

THE DEMOCRATIC REPUBLIC OF CONGO

Can Incentives to Take Home Textbooks Increase Learning?

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REACH funded an evaluation that measured the effectiveness of both financial and non-financial incentives at the student, classroom, and school levels.



The Results in Education for All Children (REACH) Trust Fund supports and disseminates research on the impact of results-based financing on learning outcomes. The EVIDENCE series highlights REACH grants around the world to provide empirical evidence and operational lessons helpful in the design and implementation of successful performance-based programs.



Significant investments have been made towards the provision of textbooks to combat the learning crisis in the Democratic Republic of Congo



Solely distributing textbooks does not necessarily mean that they are being sent home or used.

Significant progress has been made in school enrollment over the last several decades in many low-income countries (LICs), but student learning levels remain low, particularly in fragile settings. Governments and donors have invested considerable resources in the provision of school inputs and specifically in textbooks to try to combat this learning crisis. It makes intuitive sense that having school materials such as textbooks in classrooms would be an important part of the education production function. However, the existing research has found only very weak

evidence that distributing textbooks to schools increases learning. One possible explanation for this is that it is not sufficient to make textbooks available—they also must be used, which may require both teachers and students to change their behavior. Results-based financing (RBF) mechanisms have been used in many developing countries in an attempt to incentivize teachers, students, and other stakeholders to achieve better results by encouraging such desired behavior changes. RBF mechanisms work by providing rewards—either financial

or non-financial—that are given only on the condition that the potential recipient takes specific actions or achieves measurable results such as student test scores or other intermediate education outcomes.

The Results in Education for All Children (REACH) Trust Fund at the World Bank funded an evaluation that measured the effectiveness of both financial and non-financial incentives at the student, classroom, and school levels in the Democratic Republic of Congo (DRC). A new classroom routine was designed to encourage all grade five and six students to take home a classroom textbook and use it to study for a weekly quiz. Students and schools were incentivized to adopt the routine through a combination of

both financial incentives at the group level and non-financial incentives at the individual level. These incentives were implemented by Cordaid (Caritas Netherlands), a Dutch NGO that has operated an RBF project in the South Kivu region of the DRC since 2008.

The evaluation found that the incentives given to encourage students to take home textbooks raised their French language test scores by 0.27 to 0.30 standard deviations (SD) but had no significant impact on math test scores. The intervention also increased the likelihood of the students taking—and passing—the end of year national exam at the conclusion of grade six, which is a prerequisite for continuing on to secondary

school. The intervention also affected students' job aspirations in favor of jobs requiring more education rather than those that require manual labor and convinced more students and teachers of the usefulness of textbooks. These results suggest that allowing students to use textbooks outside the classroom and supporting them to do so by providing modest financial incentives or non-financial incentives can increase the effectiveness of existing resources at a relatively low cost and with limited complexity. This is likely to be particularly useful in the case of fragile countries with limited resources and administrative capacity where more demanding interventions are unlikely to be feasible.



Violence in the DRC makes it difficult for students to access education, entrenches inequalities in primary education, and threatens learning quality.

CONTEXT

This evaluation took place in the DRC, one of the poorest and most conflict-ridden countries in the world. More than 80 percent of the population lived on less than US\$1.25 in 2012. In South Kivu, a province in eastern DRC, 60 percent of households were living below the national poverty line in 2012, putting South Kivu roughly in the middle of the distribution of DRC provinces. Furthermore, South Kivu has been the center of several bouts of armed conflict since the 1990s. The World Bank has designated the DRC as a fragile and conflict-affected situation (FCS) country

every year since it began compiling a list of such countries in 2006.¹ Fragile situation countries such as the DRC often suffer from violence that makes it difficult for students to access education, entrenches inequalities in primary education, and threatens teaching and learning quality. Furthermore, it is not clear that the most binding constraints to education in fragile settings are the same as in other poor but relatively stable and peaceful environments or that the relevant actors such as students and teachers will respond in the same way to incentives. As such, the South Kivu region of the DRC provides an interesting case study to explore what interventions may be effective in fragile settings.

The DRC has achieved gross primary enrollment rates in excess of 100 percent over the last decade, but, as in many developing countries, this has not been matched by substantial learning gains.² Standardized test scores for primary students in the DRC remain among the lowest in the world, even compared to other LICs.³ Funding for education is severely inadequate, with the DRC government spending the least on education as a percentage of GDP among 28 countries in Sub-Saharan Africa.⁴ However, with the support of a US\$180 million World Bank grant, in 2008 the Government of the DRC launched a five-year program to improve public service delivery in education. As part of this project, the government distributed 18 million textbooks throughout

the country in an attempt to raise low levels of learning. However, an evaluation of this program found dismal results, in part because the program was only partially implemented. This was followed by another US\$100 million World Bank grant that funded the distribution of 22 million textbooks between 2012 and 2017. However, recent reports suggest that, while 93 percent of the textbooks made it to the schools, most are not being used in the classroom, and students are very rarely allowed to take them home because of concerns about damage and theft. Furthermore, the current textbooks are written in French, which is the official language of education in the DRC but often only the third language spoken by children in rural parts of the country.



Therefore, comprehension of French in primary schools is often weak, sometimes even among teachers.

The REACH evaluation was conducted in 90 primary schools in the Walungu and Shabunda districts of South Kivu province, where Cordaid operates its education RBF program, which reaches roughly 64,000 primary school students.

WHY WAS THE INTERVENTION CHOSEN?

During the past few decades, substantial progress has been made in boosting school enrollment in developing countries. Gross primary enrollment rates in Sub-Saharan Africa increased from 50 percent to 98 percent between 1970 and 2014, and net primary enrollment rates increased from 40 percent to almost 80 percent.⁵ However, this progress in enrollment has not been matched by a similar improvement in the amount of actual student learning. This so-called “global learning crisis” has been estimated to mean that 250 million school-aged children around

the world are not learning even the basics while in school.⁶

One possible explanation for why increasing enrollment has not led to increased learning is that learning depends not just on spending time in the classroom but also on a wide range of other complementary inputs, including learning materials. There has been extensive literature citing the crucial role played by school materials such as textbooks in producing learning and in combating the learning crisis.^{7/8/9/10} However, the few available rigorous impact

evaluations of textbook distribution projects in low-income countries have found very little positive impact. For example, Sabarwal et al (2014) found that distributing textbooks in Sierra Leone had no impact on students’ test scores, in part because the intervention merely increased the number of textbooks stored at school but did not increase the use of textbooks in the classroom or in students’ homes.¹¹ Similarly, Glewwe et al (2009) found that distributing textbooks in Kenya had no impact on average test scores, although it did increase the scores of the strongest



students. The authors attributed this to the fact that the language used in the textbooks was English, which, for many students, was only their third language, meaning that most students could not read or comprehend the textbooks.¹² These results suggest that merely distributing textbooks is not enough to have a positive impact on learning. In addition, students and teachers must be encouraged to use them, and the textbooks themselves must be of high quality and

comprehensible to students. These two challenges are of course related, as students and teachers are less likely to use textbooks that are of low quality or in a language that they do not understand.

Therefore, the objective of the REACH evaluation was to determine whether RBF incentives could improve learning by targeting the first of these two challenges by encouraging students and teachers to make more extensive use of existing textbooks.

HOW DID THE INTERVENTION WORK?

In each of the treatment schools, a routine was put in place to incentivize schools and students to use textbooks in mathematics and the French language for homework and weekly quizzes. The routine consisted of a system by which students could check textbooks in and out twice each week and take them home in order to complete their homework in math and the French language. The students were then tested on the material covered in the homework in a weekly quiz. This routine was designed to supplement the already existing routine based around weekly homework assignments in order to maximize its chances of being adopted and of becoming a habit for students and teachers. The intervention's goals were to have an immediate positive effect not only on learning outside the classroom but also on teaching within the classroom in the longer term as students and

teachers become more familiar with the textbooks over time. Students, teachers, headmasters, and parents were informed about the new routine first through verbal announcements, and then the teachers and students created posters for distribution around the school explaining the purpose of the intervention and encouraging students to take their homework seriously.

The intervention used both financial and non-financial incentives to motivate students to check out the textbooks. The first element of the incentive scheme was an intrinsic, non-financial incentive consisting of a star system displayed publicly in each classroom to showcase the students who borrowed and returned textbooks and participated in a weekly quiz. A student earned a star for every week that he or she took home a textbook, returned it in good condition, and took part in the

weekly quiz. The second element of the incentive scheme consisted of in-kind material rewards such as notebooks, pens, and pencils with a value of roughly US\$9 per student to all students in a classroom if the class as a whole achieved 75 percent participation in the textbook borrowing routine over an entire trimester. Each school was also provided with financial incentive consisting of a lump sum of roughly US\$120 to participate in the project designed to compensate teachers and school administrators for potentially lost or damaged textbooks. If there was any money left over after replacing the lost or damaged books, the school could use it to cover its general expenses.

This intervention was randomly assigned to 45 primary schools in the Walungu and Shabunda districts of South Kivu, while another 45 schools were assigned to the control group.

Baseline surveys were conducted in the winter of 2016/17 on grade five students, grade five teachers, headmasters, and the students' households. Grade five students also completed a baseline test in math and the French language so that a value-added model could be used with endline test results as the dependent variable and baseline test results as one of the control variables. Students in both the treatment and the control group schools were then followed for a period of roughly one and a half years. The endline surveys and tests in math and the French language were conducted in June 2018 when the students were in grade six. Treatment schools also received two external visits in 2017 and 2018 to ensure that they were complying with the intervention. While the randomization created generally balanced samples, some variables were significantly different between the two groups—teaching efficacy, student age, student gender, frequency of students eating breakfast, and student time spent working—and these observable characteristics were therefore included as control variables in the analysis.

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WHAT WERE THE RESULTS?

The incentives significantly increased the use of textbooks both inside and outside the classroom.

At the most basic level, the financial and non-financial incentives designed to encourage students and teachers to make better use of textbooks achieved what they were designed to do—they increased the proportion of students who used the textbooks outside the classroom. Eighty-one percent of students in the treatment schools reported having taken home a textbook in the previous month, compared to only 39 percent of students in the control schools. All teachers in the treatment schools reported that students were allowed to take textbooks home, and the initial concerns about books being lost or damaged proved to be mostly unfounded. Teachers in the treatment schools also reported that students were making greater use of textbooks in the classroom, although these self-reported measures may be biased.

The incentive scheme significantly raised French language test scores.

The financial and non-financial incentives raised French language test scores by an average of 0.27 to 0.30 standard deviations (SD) in the second year of the program, using a value-added model controlling for baseline student test scores. This impact was roughly the same across the four different categories of questions grouped according to

level of difficulty, which suggests that the intervention helped to promote learning across the board. When a small number of schools that failed to comply with the intervention in the first year were excluded from the analysis, there was a slightly higher impact of 0.35 SDs. Compared with other similar interventions focused on primary school learning outcomes, this can be considered a moderate size effect. For example, it is slightly larger than the impact of 0.22 SDs that was found in Kenya among the highest performing students in Glewwe et al (2009).¹³

However, the incentive scheme had no significant impact on math test scores.

The financial and non-financial incentives had no significant impact on math test scores (although the estimated coefficients were slightly positive), despite the fact that French and math textbooks were taken home at the same rate. This may be because the language taught in the French language textbooks is at a more rudimentary level than the level of language skills required to understand textbooks in specific subjects such as math. This suggests that the language in which the textbooks are written may be a constraint for learning a subject like math, whereas the French language textbooks are closer to students' appropriate level. To learn French, it is likely that being exposed to the language may be helpful by itself, even if the textbooks are not of the highest pedagogical quality, at the optimal level, or written in appropriate language. Although there is no conclusive evidence that this is what drives the difference in results between French language and math test scores,



it is likely that textbook language remains an important issue.

The intervention yielded the greatest benefits for the weakest students and those in classrooms with the least skilled and least experienced teachers.

When the results are separated for students above and below the median test score at the baseline, the intervention had no significant impact on above median students but had a significant impact on below median students equal to 0.42 SDs, larger in magnitude than the overall impact. This suggests that encouraging textbook use helps to reduce learning inequalities between high-performing and low-performing students. It also suggests that textbooks and other learning inputs such as teachers may be substitutes rather than being complementary in the learning production function. Similarly, the intervention had a positive and larger impact among students in classrooms with

teachers that self-identified as less effective teachers (0.42 SDs), those with teachers with lower French test scores themselves (0.41 SDs), and those with teachers with less experience (0.58 SDs). These results suggest that the positive impact from textbook use is due to students' self-directed learning rather than any classroom interaction with the teacher. The intervention also had a positive impact on both girls and boys, with no significant difference by gender or by age. On the other hand, students who had had no previous exposure to books and students who were classified as being especially vulnerable—orphans, physically disabled children, children of physically or mentally disabled parents, or children displaced by war—did not benefit from the intervention.

The incentive scheme cost relatively little and ranked higher in cost effectiveness than other similar interventions. The cost-

effectiveness of interventions aimed at improving student test scores varies substantially due to large differences in both their cost and their impact. The financial and non-financial incentives in this intervention cost roughly US\$17 per student and yielded an improvement in French language test scores of 1.6 SD per US\$100 spent. This compares favorably with the 30 randomized controlled trials evaluated for cost-efficiency by Kremer et al (2013).¹⁴ Furthermore, it is likely that the cost-efficiency of this intervention could be increased if it was scaled up if a system could be put in place to decentralize monitoring at the school level. Much of the cost of this intervention came from having to monitor the schools' implementation of the textbook routine, which would not be in place for most schools if the intervention were scaled up.

The reason why the incentives had a positive impact may have been because of changes in students' and teachers' attitudes to textbooks and students' more ambitious job aspirations. Both the teachers and the students in the treatment schools reported that they were more likely after the intervention to say that textbooks are useful for learning, whereas those in the control schools had no change in their opinions. Furthermore, students in the treatment schools had begun to aspire to qualify for non-manual jobs that would require higher levels

The intervention increased the proportion of students who either participated in or passed the national exam at the end of primary school.



of education and strong French language skills than are required by manual jobs. This may help to explain the increased test scores if the students became more motivated to learn in order to have better job prospects.

The intervention increased the proportion of students who either participated in or passed the national exam at the end of primary school. The treatment schools, where the financial and non-financial incentive scheme was implemented, had roughly 10 percent more students passing the national exam at the end of grade six than the control schools. This exam tests students on math, the French language, and general knowledge and is a requirement for students to continue on to secondary school. This result is primarily driven by a higher proportion of students taking the exam rather than a higher proportion of test participants who passed the exam. It may be that students became more confident and motivated to take the national exam in order to advance to secondary school because they had begun to aspire to jobs that require more education than manual labor. While the test scores on the national exam were not significantly changed by the intervention, this may be partly due to the fact that more marginal students may have been induced to take the exam who otherwise would not have, thus reducing the average test scores and offsetting any gains made by the students who would have taken the exam anyway.

WHAT WERE THE LESSONS LEARNED?

One significant challenge in the implementation of this intervention was the need to monitor schools' compliance with the textbook borrowing routine. During the first monitoring visit, the observers found that seven of the 45 treatment schools had failed to implement the routine at all so no textbooks had been taken home, though this improved in the second year of implementation. In any future implementation of this kind of intervention, a simple system of monitoring should be designed that is owned and managed by individual schools to ensure that teachers comply with the routine as intended.

CONCLUSION

Providing students and schools with a set of financial and non-financial incentives was effective in encouraging students to take home textbooks and in increasing their French language test scores. This suggests that there may be an important role for RBF mechanisms to play in increasing the use of existing classroom resources without the need for large additional resources. Because this kind of intervention is both low in absolute cost and relatively cost-efficient, it may be particularly useful in fragile and conflict-affected settings such

as the DRC and other low-income countries where education systems are severely financially constrained. These results also suggest that RBF incentives to encourage more extensive use of learning materials may reduce educational inequality by boosting learning among the weakest students and those with the least effective teachers.

The results of this evaluation also begin to explain the ineffectiveness of just distributing textbooks with no other initiatives. While concerns

remain about the effectiveness of textbooks countries where students' ability to read and understand the language of instruction may be limited, these results suggest that encouraging more extensive use of textbooks can help to increase learning even when the language and level of the learning material may not be optimal for the students. On the other hand, the lack of impact on math test scores suggests that the effectiveness of existing learning materials remains an important constraint and that the language

and level of textbooks may be a barrier to achieving further learning gains. Therefore, the results of this evaluation should not be interpreted as suggesting that the use of teaching materials is more important than their effectiveness but rather that the two should be viewed as complementary. Further research will be needed to establish the most effective ways to increase learning in more complex subjects like math and science and to explore the importance of the level and language of the teaching material.

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worldbank.org/reach
reach@worldbank.org

