pupils. The preliminary list will contain each pupil's name, current grade level, Preparatory English Group assignment, and Preparatory maths Group assignment. This preliminary list will be used in order to determine which groups should be offered at the school, as well as which pupils should be assigned to these groups. However, since this list is designed to be preliminary, some groups and assignments may change after the LDO and head teacher further examine the distribution of pupils across ability groups.

Grade	Pupil Name	Prep English	Prep Maths
1	Pupil 1	Aspire	Orange
1	Pupil 2	Succeed	Orange
1	Pupil 3	Aspire	Yellow
2	Pupil 4	Aspire	Orange
2	Pupil 5	Succeed	Yellow
2	Pupil 6	Succeed	Green
3	Pupil 7	Flourish	Orange
3	Pupil 8	Aspire	Yellow
3	Pupil 9	Flourish	Green
4	Pupil 10	Flourish	Yellow

Assessment day

On the day of assessment at each EdoBEST Progressive school, there will be one LDO working with the head teacher. The LDO is responsible for Primary 1, 2, and 3, while the head teacher is responsible for Primary 4, 5, and 6. After testing, the LDO and the head teacher will come together with their preliminary lists to finalise groups. As previously stated, the LDO will support the head teacher virtually if not physically present in the school while the head teacher finalises the groups for Primary 1 to 6 pupils.

Logistics of grouping with efficiency

The 3 preliminary lists may result in groups that have disproportionately fewer pupils. This is not a good use of teacher resources, and the LDO and head teachers should thus re-sort pupils in these instances. For example, if the Green Preparatory maths group has 6 pupils, while the Orange Preparatory maths group has 20 pupils, and the Yellow Preparatory maths group has 50 pupils, it is probably best to drop the Green Group. The 6 Green-group pupils should move to the Orange group to create a total of 26 pupils, and there should then be 2 Yellow groups containing 25 pupils total. In this example, Yellow Group 1 should be composed of the 25 youngest pupils and assigned to the P1–2 teacher, while Yellow Group 2 should be composed of the 25 eldest pupils and assigned to the P3–4 teacher. The Orange group should be assigned to the P5–6 teacher.

Below is an example of some Preparatory maths groups:

Situation	Groups	Classroom Assignments	What Happens to Pupils in Dropped Group?
Even numbers in each group	Orange, Yellow, Green	P12 - Orange; P34 - Yellow; P56 - Green	NA
Many pupils in Green, most others in Orange	Orange, Green 1, Green 2	P12 - Orange; P34 - Green 1; P56 - Green 2	Yellow group pupils to Orange group
Many pupils in Green, most others in Yellow	Yellow, Green 1, Green 2	P12 - Yellow; P34 - Green 1; P56 - Green 2	Orange group pupils to Yellow group
Many pupils in Yellow, most others in Green	Yellow 1, Yellow 2, Green	P12 - Yellow 1; P34 - Yellow 2; P56 - Green	Orange group pupils to Yellow 1 group
Many pupils in Yellow, most others in Orange	Orange, Yellow 1, Yellow 2	P12 - Orange; P34 - Yellow 1; P56 - Yellow 2	Green group pupils to Yellow 2 group
Many pupils in Orange, most others in Yellow	Orange 1, Orange 2, Yellow	P12 - Orange 1; P34 - Orange 2; P56 - Yellow	Green group pupils to Yellow group
Many pupils in Orange, most others in Green	Orange 1, Orange 2, Green	P12 - Orange 1; P34 - Orange 2; P56 - Green	Yellow group pupils to Green group

Dropping a group may also be necessary during the Preparatory English grouping process. The following is an example of how that could work:

Situation	Groups	Classroom Assignments	What Happens to Pupils in Dropped Group?
Even numbers in each group	Aspire, Flourish, Flourish	P12 - Aspire; P34 - Succeed; P56 - Flourish	NA
Many pupils in Flourish, most others in Aspire	Aspire, Flourish 1, Flourish 2	P12 - Aspire; P34 - Flourish 1; P56 - Flourish 2	Succeed group pupils to Aspire group
Many pupils in Flourish, most others in Succeed	Succeed, Flourish 1, Flourish 2	P12 - Succeed; P34 - Flourish 1; P56 - Flourish 2	Aspire group pupils to Succeed group
Many pupils in Succeed, most others in Flourish	Succeed 1, Succeed 2, Flourish	P12 - Succeed 1; P34 - Succeed 2; P56 - Flourish	Aspire group pupils to Succeed 1 group
Many pupils in Succeed, most others in Aspire	Aspire, Succeed 1, Succeed 2	P12 - Aspire; P34 - Succeed 1; P56 - Succeed 2	Flourish group pupils to Succeed 2 group
Many pupils in Aspire, most others in Succeed	Aspire 1, Aspire 2, Succeed	P12 - Aspire 1; P34 - Aspire 2; P56 - Succeed	Flourish group pupils to Succeed group
Many pupils in Aspire, most others in Flourish	Aspire 1, Aspire 2, Flourish	P12 - Aspire 1; P34 - Aspire 2; P56 - Flourish	Succeed group pupils to Flourish group

In some instances, pupils may require the ability to move up a group, while in others, they may be required to move down a group. Although not ideal, this is a necessary allowance to ensure the correct balance of pupil-teacher ratio and levelling is maintained.

Furthermore, the dropping of groups will not happen at all schools. This will take place only at schools where an imbalancing number of pupils are placed into a specific group. Dropping of groups may also happen only in Preparatory Maths, but not in Preparatory English at some schools and vice versa. The LDOs will make the final call on whether or not a group needs to be dropped and how to then re-sort pupils. If the LDO is not present in the school, this decision will be made virtually.

Finalising lists

Once the preliminary lists have been revised to accommodate any removal of groups and resorting of pupils, 3 permanent lists will be made: the Master List, Group List, and Leaving List. These 3 lists will ensure head teachers, teachers, and pupils know where to be during the Levelled Preparatory Maths and Levelled Preparatory English lessons that occur each day. It will also ensure that any LDO and QAO who visits an EdoBEST Progressive school is equipped to ensure the programme is functioning properly.

Master List

The Master List is a single paper that includes each group, each pupil assigned to a group, and each pupil's original grade for Preparatory English and for Preparatory Maths. This paper is created for the head teacher's use and records. Here is an example of what this Master List could look like:

Prep Maths			Prep English		
Orange	Yellow	Green	Aspire	Succeed	Flourish
Kemi (P1) Sam (P3)	Levi (P2) Rachel (P4)	Chika (P6) Blessing (P6)	Kemi (P1) Levi (P2)	Sam (P3) Rachel (P4)	Chika (P6) Blessing (P6)

Group List

The Group List is a single list for each ability group. For Preparatory English, there should be a list for the Aspire Group, Succeed Group, and Flourish Group, and for Preparatory Maths, there should be a list for the Orange Group, Yellow Group, and Green Group. Each teacher will have 2 Group Lists, so there are 6 Group Lists in total. Here is an example of what 1 of the 6 Group Lists could look like:

Flourish Group (P56 classroom)
Taiwo (P4) Kehinde (P5) Blessing (P5) Freedom (P6) Ayo (P6)

Leaving List

The Leaving List is a single list for each classroom showing which pupils leave the grade-level classroom for ability groups. Each teacher will have 1 Leaving List, so there will be 3 Leaving Lists in total. For the P5–6 teacher, their list will have which pupils will go to the P1–2 classroom and which will go to the P3–4 classroom:

P56 CLASSROOM			
Leaving for Prep English		Leaving for Prep Maths	
Goes to P12	Goes to P34	Goes to P12	Goes to P34
Peter Ajayi	Kunle Folarin	Kunle Folarin	Peter Ajayi
Joy Nwafor	Adesuwa Osagie	Joy Nwafor	Adesuwa Osagie

Note: Once the Master List, Group Lists, and Leaving Lists have been finalised, the preliminary list should be disposed of.

Appendix H: Collecting Qualitative Data in EdoBEST Progressive (April 2023)

Purpose and framing

The goal of this exercise is to understand what went well during the first two years of the EdoBEST Progressive programme, and what did not.

We understand that there may have been some operational challenges throughout this instructional period in addition to the programme's successes. As we collect qualitative data, we do not want to prime respondents against any particular issue. Instead, we want to hear their candid opinions and the specific issues that, in their view, were the most significant hindrances to achieving smoother programme implementation.

The questions below are not intended to be fully scripted. While interviewers should try to cover as much ground as possible, a key to collecting in-depth data via interviews is making the interviews "flow" by avoiding a feeling of "call-and-response" (i.e., jumping from one question to the next without any follow-ups). In other words, these questions are not meant to be asked with one-after-another immediacy. Instead, they serve as a guide to the conversations that should be brought up, but the interviewer should also feel free to ask follow-up questions and pursue tangents if these appear to be fruitful sources of information.

Throughout the conversation, the interviewer should make sure to take detailed notes. If the interview allows AND the interviewer feels that this will not bias responses, they should feel free to record the conversation. Otherwise, detailed notes, quotes, and any other helpful evidence/opinions that might be produced should be documented.

How to start the interview

The following paragraph serves as a potential guide for how the interviewer may want to frame the conversation from the start. This paragraph should NOT be read verbatim. However, the main points should be understood and then relayed to each interviewee at the beginning of each conversation:

"Thank you for your help today. We are working on understanding how the current instructional period of the EdoBEST Progressive programme went — both the positive things, and the things that still need improvement. None of this conversation is a test, and none of your responses will be used against you in any way! In fact, we are looking for your very honest opinion on how the Progressive programme could be improved further — what areas you struggled with, and what areas were not working at all. Any questions before we get started? Is it okay if I note your name, grades taught last semester, and the school where you work?"

Questions for teachers:

1. First, what are your general impressions about the Progressive programme?
2. Do you think that there are parts of the programme that are a clear improvement relative to before?
3. Were you trained in the methodology for the Progressive programme? If so, how helpful do you think it is to teach Progressive-level material?
4. How closely have you been following the methodology that you were trained on? Do you (1) follow the lesson guides closely, do you (2) use it as just some support but you can improvise/go "off script" sometimes, or do you (3) not use it at all?

5. What issues, both about the programme or from outside of it (e.g., like in your school) were the most problematic in terms of incorporating the Progressive methodology into your teaching? Even if you wanted to use this programme as you were trained on, what makes it hard to do so?

6. Did your school leader or your supervisor encourage you to engage with the programme? What do you think their attitudes towards the programme were?

7. If you could ask for 2 or 3 things to ensure that you implement this programme properly, what would they be? What could be improved by next year to make you either use the techniques more, or to ensure that you are more effective in using these techniques?

Sample data collection

We suggest that the collection of the data happens in an orderly and systematic manner. To do this, Priscilla Lu can support with the set-up of a spreadsheet with the following structure (where there is one tab for teachers, one for head teachers, one for supervisors, etc.):

For teachers

Question	Respondent 1 Name: (if available) School: (if available) Grades taught last year: (if available)	Respondent 2 Name: (if available) School: (if available) Grades taught last year: (if available)	Respondent 3 Name: (if available) School: (if available) Grades taught last year: (if available)
Question 1	Response	Response	Response
Question 2	Response	[Not discussed]	Response
Question 3	Response	Response	[Not discussed]
Question 4	[Not discussed]	Response	Response
Questions 5	Response	[Not discussed]	Response
Questions 6	Response	[Not discussed]	Response
Question 7	[Not discussed]	Response	Response
Other comments	[Add here additional comments from the respondent]	[Add here additional comments from the respondent]	[Add here additional comments from the respondent]
Interviewer observations	[Add here any observations from the interviewer – what was the tone of the conversation? Hostile? Did they seem to really dislike the programme? Were they frustrated with certain aspects of the educational system, either within or outside of the programme? Did they seem sincere/insincere in their dislike/praise of the programme?]	[Add here any observations from the interviewer – what was the tone of the conversation? Hostile? Did they seem to really dislike the programme? Were they frustrated with certain aspects of the educational system, either within or outside of the programme? Did they seem sincere/insincere in their dislike/praise of the programme?]	[Add here any observations from the interviewer – what was the tone of the conversation? Hostile? Did they seem to really dislike the programme? Were they frustrated with certain aspects of the educational system, either within or outside of the programme? Did they seem sincere/insincere in their dislike/praise of the programme?]

Ideally, after each interview, we suggest that the interviewer either takes a few minutes to add all their notes to a new column, or at the very least, that they process their notes either on paper or in the spreadsheet in such a way that they can come back to the spreadsheet later on and have a clear memory of everything that was discussed.

As shown in the example above, it is not necessary for there to be an answer for every question from every participant. Although the interviewer should aspire to cover a lot of ground with each respondent, they should not sacrifice candour and in-depth discussions to achieve a more superficial coverage of all questions.

Finally, the interviewer should also take a few minutes to meditate about the subjective feel of the interview and of the respondent's attitude towards the programme. Any "vibe" that was not able to be transmitted through the other, more concrete questions should be incorporated into this section. Then, interviewers will include this information in the last row of the spreadsheet for as many interviewees as possible.

Appendix I: An Overview of the Data Quality Assurance Protocol

Context

Foundational literacy and numeracy (FLN) skills amongst children in any given education system are integral to their success, both within their academic careers and in their everyday lives. Proficiency in these two fundamental sources of knowledge can be used as a measure of overall education quality, but it is something that is often lacking in pupils attending schools in low- and middle-income countries (LMIC). Transforming this distressing reality is a direct focus of NewGlobe's government-partnered education reform strategies. However, bringing pupil competencies in these core skills up to ideal levels necessitates that those competencies be properly assessed and measured before, during, and after our programmatic interventions.

To achieve this, we use internationally validated assessments that contextualise where pupil learning levels are within the broader scope of where they need to be. Pupils are scored based on the number of correct responses they provide, and the number of incorrect responses is also recorded. For literacy, we use two types of assessment passages provided by Dynamic Indicators of Basic Early Literacy Skills (DIBELS), which is widely regarded by researchers as an effective literacy measurement procedure. These passages work in tandem to provide insight into oral reading fluency (ORF), the sub-skill most strongly correlated with others on the path towards reading proficiency, and reading comprehension, the ultimate goal of literacy skills. The first assessment is a grade 2 passage, which all pupils (regardless of grade level) read, and the second is a grade-level passage tailored specifically to each pupil's respective grade. For both, pupils are scored based on the number of correct words per minute (cwpm), and incorrectly read words are also recorded. In order to assess pupil numeracy skills, we use the International Common Assessment of Numeracy (ICAN), which aligns with global standards for monitoring learning progress in LMIC, and tests pupils on the core skills of number recognition, addition, subtraction, multiplication, and division. With these tools, we can benchmark pupils' learning levels based on their assessment scores, and thus precisely target our efforts to help them improve.

Furthermore, given that these assessments are what underpins some of the major policy decisions needed to benefit pupils to the greatest extent possible, it is vital that the data gathered from them are current and reliable. Therefore, to ensure efficient turnaround and accuracy of assessment scores, NewGlobe dispatches trained enumerators to administer the assessments in the schools our organisation serves. Enumerators are responsible for recording and reporting assessment scores with the utmost precision. In turn, NewGlobe is responsible for effectively monitoring these enumerators' output, to ensure that there are no observances permitted that may compromise the reliability of the data. To execute this undertaking, NewGlobe's Measurement and Evaluation (M&E) team has developed a quality assurance protocol.

The goal of the protocol

The quality assurance protocol is embedded within our larger data cleaning process — which is employed to correct erroneous, incomplete, or duplicate information in data sets — and certifies that the data collection completed by enumerators is of the expected calibre. This is the primary function of the protocol, and what allows it to reach its primary goal of supporting validated data that reflect actual pupil performance in the assessed skills.

In the interest of transparency and greater visibility into data-gathering performance patterns, the M&E team also produces quality assurance reports, which detail our work in identifying problematic enumerator observations, thus allowing for targeted interventions to improve data quality. This documentation also serves as an internal guide to the quality assurance protocol for anyone in our organisation who is interested in understanding how we ensure data quality control.

Defining quality assurance indicators

To facilitate analysis of the quality of our data, the M&E team has implemented an automated approach, built with standardised code created in Stata — a statistical software platform — which allows us to identify certain indicators within the data that point to inaccuracies. These indicators reveal that some reported assessment scores may reflect an issue with enumeration, rather than a true measure of pupil ability. To further streamline this process, we've identified seven indicators that may be flagged for the possibility of potential issues that need to be investigated:

- **Indicator 1:** The share of observations showing that pupils are non-readers
- **Indicator 2:** The share of observations containing ORF scores of extreme values for a given grade
- **Indicator 3:** The share of observations containing ORF scores surpassing the maximum achievable score
- **Indicator 4:** The share of observations containing discrepant ORF scores
- **Indicator 5:** The share of observations containing identical ORF scores
- **Indicator 6:** The share of observations containing ORF scores that are multiples of 5
- **Indicator 7:** The correlation of scores among ORF, reading comprehension, and numeracy skills

While it is worth noting that not all of these indicators are, by themselves, a clear indication of inaccurate data, if the data cleaning process leads to the discovery of several of these indicators, this may indicate a pattern of malpractice among certain enumerators. Therefore, a thorough investigation into the specific cases flagged by these indicators is necessary to determine if there is an issue that compromises data quality.

Putting guidelines in place for each indicator

In order for these indicators to support our goal of consistent data quality assurance, the M&E team must have frameworks in place for analysing them. Therefore, we have defined a reasonable range that we would expect assessment scores to fall within. Scores that are within two standard deviations (SDs) from the mean are considered reasonable, while scores that are outside of that are more closely examined as outliers requiring further verification. As such, some of the indicators described below revolve around identifying scores that exist above or below a reasonable range.

In addition to this, we have established a frequency threshold for how often indicators signifying potential errors in the data collection process should occur. That is, if more than 10% of a given enumerator's observations contain these indicators, the M&E team will investigate the reliability of their findings accordingly.

Indicator 1: The share of observations showing that pupils are non-readers

The key question to answer for this indicator is whether the share of non-readers (those scoring zero correct words per minute) identified by enumerators is within the established reasonable range for a given territory. Observations outside of this range are considered to be an overestimation or underestimation of non-readers. Additionally, we investigate any discrepancies in the proportion of non-readers identified between the two passages used as assessments. We expect that enumerators who identify many pupils as non-readers using the grade-level ORF passage will also identify many non-readers using the standard-grade ORF passage, and vice versa.

Other parameters also determine whether this indicator suggests unreliable data. For instance, if most enumerators report a high proportion of non-readers in a given territory, it would not necessarily be viewed as a data quality issue. However, if only a few enumerators report a high proportion of non-readers, we will closely scrutinise the results from those enumerators to identify potential data quality issues. It is important to consider that some schools may genuinely have a higher share of non-readers, but we conduct a thorough evaluation of the data to confirm whether an actual trend exists in the territory, or whether it is an indication of errors in the data set.

Indicator 2: The share of observations containing ORF scores of extreme values for a given grade

Just as we expect there to be a reasonable range of non-readers, there should also be a realistic distribution of high-performers. For this reason, we also monitor enumerator observations for scores that would be considered outliers when viewed in conjunction with the other scores reported for pupils in a given grade. These scores would fall well outside of the reasonable range — clearly above or below what is expected of pupils — based on the typical scores seen in the rest of the sample. They would therefore be flagged as indicative of a potential data quality issue. Moreover, if the proportion of an enumerator's observations that are outside this range surpass the predetermined frequency threshold, then we would investigate the accuracy of these data based on how regularly these extreme values are occurring.

Indicator 3: The share of observations containing ORF scores that surpass the maximum achievable score

Since the assessment passages used to measure oral reading fluency contain a fixed number of words, it is impossible for a pupil to read a greater number of correct words than the total count in the passage. Even if they did not make any errors, the maximum achievable score would be equal to the total number of words in the passage. Consequently, enumerator observations showing ORF scores that exceed this number are considered an indicator of a potential data quality issue. However, it is important to clarify that the word limit can be adjusted during different data collection rounds to reflect the current passage, and this may be the source of the discrepancy.

Hence, we apply the same reasoning for this indicator as for the first indicator. If only a few enumerators report a disproportionately high share of unfeasible ORF scores when evaluating pupils in a given territory, while the majority of enumerators do not indicate such a trend, then there could be potential issues with the accuracy of their data collection worthy of closer examination. Similarly, the M&E team would also scrutinise the output of an enumerator who records many excessively high scores for one of the assessment passages, but not for the other.

Indicator 4: The share of observations containing discrepant ORF scores

In addition to scores that surpass the total number of words read in a passage, we examine whether enumerator observations contain discrepant scores. A discrepant score is defined as a total number of words read that does not match the sum of correctly read words and incorrectly read words. It is unusual for an enumerator to produce a significant proportion of discrepant scores. However, we closely monitor their observations to ensure that enumerators do not include these errors in either or both of the two passages used for assessment.

Indicator 5: The share of observations containing identical ORF scores

Because it is typical for assessment scores to show variation, it is unlikely that enumerators would report a large share of observations containing the exact same ORF score. Therefore, an enumerator reporting a proportion of identical scores that is above the established threshold would prompt further examination to ensure the accuracy of the data. Likewise, we expect individual pupils to score differently on the different passages used for assessment. It is hence an indication of a potential data quality issue if enumerators report the exact same score for one pupil across both passages.

Indicator 6: The share of observations containing ORF scores that are multiples of 5, or similar grouping patterns

This indicator is focused on examining whether enumerators are reporting an excessive number of ORF scores that are multiples of five. Based on the typical range of reading fluency scores, we would expect only around 20% of scores to be multiples of five. Therefore, significant clusters or groupings of scores that are multiples of five, such as 100 cwpm, for example, would raise concerns about potential round number bias, rather than reflecting genuine variations in performance. In cases of high-quality data collection, we anticipate observing scores that are uniformly distributed across a range of values, including those that are multiples of five.

Furthermore, it is more probable for enumerators to report a score that is a multiple of five for one assessment passage than for both passages. Therefore, reporting a score that is a multiple of 5 for one passage is less concerning, but if an enumerator reports scores that are multiples of five for both assessment passages, it would be considered a flag and require further scrutiny.

Indicator 7: The correlation of scores among ORF, reading comprehension, and numeracy skills

Reading fluency, reading comprehension, and numeracy assessment scores tend to correlate with one another. Given this relationship, we assess whether the correlations among these skills reported by specific enumerators differ significantly from those observed across the rest of the sample.

Correlations that are disproportionately higher or lower than others could indicate a serious data quality concern. Correlative deviations may signify inattentive and imprecise observations completed by enumerators — especially in the case of lower correlations — and they can also point to inaccurate assumptions being made about pupils' competencies in one or more of these skills, based on their performance in other skills, which would mean an inaccurate reading of their learning levels.

Understanding how the M&E team interacts with quality assurance indicators to maximise data quality

Part 1: Creating flags for each indicator across observations

If the observations completed by enumerators contain these indicators, and the number of indicators exceeds the frequency threshold or contain scores that are outside the reasonable range, flags will be raised to signify the need for review of the data. To standardise this process, the M&E team has created code to flag the issues defined by each indicator, for each of the observations in a data set. The specifics of this code ensure that these flags identify the individual enumerator who completed the observations, thereby establishing accountability norms and governance over performance patterns.

Part 2: Aggregating data for each indicator, by enumerator

After the indicator flags for each observation have populated, the next step involves aggregating the data embedded in each indicator, per enumerator. This allows us to quantify the number of flags per indicator that are occurring as a result of a given enumerator's data collection process, which provides further insight into the consistency with which they report accurate data.

Part 3: Investigating enumerator alert rates based on indicators

These tools, used for identifying potential errors within enumerators' observations, provide us with an alert rate, which serves as part of the basis for determining which enumerators' data collection processes require further investigation. An alert rate is a metric that measures the severity of potential errors in an enumerator's work. It is calculated by dividing the number of flagged indicators for an enumerator by the total number of indicators present. A higher alert rate indicates a higher likelihood of errors, and potentially reduced reliability in an enumerator's data collection. We pinpoint enumerators with comparatively high alert rates and rigorously examine the data they collected to determine whether the improbabilities found in their data are genuine, or if they are indicative of unreliable data collection.

Part 4: Reporting enumeration performance to the data collection team

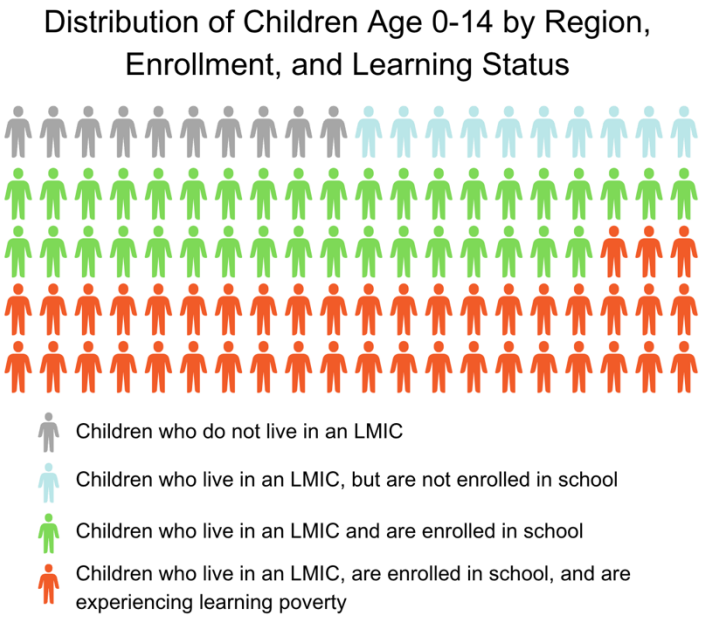
By implementing these measures, our organisation can conduct a thorough evaluation of enumeration performance aligning with our mission to uphold data integrity. Once we have followed these steps, which ensure a sound evaluation of each enumerator's data collection process, we share our results with the data collection team. At this stage, the team carries out independent investigations and takes proactive measures to address any identified issues. Via this iterative process, we foster a collective effort to promote transparency and accountability, and reinforce our commitment to deliver accurate and trustworthy data.

Appendix J: The Learning Crisis in Low- and Middle-Income Countries: Causes, Contributors, and Consequences

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 (LMIC), and in these countries, 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[20] (World Bank, 2018).



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 pupils 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.

[20] 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.

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 pupils 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 pupils 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 begs 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 pupils, 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 pupils and their families (Abdul Lateef Jamil Poverty Action Lab, 2019). In a current report, it was shown that an average of one-fifth of pupils 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 pupils (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 pupils 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 pupils falls on the education system, to a far greater degree than it is dependent on pupils' backgrounds or characteristics (OECD, 2012; Eble and Escueta, 2022). Ultimately, failure to ensure adequate pupil retention and attainment has negative implications for both parties. It is more costly for education systems to devote educational resources to pupils 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 pupils (44%) begin school later than the intended age (USAID, 2018.; Global Education Monitoring Team, 2022). In a study conducted in Uganda in 2017, pupil ages in the last year of Primary school ranged from 12 to 22 years, and most pupils 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 pupils 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 pupils 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, and which starts with pre-Primary programmes, but informs a lack of 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). However, 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 pupils to meaningfully participate (UNICEF, 2019).

While pupils 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 pupils into their education systems and have strategies in place to accommodate them. Keeping enrolled pupils 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 depiction of learning outcomes

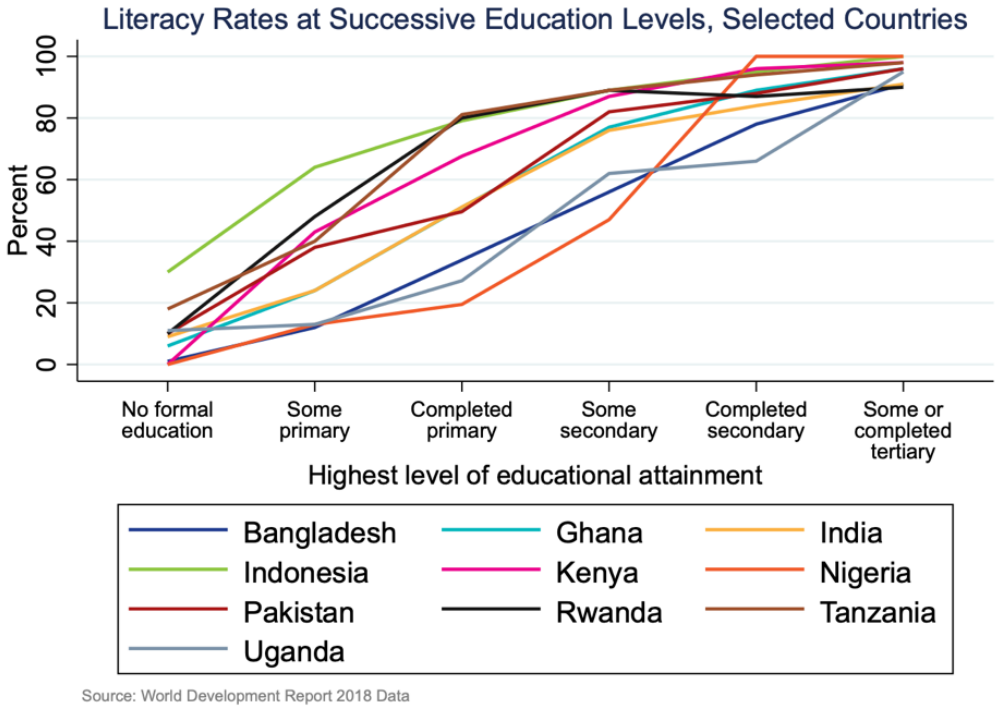
Literacy, like enrolment, is often used as a measure of education access. Because this foundational skill underpins the pupil's ability to master content in all subjects and to properly function in everyday life, it is also highly studied as a barometer of the actual learning taking place in schools. On a global scale, literacy rates have dramatically increased — from 42% in 1960 to 86% in 2015. However, there are sizeable 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 pupils 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 low- and middle-income countries. 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 the more far-reaching 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 pupils' 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.



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 pupils should have the skills to navigate and grow within. In this sense, the benchmark aligning with achievement may be too low. In certain cases, observing that pupils cannot meet or surpass a relatively lenient threshold in literacy can provide beneficial visibility into the extent to which these pupils require intervening instruction. Conversely, the evaluations may show that pupils are nominally literate, though they are far from achieving the ultimate goal of literacy: reading comprehension, which incorporates a variety of emergent sub-skills commonly featured on assessments, such as phonemic awareness and automatic decoding. Combining these contributing sub-skills 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 pupil 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 pupil proficiency in foundational skills. On average, policymakers estimated that double the share of pupils 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 pupil 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 pupils 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 pupils in all levels of schooling, but especially in Primary grades

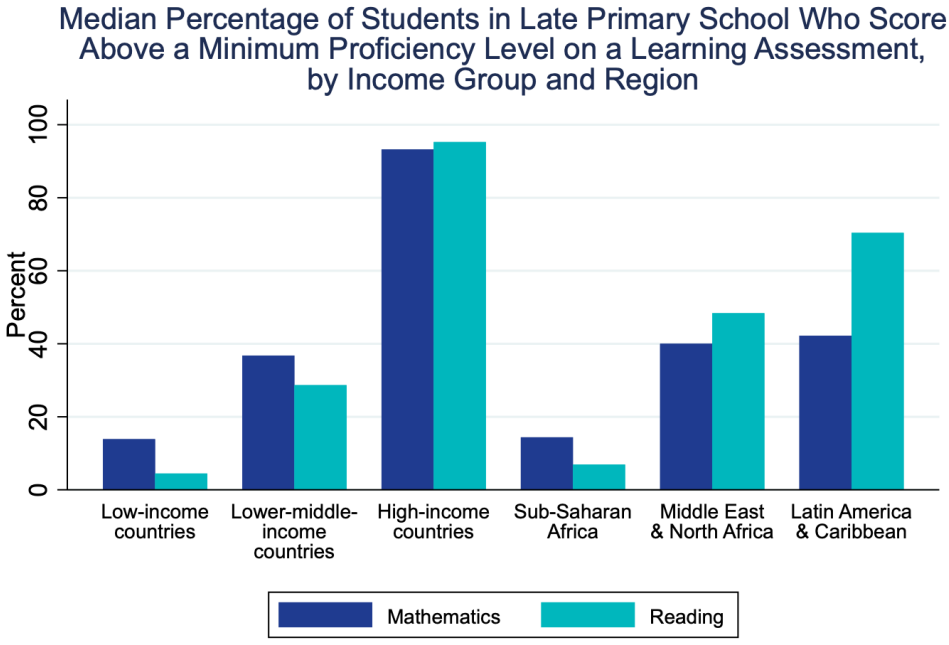
While ensuring that children have access to school, start school at a developmentally appropriate age, and stay in school for the expected duration is a massive undertaking, succeeding in any or all of these areas does not guarantee that pupils are receiving an education that will properly equip them 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[21], 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 pupils 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 pupils in LMIC. Competency in this domain is essential for pupils 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 sub-skills that ultimately inform literacy. In rural India in 2016, for example, half of pupils 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 pupils in Ghana and Malawi were unable to read a single familiar word, such as “the” or “cat”, during assessments conducted at the end of

[21] “Learning poverty” is defined as the inability to read and comprehend a simple text by the age of 10.

the school year. When using a three-sentence passage for assessment and reducing the defining characteristics of literacy to a relatively lower threshold[22], 75% of pupils 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 pupils within and across education systems.

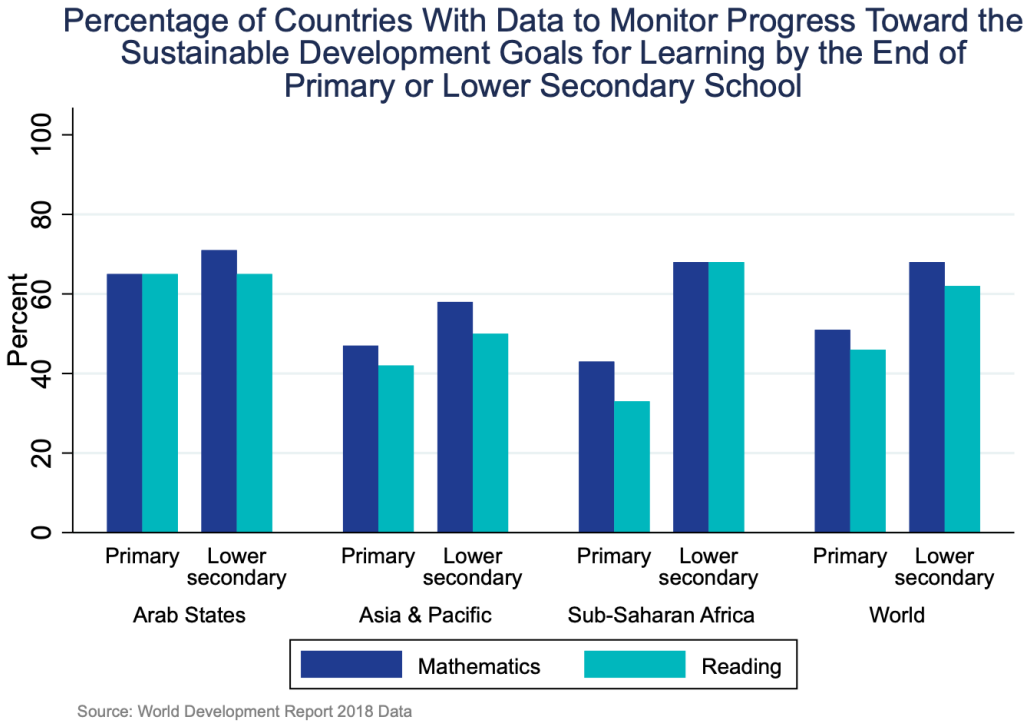
Problematic literacy rates are mirrored by numeracy rates that could also significantly inhibit pupils' abilities to function in their daily lives. For example, 50% of all third graders in Uganda cannot solve simple subtraction operations. An even higher percentage, 69%, of third graders cannot complete 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 pupils 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 pupils 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.



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 pupils 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).

[22] "Literacy" was defined in this context as the ability to read either "fluently without help", or "well but with a little help".

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 pupil progress against international standards, thereby ensuring that pupils are prepared to become globally competitive adults.



Source: World Development Report 2018 Data

b. Year-on-year improvement is too slow for pupils 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 upward. In addition to measuring the pupil 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 pupils 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 pupil learning will not result in globally comparable content mastery in a reasonable number of decades (World Bank, 2018; Pritchett, 2013). For example, one study estimates that it will take 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 pupils 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 pupil in an LMIC spent close to two academic years (236 days) out of school (World Bank, 2023), while learning poverty in LMIC could have increased beyond original estimates from 53% to as much as 70%, which 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 pupils' 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 certify pupil engagement with lessons via observation, nor did they enable teachers to track pupil 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 pupils was the inability to manage these pupils' mastery of lesson content in real-time.

As a result, many pupils across LMIC learned much less than they would have if participating in conventional, in-person instruction, and therefore, more pupils demonstrated lower learning levels from 2020 onward. In Brazil, for example, some pupils 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 pupils 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 pupils 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 pupils on a worldwide scale (United Nations, 2020), with the most significant consequences for pupils 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 pupil participation in these countries, as only 19% of teachers were provided with ICT tools or internet connectivity (UNESCO, 2020).

Furthermore, UNESCO data (2020) shows 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).

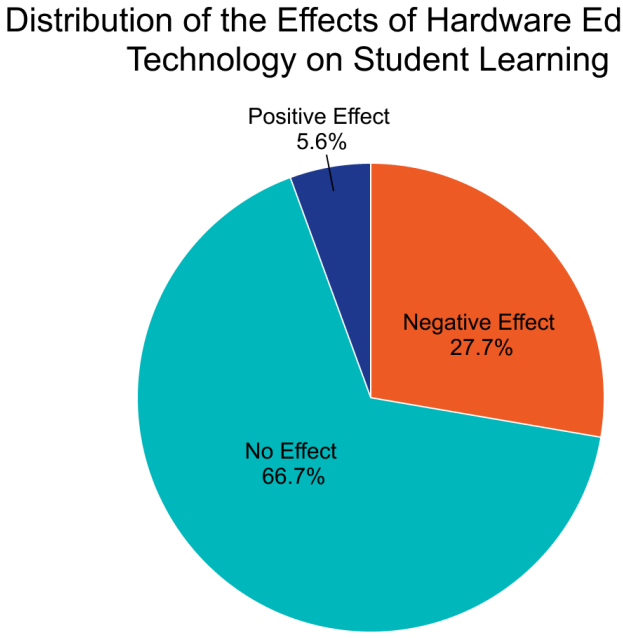
In this sense, teachers need the support of impactful tools and resources, and the motivation of effective leadership, in order to implement systemic changes to education systems in their classrooms, which pupils will require to overturn the severe learning losses incurred in recent years. Education 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 pupils.

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 pupils in Niger and Nigeria had paper to write on, while there was only 1 maths textbook for every 66 pupils 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 continue to languish. 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 pupil learning, and signifies non-cost-effective spending on education improvement.

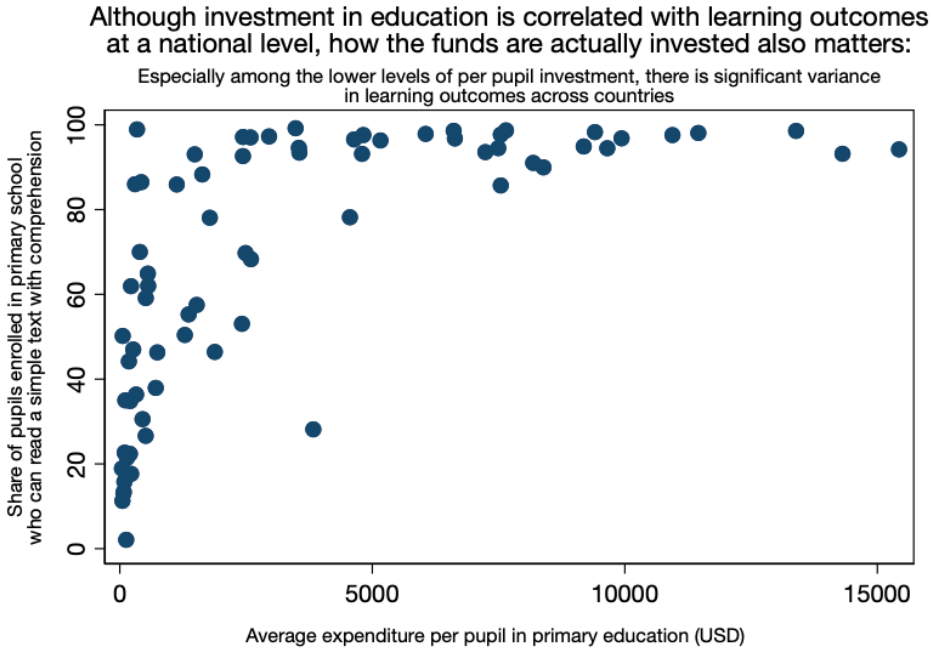


Source: World Development Report 2018 Data

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). Many studies in a range of low- and middle-income countries conveyed neutral or negative results stemming from OLPC on academic outcomes. In some cases, pupils 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 pupil learning, while the other 94% of the effect on pupil 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 pronounced impact on learning gains, which, in turn, ensures that investment in them is cost effective. Framed differently, it can be said that which resources are allocated to these education systems, and for what purpose, constitutes a more pivotal policy decision than the amount of resources that are allocated, above a certain threshold. This concept becomes more clear when examining a distribution of per-pupil expenditures across X countries, which also shows a large range of learning outcomes. In the majority of these contexts, high literacy rates exist alongside relatively high per-pupil expenditures, but this is not a causal trend. Firstly, it should be noted that a multitude of assessments point to the fact that for high-income countries

that have exemplary—or at least, satisfactory—learning outcomes, this has been the case 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-pupil expenditures that largely maintain 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-pupil expenditures. Instead, this variation emphasises 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-pupil 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. As a result of improvements to learning that will strengthen generations of pupils, the economic capacities of currently low-spending countries will grow in succession.

Overall, the focus on prioritising educational resources must be steered away from their high visibility and positioned closely on their ability to foster data-driven results. This is the necessary starting point for whole education systems and the pupils they serve, which 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.

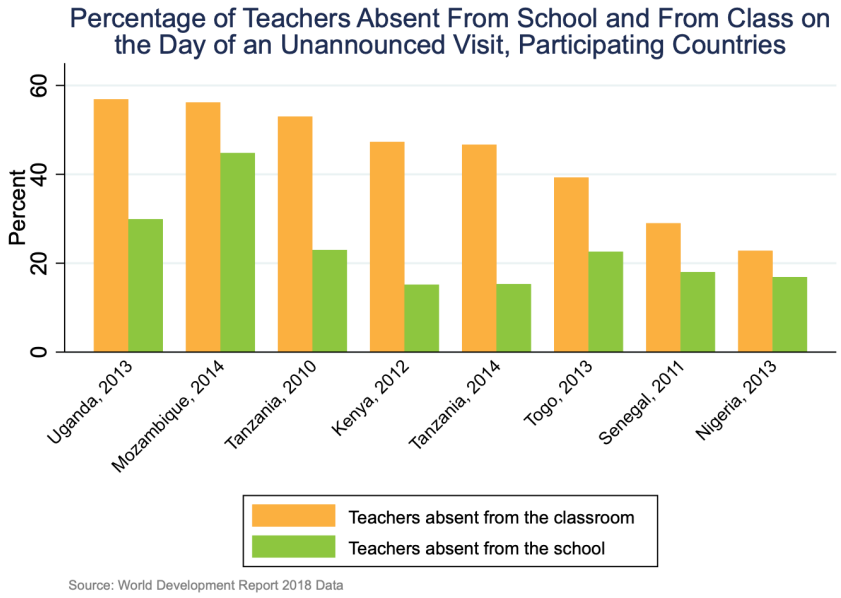
b. Low teacher content knowledge can translate into poorly executed pedagogy

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 pupils in fulfilling their academic potential. In some instances, though, teachers in LMIC may lack the content knowledge necessary to sufficiently coach struggling pupils. In 14 sub-Saharan African countries, for example, teachers performed at the same level on reading tests as their highest-performing grade-6 pupils (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 pupil achievement. In some contexts, as much as a third of pupils' 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 pupil answers on a fourth-grade mathematics test — therefore demonstrating an inability to evaluate whether pupils are learning or to guide pupils towards that goal (Brunetti et al., 2021).

This may lead teachers to cater to higher-performing pupils in order to maintain instructional flow, or to push through the curriculum without identifying areas in which pupils need more support. These would be in direct contrast with the classroom approaches that pupils often need most to succeed, like ability-grouping, and can encourage pupil 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 characteristics, like scaffolding, that ensure the teacher properly paces dissemination of the lesson with pupils' ability to achieve mastery of foundational concepts.

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



Source: World Development Report 2018 Data

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 and 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 pupils into their own class contradict the benefits of ability-grouping and disorder the appropriate scope and sequence of academic content by imparting it to those whom it was not intended for.

The issue of teacher shortages extends beyond frequent absences, furthermore, especially when considering daunting pupil-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 pupil achievement (Molina et al., 2020), hiring more teachers as an investigational measure to reduce class sizes in western Kenya did not correlate with improved teacher performance. Instead, the sense of urgency and personal responsibility among teachers to optimise their instruction was reduced with the increase of staff, and a significant portion instead shifted their focus to seizing employment opportunities for relatives (Mbiti, 2016).

Effective school-monitoring practices are what is required to mitigate high rates of absenteeism across LMIC, but they are not always 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 introducing 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 pupils. 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 in India, 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 pupil 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.

An imperative aspect of ensuring the optimisation of pupil learning opportunities through teachers is to ensure that teachers are adequately supported by the education systems they serve. 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, and 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 developing education systems

Further data across eight countries substantiate the idea that increased school management capacity positively correlates with pupil learning outcomes (World Bank, 2018), therefore emphasising that the performance of all stakeholders in an education system are pivotal for fostering pupil success, and equally capable of undermining said success. However, policymakers seeking to enact change for learning-deprived and under-managed schools can be inhibited by a lack of metrics providing insight into the state of learning across education systems, and may therefore lack the context with which to make viable recommendations. Yet, as purported by World Bank researchers, the vast majority of the countries that represent the global population are low- and middle-income countries, which have historically lacked assessments to reliably compare learning outcomes on an international scale, but also possess the most profound 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 collection of robust, regular measurements of an education system's state of learning.

Policymakers may also be inclined to abide by falsely representative optics, however, regarding assessment data. If, for instance, low-performing pupils drop out of school in higher proportions than mid- to high-performing pupils, subsequent school-wide assessments appear more favourable on average, but learning gains have not improved (World Bank, 2018). Moreover, the effective facilitation of learning gains among low-performing pupils 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 pupils rather than the median pupil, for example (Mbiti, 2016). Additionally, research suggests that overly complex, fast-paced curricula in low- and middle-income countries are a deterrent to pupil learning (Pritchett and Beatty, 2012), despite being implemented with the intention of setting rigorous expectations for academic achievement. In response to this, policymakers should take a more segmented 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 pupils are not keeping pace with it, as well as the pedagogical factors that will foster achievement in that system's particular context. In doing so, the policy focus will surround targeting pupils at level, 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 pupil learning via a multi-tiered feedback structure. Such a structure begins with formative assessments conducted in the classroom, which allow teachers to identify struggling pupils, and expands to national assessments and examinations, which provide insight into the functionality of the education system overall, and then international assessments, which evaluate the effectiveness of education systems across countries and over time (World Bank, 2018). In turn, the far-reaching reforms education leaders introduce by discerning core effective principles from this host of information sources will ultimately return to benefit classrooms and teachers.

Importantly, however, policymakers and education personnel alike should be prepared with the fact that reforms targeting pedagogical improvement and increased accountability are not always as conspicuous as input-based policy changes or efforts to increase attendance. However, 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 Cases for Solving the Learning Crisis Through Targeted Investment in Foundational Skills and Beyond

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

Pupils 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. Pupils who are currently learning deprived stand to lose USD 10 trillion 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 pupils 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 pupil performance deficits will lead to the loss of USD 700 trillion 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 pupil population is clear, which not only precludes those pupils 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 government expenditures, worldwide, 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 are proven effective in elevating pupil performance, which will heavily contribute to pupil 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

It is also crucial to consider the fact that missed learning opportunities early in life can have a stunting effect on pupils' learning trajectory 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, pupils who lack mastery of fundamental subject area content from the early grades onward are at a greater risk of being subject to lower performance thresholds, due to the cumulative nature of learning (World Bank, 2018; Eble and Escueta, 2022). This is also partly attributable to 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 knowledge base is essential for supporting the pursuit of an intensifying and comprehensive education (World Bank, 2018).

There is further evidence to support the idea that foundational skills constitute a pivotal building block that encourages pupils' 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. Ensuring mastery of fundamental concepts in this way provided more advantage for pupil 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, pupils 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 low- and middle-income countries that do not prioritise pupil mastery of foundational literacy and numeracy sub-skills, which will ultimately hinder pupil participation in subsequent tiers of instruction.

Conversely, pupils who are able to engage with and apply foundational skills are better equipped to develop metacognitive thinking from the earlier grades onward. Those pupils 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 pupils 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 pupils 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 widen over time, which highlights the necessity of early interventions that create equitable learning opportunities and foster gains for pupils from all wealth groups (DHS, 2014, 2015–16; Spaull and Kotze, 2015). Research indicates that improving pupil mastery of foundational skills in an education system, regardless of the disparate socioeconomic statuses present in the classroom population, mitigates gaps in academic performance — which have been attributable to differences in pupil background characteristics — by providing the appropriate substructure pupils 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 pupils become important contributors to a knowledge-based economy that they otherwise would have been precluded from participating in.

Further evidence suggests that even in instances of severe socioeconomic disadvantage, pupils' 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. More specifically, 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, but 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 pupils, 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. However, given that education systems are composed of distinct components — teachers, pupils, 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).

In situations in which that objective is a digression from the intended one, or in which 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, but the processes they use to 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 achieve the current, pressing need to increase the learning levels of pupils — which is not only pivotal for maintaining high enrolment and attainment rates, but also underpins a pupil'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.

Appendix K: Works Cited

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