Independent Evaluation of the Effectiveness of Institut pour l'Education Populaire's "Read-Learn-Lead" (RLL) Program in Mali

COST ANALYSIS OF KEY ELEMENTS OF THE RLL PROGRAM (Educator training, pedagogical support, and pedagogical materials inputs)

Prepared for
The William and Flora Hewlett Foundation
2121 Sand Hill Road
Menlo Park, CA 94025

Prepared by
Jennifer E. Spratt, RTI
Michel Diawara, Consultant; and
Maria Perez, University of Washington

November 2013

RTI International
3040 Cornwallis Road
Post Office Box 12194
Research Triangle Park, NC 27709-2194

Acknowledgements

The authors would like to express their thanks and gratitude to the William and Flora Hewlett Foundation, which financed this study, and to the Institut pour l'Education Populaire and its Founder and Director Maria Diarra Keita, Co-Founder and Technical Advisor Deb Fredo, Associate Director Cheick Oumar Coulibaly, Finance manager Oumou Kamissoko, Accountant Almoudou Coulibaly, Monitoring and Evaluation head Lazare Coulibaly, and Saran Bouaré Sagara, responsible for Documentation, for their insights, time, cooperation, access to information, records and materials, and hospitality.

We also thank Luis Crouch, Patrick McEwan, and Hank Healey for invaluable advice and suggestions on earlier drafts of this paper.

TABLE OF CONTENTS

List of Tables

List of Figures

Acronyms and abbreviations

CAP	*Centre d'animation pédagogique* (pedagogical support jurisdiction)
LPM	letters per minute
CPI	Consumer Price Index
WPM	words per minute
EGRA	Early Grade Reading Assessment
G1	Grade 1
G2	Grade 2
G3	Grade 3
GDP	gross domestic product
IEP	*Institut pour l'Education Populaire* (Institute for People's Education)
IRR	internal rate of return
MEALN	*Ministère de l'Enseignement, de l'Alphabétisation et des Langues Nationales* (Malian Ministry of Education, Literacy and National Languages)
ORF	oral reading fluency
PHARE	*Programme Harmonisé d'Appui au Renforcement de l'Education* (Harmonized Program of Support to Strengthen Education)
PPP	purchasing power parity
QEDC	Quality Education in Developing Countries
RCT	randomized controlled trial
RLL	Read-Learn-Lead Program
RTI	Research Triangle Institute
USAID	United States Agency for International Development

Executive summary

The cost study presented in this paper constitutes one part of a broader, multi-year impact evaluation of the early grade reading component of the Read-Learn-Lead (RLL) program developed by Malian NGO Institut pour l'Education Populaire (IEP) and implemented between 2009 and 2012. The paper presents methods, results, and discussion of cost- and cost-effectiveness analysis of the program. Cost elements examined included development and implementation of teacher and school principal training; pedagogical support visits to teachers by IEP coaches and district (CAP) education staff; and development, production and distribution of RLL program teacher's guides, student books and other materials.

The analysis contrasts the incremental cost and cost-effectiveness of the mother-tongue reading program at (a) early and (b) later stages of program implementation, and after (c) one year (Grade 1) and (d) two years (Grades 1 and 2) of participation in the program, relative to performance of a control group. Sensitivity of cost estimations to a number of assumptions is explored, and an illustrative simulation of cost-benefit and rate of return projections is presented. Implications for the viability / scalability and transferability of the RLL model to other implementers and settings are discussed, as well as options for containing future costs while preserving program quality and outcomes.

RLL costs and their distribution across inputs and years. According to estimates, development of the RLL program cost a total of about $70,428 in 2009 USD, or 18% of all costs associated with bringing the program to 38 experimental schools over the three years of the study. Program implementation in 38 schools, assuming 3 years' useful life of training and school support visit inputs, cost a total of $315,843 in 2009 USD, or $21.50 per student annually, above and beyond Ministry and community inputs.

Turning to the distribution of spending by type of input and year, the training of teachers and school heads represented 18% of total RLL implementation spending, pedagogical materials 37%, and support visits a striking 45% of total implementation. In Year 3, these last costs were however significantly reduced to 28% of spending, while pedagogical materials costs increased to 58% as all materials envisioned by the program for all languages became available. The changes observed in the costs of a given program input across study years reflect changes in input delivery, which affected both unit costs, in some cases, and the number of units delivered per year.

Cost-effectiveness of RLL program variants. To estimate cost-effectiveness, we combined cost estimations with effect sizes calculated on the basis of impact evaluation results at Year 1 and at Year 3 of program implementation. For grade 1, cost effectiveness estimations suggest that the "more mature" program, at Year 3, was only marginally more

cost-effective than it was in its first year of implementation, with roughly equivalent costs to produce a 0.2 standard deviation of gain in reading skills.

We also contrasted cost-effectiveness estimations at Year 3 between Grade 1 students (who had been exposed to the first year of the RLL program only), and Grade 2 students (who had been exposed to the full two years of the RLL program). Overall, one year of provision of the RLL program to Grade 1 students cost a total of $17.66, while two years of provision, representing the sum of the cost of Grade 1 provision from year 2 ($25.56) with that of Grade 2 provision at year 3 ($17.66), had a total cost of $43.22. Combined with the effect sizes achieved, the results of these estimations suggest that Grade 1 provision alone is more cost-effective than providing the full two-year program across Grades 1 and 2, for letter knowledge and new word decoding, and to a lesser extent for oral reading fluency. Only for familiar word reading, do the results suggest greater cost-effectiveness of the full two-year program.

Two more variants of RLL program implementation illustrate some additional issues. At Year 1, Grade 2 students also received inputs intended for Grade 1. For these Grade 2 students, achieving 0.2 sd of gain was estimated to cost more than twice to three times what it cost for the same level of gain among Grade 1 students. From this result we may conclude that providing inputs that were not designed for the grade level in question can be a very costly proposition. In addition, results at Year 3 for Grade 3 students (one year after completing the 2-year RLL program) suggest that even at a modest distance from direct program participation, the cost of provision to produce more lasting gains can be considerably higher than the cost of producing immediate gains. These results suggest that stopping an intervention prematurely, before a minimum level of performance is achieved, can also prove costly.

Sensitivity of estimations to underlying assumptions. Cost estimations require the application of a number of assumptions, including, in our case, that of how long into the future the effects of RLL training and school visits could be expected to influence a teacher's or school's practices. Conservatively, the estimations above assumed a period of only 3 years – roughly, the period of the study for Year 1 inputs, and with inputs made in Year 2 and Year 3 of the program continuing to have an effect 1 and 2 years, respectively, after the end of the study. On the whole, this assumption produces a relatively high cost.

In fact, estimations can vary greatly depending on the assumed period of "usefulness" posited. If we extend the period of assumed usefulness of teacher training to 10 years, and of school support visits to 5 years, for example, the cost of the program per year is substantially lower. Depending on our assumptions, the proportions of costs by type of input for a given year can also change, and the relative total cost of the program earlier and later

on in the program can be affected. These differences would directly affect cost-effectiveness estimations as well.

Program budgeting assumptions and decisions themselves often build on costing projections such as these. Researchers as well as decision-makers and other consumers of cost-effectiveness analysis need to be mindful of these sensitivities in the choice of realistic assumptions as well as in the interpretation and application of results.

Illustrative cost-benefit projections. We also carried out a series of illustrative cost-benefit projection scenarios of the RLL program relative to "business as usual" in non-program schools. Based on a comparison of average control-group inter-grade gains to the difference-in-differences gains attributable to RLL participation at endline, participation in the RLL program was found to add roughly the equivalent of a full year's worth of schooling, and in some cases more, above and beyond what typical schooling alone produced.

By "monetizing" these gains in terms of what they would cost to achieve in a non-program school, we can obtain rough estimates of the **cost-benefit** of the program, relative to business as usual. A first scenario ("modest") assumed a relatively modest level of RLL benefit (observed average Letter Knowledge subtask gain) and a relatively high level of additional input to sustain this benefit after Year 3. In this scenario, the RLL program would begin to show a positive rate of return after 8 years only, and would reach a modest 8% rate of return if continued for 10 years. If this scenario were extended over 15 years, its internal rate of return would reach 13%.

Scenario 2 ("moderate") assumed a moderate level of RLL benefit (observed average Oral Reading Fluency subtask gain), and a moderate level of additional input (only supervision and materials) to sustain this benefit after Year 3. In this scenario, the RLL program would begin to show a positive rate of return if the program were to run for 6 years, and would reach a respectable 22% rate of return if it continued over 10 years.

Scenario 3 ("optimistic / ambitious") assumed a relatively high level of RLL benefit (observed Grade 2 Oral Reading Fluency subtask gain), and a high level of additional input (training, supervision and materials at Year 2 level) to sustain this benefit after Year 3. In this scenario, the RLL program would begin to show a very respectable rate of return (23%) if it ran for just 5 years, and would reach a very high 43% rate of return if continued for 10 years.

Compared against the median rate of return obtained for World Bank projects over the period 1980-2004 (15% for projects across all sectors reporting rates of return; 19% for Education sector projects; see Herrera 2005), our "modest" scenario does not meet these levels. But with moderate or better assumptions, our simulations suggest that the RLL

program (or programs with similar cost and impact profiles) would be a worthwhile investment if sustained for at least 10 years.

These cost-benefit projections underscore the importance of commitment to long-term investment – not only of funding, but in terms of continuing to implement a specific intervention demonstrated to be effective. When educational approaches are selected, launched, and changed mid-course for reasons of politics or convenience rather than for their technical soundness, the potential long-term returns they might have had, may never be realized.

Implications for viability and scalability of the RLL approach. RLL offers a program that is more effective than the status quo, and could be expected to pay for itself in terms of gains above business as usual, over a ten-year period. At $14 to $18 per student per year, or roughly 20% more than current average expenditure per primary school student, however, implementing the program at scale would represent a substantial additional cost to the system. In addition, RLL is still not as efficient as desired in terms of creating learning skills at a rate adequate to achieve sustainable levels of skill by Grade 2 or Grade 3.

If RLL program implementation is extended on the grounds that it is more effective than business as usual, we would want implementers to continue to seek program improvements to accelerate the rate of learning produced, while also pursuing cost reduction strategies. Tightening fidelity of implementation could be expected to improve effectiveness, and other measures may also be needed. In terms of cost reduction, the program presents several possibilities, including the following:

- Reducing the number of teacher training days from 14 to 12 and increasing the participant / trainer ratio from 13 / 1 to 18 / 1 could be expected to produce a cost reduction of roughly 20%.
- If Ministry staff were re-deployed from less directly-effective desk work to fully take on the school support visits, the additional cost of such visits could be reduced by about half, since the cost of labor for this task would already be accounted for in the system salary bill.
- To reduce unit costs of materials, it would be reasonable to anticipate that economies of scale could be obtained with program scale-up, and some compromise on quality of paper and production could also be made, even while materials continued to be provided following RLL's principle of a new book for every student every year.

In other words, there is reason to posit that substantial cost reductions could be made to the RLL program in a scale-up phase using Ministry structures, with little change to the likely qualitative outcome. Development costs would also be much lower, as the basic material for

the RLL program, including teachers' guides and student materials, now exists for four languages.

Considerations for growing demand and opportunities for further cost analysis. With heightened awareness of cost and cost-effectiveness trade-offs, it is hoped that decision makers and implementers will become interested in demanding and practicing more careful and systematic budgeting and cost accounting going forward, and pursuing more cost-effective combinations of inputs. As demand and standard methods for cost accounting and cost analysis become more widespread in developing country contexts, there is reason to hope that comparative cost analysis will also become more readily feasible.

Currently, many educational programs are implemented without accounting systems in place that facilitate the extraction or recovery of such elements. Greater coordination of technical and financial tracking approaches is needed, to help improve the accuracy of cost estimates.

Cost-effectiveness analysis holds the advantage of expressing the costs of an intervention in terms of outputs and outcomes that are directly meaningful to most stakeholders: the cost of "one teacher trained", "one school equipped"; "one student reached"; "one (more) word read correctly". Even in the absence of comparison across different interventions, this way of expressing costs can be motivating. As consumers, knowing the cost of something almost inevitably leads us to wonder, "Why does it cost this much to produce this output? ", and, "Could we obtain the same result at lower cost?". These are useful questions that can lead program developers and implementers to seek ways to control and reduce costs without sacrificing quality. IEP has embarked on this process.

I. INTRODUCTION

Cost effectiveness analyses based on both robust evaluation of program effectiveness and on systematic assessment of costs that are tightly linked to the implementation of the specific program evaluated, are still relatively rare in the educational evaluation literature, particularly in developing country contexts. The reasons for this continuing situation may be due to technical challenges as well as political ones (Levin, 2001; 2013), but the end result is the same, that education policy makers, managers, and other decision makers have little access to information that could help to improve the allocation and use of education resources for better outcomes.

The present study, carried out through the Quality Education in Developing Countries (QEDC) initiative funded by the William and Flora Hewlett Foundation, represents a modest effort both to demonstrate the application of rigorous cost effectiveness analysis and its challenges in a developing country context, and to produce directly useful initial results for consideration and discussion by Malian education decision-makers.[1]

The specific objective of this cost analysis study was to determine the costs of key elements of the RLL early grade reading instruction model and the cost-effectiveness of the model as a whole, in order to explore budgetary implications for its viability, scalability and transferability to other implementers and settings while preserving program quality and outcomes.

The study constitutes one part of a broader impact evaluation of the early grade reading component of the Read-Learn-Lead (RLL) program designed and implemented by Mali's Institut pour l'Education Populaire (IEP). As such, it benefits from the availability of effectiveness measures obtained through a randomized controlled trial (RCT), and applies the costs of the implementation of this same RCT program.

Specifically, the study addresses the following questions:

- What is the added cost of the RLL program as a whole (with costs of educator preparation, pedagogical support, and materials taken together), above and beyond "business as usual" in Malian primary schools?

[1] Mali's education sector and cost-effectiveness analysis are not strangers. important cost studies have been carried out on other educational programs, notably the community schools efforts of Plan International and Save the Children. See Tietjen (1999) and DeStefano, Hartwell, Schuh-Moore, and Benbow (2005).

- To what degree does maturity of implementation appear to affect costs, and cost effectiveness, of the RLL program (comparing costs and outcomes for earlier and later cohorts of the study)?
- What is the effectiveness of this added cost, relative to student learning advantages observed at the end of one year of engagement with the program (Grade 1 or Grade 2 only), and after two years (Grades 1 and 2)?
- What implications can be drawn from the results regarding the viability of the RLL approach, and its scalability to other implementers and settings?

II. METHODOLOGY

The cost analysis study was carried out in three phases.

Study phases

During Phase 1 (April – June 2011), the study team focused on identifying key cost elements and developing appropriate instruments to collect information on these elements for key RLL interventions. We also gathered an initial set of cost information through these instruments and other documents on RLL activities and expenditures as a means to build and test initial cost estimation worksheets. The specific steps undertaken included the following:

1. Obtain clarification of the range and nature of key RLL program activities in the field of early grade reading instruction, and define the key inputs into these activities.

2. Obtain initial unit cost information on the key inputs identified.

3. Develop cost-estimation worksheets on the basis of inputs and unit costs for each activity and phase of the program.

4. Prepare subsequent phases, including stabilization of data collection instruments for transfer to local consultant, and discussion of outstanding tasks with IEP.

These tasks were accomplished through a series of working sessions with IEP/RLL senior management, financial management, training, materials development, and monitoring and evaluation teams in Mali (see Attachment 1 for a list of persons contacted); and the review of available annual reports, other IEP administrative and technical documents, and the RLL baseline and 2010 follow-up study reports (IEP 2009, IEP 2010, IEP 2011; RTI International 2010a; Friedman, Gérard and Ralaingita, 2010).

During the working sessions, a collaborative and iterative process was employed to construct Excel-based estimation worksheets with input and cost data for an initial set of

illustrative RLL activities and materials, while adjusting the worksheet structure itself as needed to accommodate specific cost elements and other particularities of the RLL approach. This method helped to stabilize a reasonably exhaustive list of the critical cost elements making up each type of input, and that would be necessary to estimate total and unit costs using an "ingredients" method (see McEwan, 2011, pp. 20-23). The resulting list of inputs is provided in Attachment 2. This list was then used to design instruments for further data collection on IEP-RLL teacher training activities and pedagogical support visits, and on educational materials development and production (instruments provided in Attachment 3).[2]

The second phase of the cost study (July 2011 – December 2012) involved collection of additional cost information on all RLL trainings, support visits, and material inputs provided to experimental schools across the period of the study. We also collected and endeavored to confirm the numbers of units of each input provided to RLL program schools specifically participating in the larger evaluation (numbers of teachers and school principals trained, numbers of pedagogical support visits conducted, and numbers of RLL pedagogical materials delivered).

The units confirmation process involved the juxtaposition of information provided by teachers and school principals (collected through surveys conducted with these actors in the course of the larger evaluation), with information provided directly by IEP on the basis of the Institute's administrative records. These numbers sometimes differed substantially . For the purposes of this cost analysis, we used IEP's unit numbers, which when different were almost invariably higher than those provided by recipients, resulting in conservatively higher cost estimates.[3]

The third and final phase of the study (January – October 2013) comprised continued compilation and confirmation of incoming data, construction of analytical worksheets incorporating estimates of IEP facilities costs and participants' opportunity costs during

[2] RLL's community mobilization and service learning work was initially anticipated to be an additional key dimension for the cost study. This dimension was removed from consideration after Phase 1, however, due to the early stage of development and implementation of these activities during the period of the study, First, on the basis of IEP staff descriptions and available documentation, the majority of these activities were in an early pilot phase and their specific inputs and parameters were not yet stabilized. Second, most of these activities were as yet confined to a few schools or communities, such that it would not be possible to link them in any statistically meaningful way to the learning effects found in the sample schools of the broader impact evaluation. A listing of activities initially examined for this dimension is provided in Attachment 4.

[3] During the second phase of the study, cost, implementation, and effectiveness information on similar interventions in Mali was also attempted through interviews and review of available reports and administrative documentation on these interventions. However, data collected through these efforts were inadequate for useful comparison.

training, as well as appropriate inflation, discounting and currency adjustments, production and analysis of summary estimations, integration of effectiveness results based on student's early grade reading assessments conducted student learning measurements and preparation of this report.

Assumptions and estimations

While every effort was made during data collection to obtain the most complete and accurate cost data available, sufficiently detailed administrative records and collective memory were sometimes lacking, and estimations were required in these cases. In particular, levels of effort expended in the development phase for each type of input were estimated by IEP staff. Average IEP staff salary, Ministry salary, or consultant fee rates, as appropriate, were applied to obtain total costs of these efforts.

The program development and implementation costs presented in this paper include estimations of the costs of labor or an equivalent opportunity cost (in the case of Ministry staff who participated as trainers and as pedagogical support visit agents). In all cases an average rate for each type of actor was applied, rather than actual amounts paid. In addition, an "opportunity cost" of roughly 50% of average daily Ministry staff salary was applied for each day of participation by teachers and school heads in RLL program training.

The assignment of a given training cost to a given school year for the purposes of estimating per-student costs and cost-effectiveness posed some challenge. While determining estimated costs incurred in a given school year was relatively straightforward, that of representing the cost of inputs that might contribute to student performance over time demanded a different approach. The impact study followed the same school heads and teachers over a three-year period; these personnel, with some attrition and replacement, participated in a number of trainings across the years of the study. Our per-student "real" cost estimations at later years of the study therefore apply the cumulative costs of training. Our analyses included testing a series of assumptions about the "years of usefulness" of training and follow-up visits in terms of their value in changing teacher behavior, to illustrate the sensitivity of costs to these assumptions.

In addition, RLL trainings occurred at different times in the school year. We wanted to apply these costs appropriately, respecting the logic that teachers would need to have an opportunity to apply the new skills acquired through training, in order to realize the contribution of training received to student performance in the classroom. Thus our annual per-student cost estimations first apply the costs of trainings that occurred between April 2009 and March 2010 to the October 2009-June 2010 school year, even though the cost of some of these trainings (April through September 2009) had in fact been incurred in the previous school / study year. The same logic was applied to subsequent years.

For the estimation of costs of pedagogical school visits, an average daily transportation cost based on IEP and RTI experience in Mali was applied, although actual costs in the field could be quite different depending on type of terrain and distances traveled. The estimation is also based on an average of two schools visited per day by a team of two people, although again, circumstances, terrain, and distances involved could vary. As noted above, cost estimations include estimated salaries and fringe for both IEP staff and district Ministry (CAP) staff, who typically participated in pairs in these visits.[4]

With regard to pedagogical materials, students' RLL textbooks and writing notebooks were designed for single-year use, and are costed accordingly. Teachers' guides and picture-card sets, and sets of 100 short readers, on the other hand, were produced for use over a three-year period. We therefore pro-rated the cost of these materials across three years, using a standard 3% annual discounting factor.

Also, where reported distribution of items intended for individual use (student books and workbooks for students, and teachers' guides for teachers and school heads) in a given year exceeded the number of first and second graders, teachers, and school heads in study schools for that year, the excess was counted as "stock" and added to the following year's distribution. Any excess in the final year of the study was not counted or costed; in other words only the ""useful" numbers of material units for a given year were included in the estimation of per-student costs and cost effectiveness.

Average annual XOF-USD bank exchange bid rates (OANDA) and a standard US GDP deflator (after currency conversion) were applied to produce the results presented here.[5]

Limitations of the study

The present study did not attempt to determine with accuracy the "basic" costs of providing education in Malian elementary schools according to business as usual. In other words, the counterfactual is uncosted (although not assumed to be zero). The only costs presented and discussed in depth in this paper are the incremental, or additional, costs of applying the RLL program in schools, with the implicit assumption that these schools were also receiving standard Ministry inputs at the same level as schools in the control group. A rough estimate of current Government expenditures on primary education is made using published statistics for the illustrative cost-benefit analysis presented in the last "Results" subsection of this

[4] The worksheets developed provide toggles for inclusion or exclusion of Ministry salary and other opportunity costs, so that cost sensitivity to these elements can be examined.

[5] The estimation worksheets developed also provide toggle for the choice of exchange rate (OANDA or PPP) and deflator (US GDP or US CPI) to be used.

paper. However this estimate was not established empirically in the same manner as the RLL cost estimates, nor specifically for the control population of schools in this study (for which real expenditures may well have been higher, or lower, than the national average), and thus must be considered illustrative only.

Tentative qualitative and survey data from the larger evaluation study also suggest that our treatment of RLL program costs as purely additive may also be a conservative simplification. On average RLL program schools reported receiving fewer Ministry textbooks and other inputs relative to control schools during treatment years of the study, possibly as a result of Ministry efforts to redistribute limited resources to schools not receiving inputs from other sources. In other words, RLL inputs, while intended as additive, may in reality have been replacing the "basic" inputs provided in other schools.[6]

The different "treatments" compared in this study represent levels of intensity or length of the full set of RLL program inputs, rather than distinct, separate types of inputs. In other words, the relative proportions and costs of program elements received across the years of the study varied. However, since all types of inputs were distributed to all program schools across all years of the study, albeit in varying amounts, we are unable to establish the specific cost effectiveness of each type of input taken individually. Also, the study does not directly compare the results for Mali with other programs, however we hope that they will be useful to other researchers for this purpose.[7]

Despite these limitations, the present study offers a useful contribution, in that it represents one of still only a small number of studies that have been able to combine robust effectiveness measures from an RCT, with cost measures relating to the same study sample over the same period. And while the distinctions among the "treatments" compared in this study are those of degree rather than of fundamental differences in nature, they are still relevant to decisions that Malian decision makers now face, as they move forward with plans to extend "the RLL approach" to all schools that use Bamanankan-language reading instruction in the early primary grades.

---

[6] The data available on this phenomenon were deemed insufficiently complete or reliable to permit a solid estimation of its impact on results of the broader evaluation study.

[7] In the original design of this study, we had also hoped to examine how the cost and cost effectiveness of the RLL model compared with those of other early grade learning approaches currently or recently used in Mali, however this dimension of the study was ultimately abandoned. While some of the organizations contacted (which included USAID/PHARE; Save the Children; Unicef; and Fondation Stromm) were forthcoming and we thank them for their time and effort, the level of detail they were able to provide was not adequate to obtain estimates that would be sufficiently comparable to the RLL cost estimates.

III. RESULTS

In the following pages, study results are presented as they pertain to the specific study questions laid out at the beginning of this paper. The final study question, concerning implications for using these results in programmatic decisions, is explored in Chapter IV, Discussion.

Estimated RLL program costs overall and by type of input over time

STUDY QUESTION 1. *What is the added cost of the RLL program as a whole, above and beyond "business as usual" in Malian primary schools?*

The results of our estimations of overall RLL program costs in support of early grade reading instruction are provided in Table 1, using a conservative assumption of 3 years of usefulness of both teacher training and support visits[8].

Table 1. Summary of RLL program cost estimation results, by year and input type
(Costs associated with Songhai language group excluded)[9]

INPUT OR OTHER COST CATEGORY	Develop-ment costs	IMPLEMENTATION COSTS (presented in 2009 USD)					
		Year 0 (2008-2009)	Year 1 (2009-2010)	Year 2 (2010-2011)	Year 3 (2011-2012)	Total implemen-tation cost	%
Teacher & school head training	$ 21,026	$7,747	$15,015	$17,909	$10,911	$51,582	18%
Pedagogical support visits	$ 5,090		$45,581	$60,197	$20,775	$126,552	45%
Pedagogical materials - total cost	$ 36,766		$22,494	$38,111	$43,263	$103,869	37%
TOTAL DIRECT COSTS	$ 62,882	$7,747	$83,090	$116,217	$74,949	$282,003	100%
IEP facilities cost est. at 12%	$ 7,546	$930	$9,971	$13,946	$8,994	$33,840	
Total direct cost plus facilities	$ 70,428	$8,677	$93,061	$130,163	$83,943	$315,843	
Development cost as % of total	18%	Total cost on average per school (38 schools)				$8,312	

Source: All figures in this table were estimated on the basis of data collected during the study.

[8] This assumption applies straight-line depreciation of total cost over the period of X years of usefulness (3 years in the scenario shown), with "annual" cost diminishing at a constant rate over the period until it has a value of 0 at year X + 1.

[9] Costs shown in this table are those used in the cost-effectiveness analysis presented in this report. They exclude costs incurred for the Songhai-language group, as effectiveness measures for that group at endline could not be obtained (see Spratt, King, and Bulat, 2013). Costs associated with program implementation for the Songhai language group for earlier study years may be found in Attachments 5 and 6.

The amounts presented in Table 1 were calculated on the basis of estimated input unit costs and the reported numbers of units provided to experimental schools for each year, language group, and unit type. All costs are adjusted for inflation, currency exchange, and discounting where called for, and presented in 2009 USD. The underlying unit costs and numbers of units are provided in Attachment 5 (for teacher and school head training inputs) and Attachment 6 (for pedagogical support visits and materials).[10]

According to these estimates, development of the RLL program cost a total of about $70,428 in 2009 USD, or 18% of all costs associated with bringing the program to 38 experimental schools over the three years of the study. Because the costs of program development are also applicable to other schools reached by the program that are not within the experimental group considered here, both during and beyond the 3 years of the study, these “investment” costs are provided for information but do not figure into subsequent analyses.

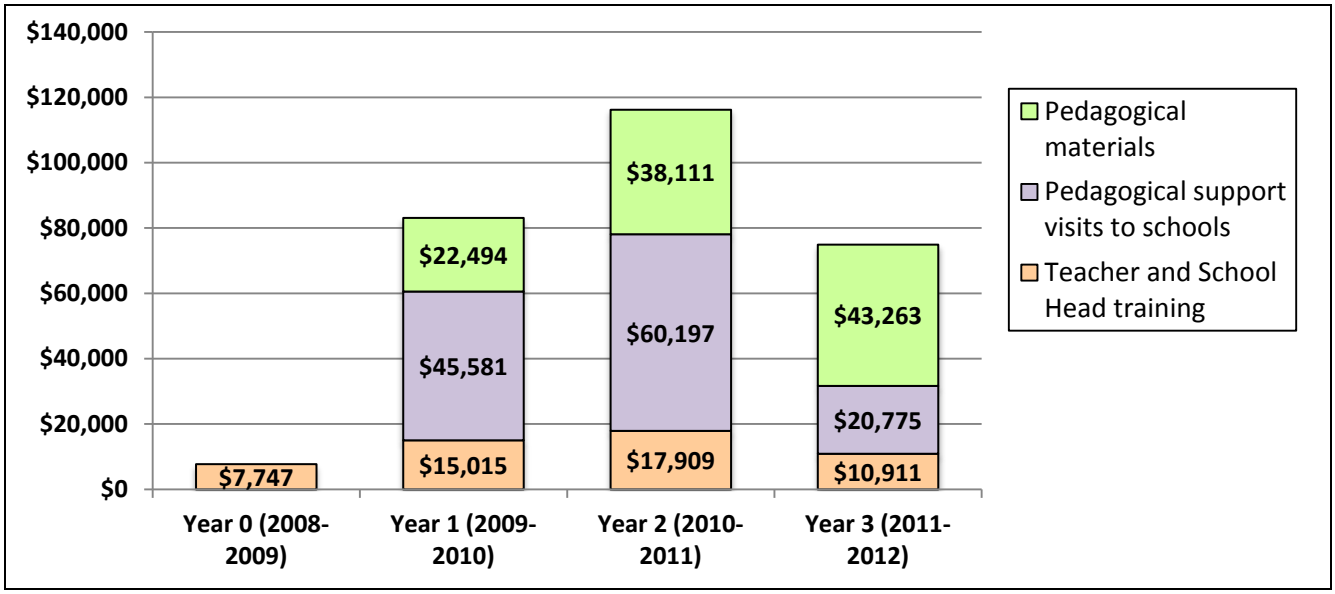
Program implementation in the 38 experimental schools (in other words, schools for which effectiveness information is available at baseline, after Year 1, and after Year 3 of the program), cost a total of $315,843 in 2009 USD, or $8,312 on average per school, or $21.50 per student annually, above and beyond Ministry and community inputs to the infrastructure and functioning of the school. For comparison, using published statistics (World Bank, 2013), the Malian government spent roughly $87.19 in 2009 USD per primary school student per year during the 2008-2011 period.[11]

Turning to the distribution of spending by type of input and year we note that according to this scenario (of 3 years of usefulness of training and school visits), the training of teachers and school heads represented 18% of total implementation spending (Table 1), ramping up to peak during Year 2, with some reduction at Year 3 (Figure 1).

[10] More detailed worksheets, used to produce these unit costs with appropriate adjustments for inflation, currency exchange, and annualized discounting, are available upon request.

[11] The cost of one year of primary education in Mali is estimated from World Bank (2013) EdStats database indicators on Malian GDP per capita for 2008, 2009, 2010, and 2011 and on per-student cost of primary education as % of GDP per capita for the same years, deflated to 2009 USD and averaged across years.

Figure 1. Evolution of RLL program implementation costs by type of input, 2008-2009 to 2011-2012



Spending on pedagogical materials, representing 37% of total RLL implementation spending, displays a somewhat different pattern. Under the assumption that training and support visits had continuing usefulness over 3 years, the cost of pedagogical materials increased from Year 1 to Year 3, as more types of materials became available (see Table 2 below).

The most striking feature of the costs of implementation of the RLL program is the proportion spent on pedagogical support visits, particularly in Years 1 and 2. Overall, these costs account for 45% of all implementation spending, even with pro-rating of costs over 3 years of usefulness. These pedagogical support visits were for the most part carried out by an IEP staffer and a district Ministry (CAP) staffer together, and followed a set process of classroom observation, student spot assessment, and advisory discussion with school educators during each half-day visit. The visits involved frequent, focused spot-training in the teacher's own setting, a modality that has been shown in certain contexts to improve teacher practice more effectively than grouped, off-site training sessions. It is noteworthy that IEP has recognized the relatively high cost of this element of its RLL program, and over the years of the study instituted various measures to bring down this cost considerably (see Table 2 and following discussion).

The variations observed in the costs of a given program input across study years reflect changes in input delivery, summarized in Table 2. These changes in input delivery affected both unit costs, in some cases, and the number of units delivered per year, which together account for total annual costs. As mentioned above, detail on unit costs and units delivered per year may be found in Attachments 5 and 6.

Table 2. Summary of nature and changes in input delivery across program years

STUDY YEAR	Summary of nature and changes in input delivery across program years		
	Teacher and school head training	**Pedagogical support visits to schools**	**Pedagogical materials provided**
Year 0 (2008 - 2009)	Initial **5-day** RLL training provided to all School Heads and G1 and G2 teachers. Average participant / trainer ratio: **10.6 to 1**	- - -	- - -
Year 1 (2009 - 2010)	All school heads and G1 and G2 teachers received **3 days** of training on RLL book 1. Average participant / trainer ratio: **13.3 to 1**	IEP and Ministry support agents received per diem as well as transportation costs for each visit. Average number of half-day visits received per school during the year: **36 visits / year**	RLL Student book and writing workbook Level 1 provided to G1 and G2 students. RLL Teacher book Level 1 provided to G1 & G2 Teachers and school heads. Picture-card sets provided to all schools; sets of 100 short readers provided to Bamanankan schools only.
Year 2 (2009 / 2010)	All school heads and G1 and G2 teachers received **3 days** of training on RLL Book 2 at end Y1 (costs applied to Y2). Newly incoming teachers not previously trained received a **3-day** catch-up training. Average participant / trainer ratio: **12.9 to 1**	IEP and Ministry support agents received transportation costs only for each visit. Average number of half-day visits received per school during the year: **35 visits / year**	RLL Student book and writing workbook Levels 1 & 2 provided to G1 & G2 students. RLL Teacher books Levels 1 & 2 provided to G1 & G2 teachers and school heads. Additional sets of 100 short readers provided to Bamanankan schools only.
Year 3 (2011-2012)	All school heads and G1 and G2 teachers received **3 days** of refresher training (training received at end Y2, costs applied to Y3). Average participant / trainer ratio: **12.9 to 1**	IEP and Ministry support agents received transportation costs only for each visit. Average number of half-day visits received per school during the year: **11 visits / year**	RLL Student book and writing workbook Levels 1 and 2 provided to G1 and G2 students. RLL Teacher books Level 2 provided to G1 & G2 Teachers and school heads. Sets of 100 short readers provided to Bomu and Fulfulde schools.

Source: Data collected from IEP in the course of study fieldwork.

As shown in Table 2, training delivery varied both in the number of days of training provided and the ratio of trainers to training participants, which together contributed to higher per-participant training costs in Year 0 than in subsequent years. Conversely, the cost of providing pedagogical support visits was brought down from Year 1 to Year 3, both due to a

cost-controlling measure taken at Year 2 of removing a per diem payment to agents conducting visits, and to a sharp reduction at Year 3 in the number of visits conducted with each school (from about 4 visits per month in Years 1 and 2, to just over 1 visit per month). Finally, the distribution of pedagogical materials to schools followed the availability of materials, with certain materials (notably, Level 2 student books, workbooks and Teachers' guides) not ready for distribution until Year 2, and others (notably, the sets of 100 short readers) only available in Bamanankan language until Year 3, when Bomu and Fulfulde sets became available.

The total amounts presented above, when translated into **average annual cost per student**, offer a similar picture, summarized in Table 3 and Figure 2 below. Basic annual per-student costs are obtained by dividing the total implementation cost for the year (from Table 1) by the total number of students served in that year. Costs of RLL teacher training that occurred in Year 0 (2008-2009), prior to the program's launch in schools, are included with Year 1 costs.

Table 3. Number of students and estimated per-student costs of program implementation, by type of unit and study year

TYPE OF INFORMATION	Year 1 (2009-2010)	Year 2 (2010-2011)	Year 3 (2011-2012)
Total number of Grade 1 and Grade 2 students served (a)	4846	5093	4752
ESTIMATED PER-STUDENT COSTS OF IMPLEMENTATION (b)			
Teacher and school head training cost per student	$5.26	$3.94	$2.57
Pedagogical support visit cost per student	$10.54	$13.24	$4.90
Pedagogical materials cost per student	$5.20	$8.38	$10.20
Estimated per-student cost of exposure to 1 year of RLL (c)	$21.00	$25.56	$17.66
Total cost per student of exposure to 2 years of RLL (d)		$46.56	$43.22

Source: All figures are estimated on the basis of data collected during the study.

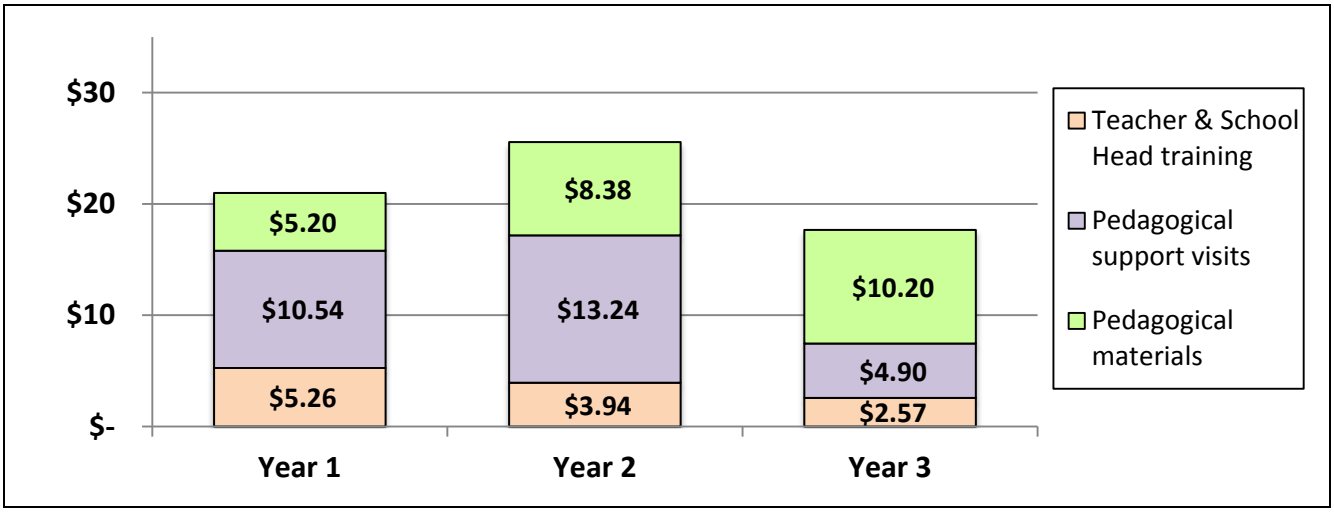
(a) "Total number of students served" excludes the Songhai language group, as effectiveness measures for that group at endline could not be obtained.

(b) Estimated per-student costs are calculated by dividing total costs for each input shown in Table 1, by the total number of students served during the same year. At Year 1, teacher training costs from Year 0 are also included. The estimated 12% IEP facilities cost is applied to all per-student cost estimations shown.

(c) "Estimated per-student cost of exposure to 1 year of RLL" is the sum of per-student costs for all RLL inputs for that year.

(d) "Estimated per-student cost of exposure to 2 years of RLL" is the sum of current and previous year total per-student costs.

Figure 2. Evolution of per-student costs of program implementation, by type of input and study year



With actual costs of teacher training and pedagogical support visits prorated over a three-year period, we note that per-student costs of implementing the program were highest in Year 2 (at almost USD 26 per student), but came down considerably to under USD 18 by Year 3, with pedagogical materials overtaking school visits as the largest input in the same year. It should be noted that RLL took the decision to provide single-use books to children each year, such that these inputs would need to be replenished for every new cohort of children. In literacy-resource-poor environments such as Mali, the benefit of children having books to keep was anticipated to outweigh the recurrent cost.

Cost effectiveness of RLL program in different doses and at different moments in time

The relative cost-effectiveness of the RLL program for several input-mix variants across the years of the study is presented in Table 4 and Table 5 below. Basic per-student costs obtained for Year 1 and for Year 3 of program implementation are combined with effect sizes obtained for the same experimental groups through the RCT portion of the study, to calculate standardized cost-effectiveness measures representing the per-student cost of achieving 0.2 sd gain on a given reading measure. The statistics underlying the effect sizes shown are provided in Attachments 8 (Year 1) and Attachment 9 (Year 3).

STUDY QUESTION 2: **To what degree does maturity of implementation appear to affect costs, and cost effectiveness, of the RLL program**?

"Maturity of program implementation" as defined for our purposes, refers to anticipated improvements in quality of training and support provided (by virtue of program agents' practice and repetition), and the degree of availability of the intended set of program materials, with each year of program implementation. To address this question, the study design permits us to compare the cost-effectiveness results for Grade 1 students at end Year 1 and at end Year 3 (see Table 4).

Table 4. Estimation of RLL program cost-effectiveness at Grade 1 by maturity of treatment, on selected EGRA measures

EGRA COMPONENT	Average Experimental group score	Experimental Effect size	Per-student cost	Cost of 0.2 sd improvement	Average cost of 0.2 sd improvement
Grade 1 results at end Year 1: RLL program at a "less mature" state of implementation					
Letter knowledge	10.6 lpm (a)	0.763	$21.00	$5.51	$13.35
Familiar word reading	1.6 wpm (a)	0.502		$8.36	
Decoding of new words	0.7 wpm	0.173		$24.29	
Oral reading fluency	0.8 wpm	0.275		$15.25	
Grade 1 results at end Year 3: RLL program at a "more mature" state of implementation					
Letter knowledge	7.2 lpm	0.594	$17.66	$5.95	$12.78
Familiar word reading	1.0 wpm	0.207		$17.07	
Decoding of new words	1.2 wpm	0.274		$12.89	
Oral reading fluency	3.8 wpm	0.232		$15.23	

Source: Year 1 and Year 3 average scores and effect sizes are estimated on the basis of RLL impact evaluation data.[12] Per-student costs are repeated from Table 3.

(a) Note, "lpm" refers to "letters read correctly in one minute"; "wpm" to "words read correctly in one minute".

The estimations in Table 4 suggest that the "more mature" program, at Year 3, was only marginally more cost-effective than it was in its first year of implementation, with roughly equivalent costs to produce a 0.2 standard deviation of gain in each skill. The program had almost identical cost-effectiveness at Year 3 for imparting the most basic skill in the set

[12] For Year 1, average scores and effect size data are recalculated on the basis of 2010 follow-up study data to exclude Songhai language group and certain controls that had been applied in Friedman, Gérard and Ralaingita (2010), and so differ somewhat from the results presented in that paper. Year 3 average scores and effect size data are drawn directly from Spratt, King, and Bulat (2013).

(letter knowledge) as it did in Year 1; the same is true for the most advanced skill (oral reading fluency).

On familiar word-reading, the program appeared to be more cost-effective in its very first year than it was two years later. These results present a caution, in that early effects of an intervention program may not always be sustained, let alone improved, over time. One possible explanation is that, despite the accumulated benefits of training, supervision, and teachers' own practice, the energy and attention with which teachers may embrace and implement a new program early on, can wane in later years.

It is noteworthy that only on word decoding (ability to decipher "new" words using phonics principles and letter-sound knowledge) did RLL program maturity seem to result in a more cost-effective outcome. Of all four skills, new word decoding is arguably the most distinctly novel to teachers and students, and relies heavily on practice with phonics – an instructional approach emphasized in the RLL program and much less so in traditional schools. The greater cost-effectiveness of RLL in Year 3 on this specific skill, may reflect a learning curve in implementing this kind of practice, not only on the part of teachers, but of trainers and supervisors .

STUDY QUESTION 3: What is the effectiveness of the RLL program added cost, relative to student learning advantages observed at the end of one year of engagement with the program, and after two years?

To address this question, the study design permits the comparison of cost-effectiveness at Year 3, between Grade 1 students (who had been exposed to the first year of the RLL program only), and Grade 2 students (who had been exposed to the full two years of the RLL program). Results are presented in Table 5.

Table 5. Estimation of RLL program cost-effectiveness after one year (Grade 1) and two years (Grades 1 and 2) at Year 3, on selected EGRA measures

EGRA COMPONENT	Average Experimental group score	Experimental Effect size	Per-student cost	Cost of 0.2 sd improvement	Average cost of 0.2 sd improvement
Grade 1 results at end Year 3: RLL program at a "more mature" state of implementation					
Letter knowledge	7.2 lpm (a)	0.594	$17.66	$5.95	$12.78
Familiar word reading	1.0 wpm (a)	0.207		$17.07	
Decoding of new words	1.2 wpm	0.274		$12.89	
Oral reading fluency	3.8 wpm	0.232		$15.23	

EGRA COMPONENT	Average Experimental group score	Experimental Effect size	Per-student cost	Cost of 0.2 sd improvement	Average cost of 0.2 sd improvement
Grade 2 results at end Year 3: RLL program at a "more mature" state of implementation					
Letter knowledge	16.5 lpm	0.664	$43.22	$13.02	$15.73
Familiar word reading	5.4 wpm	0.672		$12.86	
Decoding of new words	4.4 wpm	0.524		$16.50	
Oral reading fluency	7.8 wpm	0.421		$20.53	

Source: Year 3 average scores and effect sizes are drawn directly from Spratt, King, and Bulat, 2013. Per-student costs are repeated from Table 3.

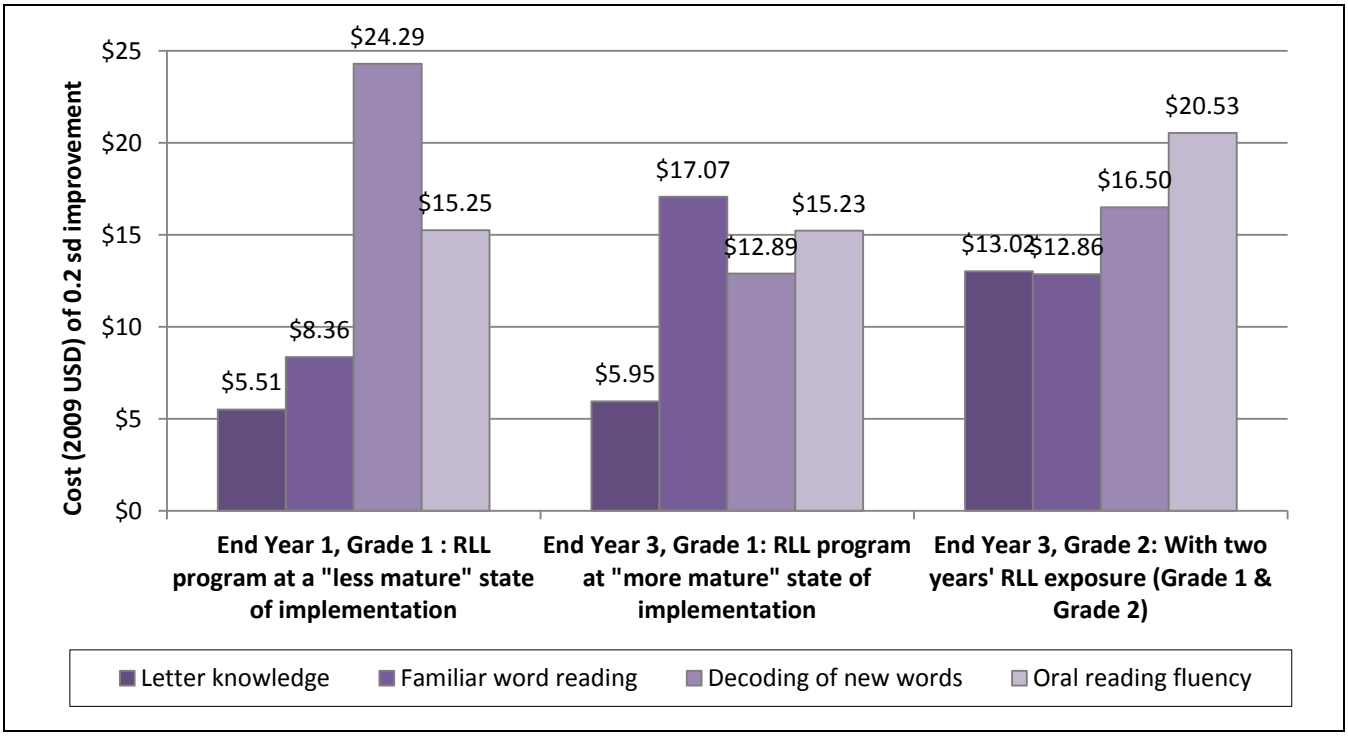
(a) Note, "lpm" refers to "letters read correctly in one minute"; "wpm" to "words read correctly in one minute".

In Table 5, we note that overall, one year of provision of the RLL program to Grade 1 students cost a total of $17.66, while two years of provision, representing the sum of the cost of Grade 1 provision from year 2 ($25.56, from Table 3) with that of Grade 2 provision at year 3 ($17.66), had a total cost of $43.22.

Combined with the effect sizes achieved, the results of these estimations suggest that Grade 1 provision alone is more cost-effective than providing the full two-year program across Grades 1 and 2, for letter knowledge and new word decoding, and to a lesser extent for oral reading fluency. Only for familiar word reading, do the results suggest greater cost-effectiveness of the full two-year program (with a cost of $12.86 per 0.2 sd gain for the two-year program, versus $17.07 for the first year only).

Figure 3 below presents a summary of the contrasts of cost-effectiveness shown in Table 4 and Table 5 by EGRA subtask, RLL program year and level of exposure.

Figure 3. Per-student cost of 0.2 sd gain in student performance, by EGRA subtask and year and length of RLL exposure



While cost-effectiveness did not consistently decline for all skills as the RLL program year or length of exposure to implementation increased, it is worth noting that cost-effectiveness across skills converged, becoming more similar particularly by Grade 2 in Year 3. This finding reflects a convergence of gains across the four reading skill areas, possibly as teachers consolidate their instructional practice to address all areas, and as children themselves display the cumulative effect of compounding of interdependent skills.

Two more findings from the study, while they do not provide direct responses to our study questions, bear mention as they illustrate some additional issues. At Year 1, Grade 2 teachers and classes received the same set of inputs as their Grade 1 counterparts, although these inputs covered only RLL Level 1 (intended for Grade 1). At Year 3, the evaluation study measured the reading performance of Grade 3 students who had participated in RLL at Year 1 (Grade 1) and Year 2 (Grade 2), followed by one year (Grade 3) of instruction in a regular (non-RLL) classroom.

Estimating the cost-effectiveness of these two additional “variants” in RLL program implementation produced the results shown in Table 6.

Table 6. Estimation of RLL program cost-effectiveness for Grade 2 at Year 1, and for Grade 3 at Year 3, on selected EGRA measures

EGRA COMPONENT	Average Experimental group score	Experimental Effect size	Per-student cost	Cost of 0.2 sd improvement	Average cost of 0.2 sd improvement
Grade 2 results at end Year 1: One year of exposure to RLL Level 1 inputs only					
Letter knowledge	19.7 lpm (a)	0.369	$21.00	$11.39	$31.15
Familiar word reading	5.1 wpm (a)	0.331		$12.69	
Decoding of new words	2.8 wpm	0.080		$52.23	
Oral reading fluency	3.5 wpm	0.087		$48.30	
Grade 3 results at end Year 3: Two years of RLL (Grade 1 in Year 1, & Grade 2 in Year 2), followed by Grade 3 in "regular" non-RLL class					
Letter knowledge	22.7 lpm	0.180	$46.56	$51.73	$43.59
Familiar word reading	9.2 wpm	0.260		$35.81	
Decoding of new words	7.6 wpm	0.285		$32.67	
Oral reading fluency	11.0 wpm	0.172		$54.13	

Source: Year 1 and Year 3 average scores and effect sizes are estimated on the basis of RLL impact evaluation data (See Attachments 8 and 9). Per-student costs are repeated or calculated from Table 3.

(a) Note, "lpm" refers to "letters read correctly in one minute"; "wpm" to "words read correctly in one minute".

The data in Table 6, presenting the least cost-effective outcomes among all of the variants presented, demonstrate some important lessons.

Regarding the results for Grade 2 at Year 1, we may conclude that providing inputs that were not designed for the grade level in question, can be a very costly proposition, with little benefit to students: For word decoding and oral reading fluency in particular, achieving 0.2 sd of gain by providing Grade 2 teachers and classrooms with RLL level 1 inputs cost more than twice to three times what it cost for the same level of gain among Grade 1 students.

Turning to the question of longer-term effectiveness and cost-effectiveness of the RLL program after exposure to it has ended, the Grade 3 results provide a sobering picture. These results suggest that even at a modest distance (one year out) from direct program participation, the cost of provision during the period of participation to produce more lasting gains can be considerably higher than the cost of producing immediate gains.

A parameter that underlies all of these results but is not statistically examined in this paper, is the generally low level of performance on any measure, even after two years of exposure to the RLL program. While Mali has officially proclaimed a curriculum target of 31 words per minute reading fluency by the end of Grade 2, and 45 words by Grade 3 (MEALN, 2011), the

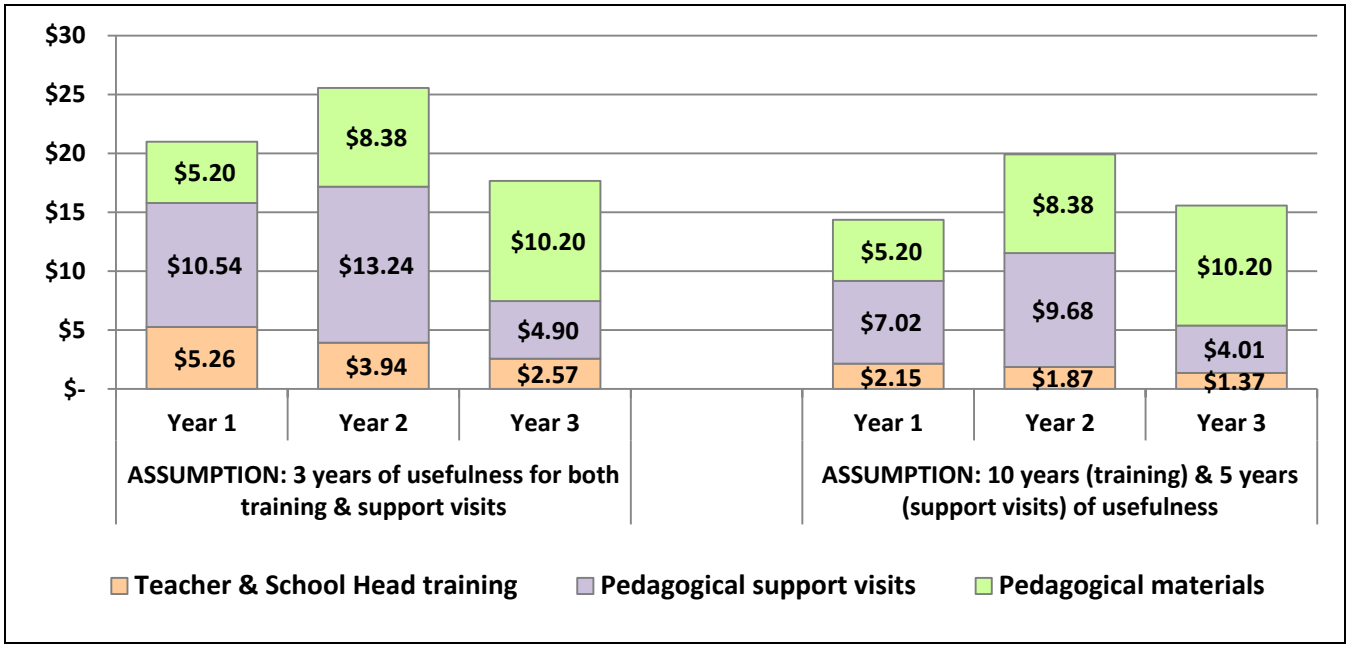
average levels achieved on oral reading fluency by any group in the evaluation study fell well below the Grade 2 target. This finding is important in light of the hypothesis, supported by compelling evidence (Abadzi, 2011; Gove and Cvelich, 2011), that reaching some minimum threshold of reading performance (generally at least 40 words per minute, or more depending on the language), is critical before reading skills are "acquired" to any lasting degree, or capable of sustaining or supporting further learning. The Grade 3 results obtained in the larger evaluation provide an example of what may happen when an intervention is stopped before such a minimum level of performance is achieved. When examined in terms of cost-effectiveness, the relatively high cost of withdrawing the intervention too soon, can also be appreciated.

Methodological considerations in estimating cost and cost-effectiveness of educational inputs with "lasting" effects

As noted in the methodological section of this paper, the estimations presented here required the application of a number of assumptions, most importantly that of how long into the future the benefits or effects of RLL's training and school visits could be expected to continue to influence a teacher's or school's practices. Conservatively, the estimations presented in the previous sections of this paper assumed a period of only 3 years – roughly, the period of the study, after which the contribution to teachers' practice of the initial training and support visits received in Year 1, was assumed to be "zero" (though these inputs made in Year 2 and Year 3 of the program, would continue to have an effect 1 and 2 years, respectively, after the end of the study). On the whole, this assumption produces a relatively high cost.

In fact, the estimations can vary greatly, depending on the assumed period of "usefulness" posited for a given important input (in our case, trainings and support visits received). To illustrate, consider the per-student cost estimations based on an assumption of 10 years of usefulness of teacher training and 5 years of usefulness of support visits, relative to 3 years (Figure 4).

Figure 4. Comparison of per-student cost estimations based on different assumptions about period of usefulness of RLL program inputs



This example illustrates that the estimation of cost (and cost-effectiveness) can be highly sensitive to the assumptions we apply.[13] In Figure 4 we note that overall, the first set of assumptions (positing 3 years of usefulness for both training and support visits) produces total costs that are considerably higher, especially in the early years, than the second set, which spreads total costs for training and support visits over longer periods.

We also note that, depending on our assumptions, the proportions of costs by type of input for a given year change. In this example, pedagogical materials (whose cost is not affected by the assumptions being varied) represent a greater proportion of total per-student costs under the second set of assumptions.

Finally, we see that our assumptions affect the relative total cost of the program earlier and later on in the program. The first set of assumptions leads to a per-student cost that is lower at Year 3 than it was at Year 1. The second set, however, leads to a slightly higher per-student cost at Year 3 relative to Year 1. These differences would directly affect cost-effectiveness estimations as well.

[13] All estimations incorporate prorating of total cost or value across the period of usefulness, with linear decline toward 0 reached in the year following the last year in the period.

Program budgeting assumptions and decisions themselves often build on costing projections such as these. Researchers as well as decision-makers and other consumers of cost-effectiveness analysis need to be mindful of these sensitivities in the choice of realistic assumptions as well as in the interpretation and application of results.

Illustrative cost-benefit estimation[14]

Up to this point, our cost-effectiveness analyses have been applied only over a very short term, namely, the period of the study. We have also confined the analysis to an illustration of the relative cost-effectiveness of "variants" within a single intervention program.

We turn now to a more speculative, but longer-term and potentially more broadly applicable cost-benefit estimation of the RLL program relative to "business as usual" in non-program schools, using the following parameters:

1. Calculating control-group inter-grade gains at baseline gives us a sense of "typical" skill progression in Malian Curriculum schools.

2. Difference-in-difference results at Endline provide an estimation of the additional gains achieved due to the RLL program by Year 3.

3. Deriving the per-student cost of a typical year of primary school from published statistics, we can then estimate the cost of a one-point gain in reading skills according to "business as usual". This cost estimate is obtained by dividing per-student cost by the average inter-grade gain observed in the control group, and adjusting to approximate the proportion of a child's total learning during an early primary grade year that is represented by reading skills (here proposed at 33% of total learning).

4. Multiplying this "typical" cost of one-point gain by the additional gain produced by the RLL program, offers a means of estimating the "benefit" of the additional gain produced by the RLL program in monetary terms.

The results of these calculations are presented in Table 7.

[14] The authors thank Luis Crouch for proposing this cost-benefit simulation to complement the cost effectiveness estimations. It illustrates a simple approach to "monetizing" the gains produced by the RLL program, and to simulating the extension of the program several years into the future, as a means to better appreciate the possible positive returns of the program over time relative to continuation of the status quo.

Table 7. Estimation of "typical" and RLL program gains and their monetized value

ELEMENT OF ESTIMATION	Letter knowledge	Familiar word reading	Decoding of new words	Oral reading fluency
AVERAGE CONTROL-GROUP SCORES AT BASELINE				
Grade 1	5.301	0.319	0.199	0.482
Grade 2	13.003	2.153	1.332	1.910
Grade 3	16.206	3.754	2.589	3.994
AVERAGE CONTROL-GROUP SCORES AT ENDLINE				
Grade 1	3.871	0.370	0.382	2.997
Grade 2	8.881	0.812	0.865	3.962
Grade 3	16.427	5.143	4.424	7.361
AVERAGE "BUSINESS AS USUAL" INTER-GRADE GAINS (a)				
G1 to G2	6.356	1.138	0.808	1.196
G2 to G3	5.374	2.966	2.408	2.742
Average	*5.865*	*2.052*	*1.608*	*1.969*
DIFFERENCE-IN-DIFFERENCES FOR RLL AT ENDLINE				
Grade 1	4.614	0.503	0.618	0.974
Grade 2	8.998	4.514	2.954	3.635
Grade 3	3.086	2.696	2.323	2.129
Average	*5.566*	*2.571*	*1.965*	*2.246*
ESTIMATION OF "TYPICAL" COST AND APPLICATION TO RLL GAINS (b)				
Average per-student cost of one year of primary education in 2009 USD				$87.19
"Typical" cost of one point gain	$4.95	$14.15	$18.06	$14.74
ESTIMATION OF MONETIZED ADDITIONAL GAIN DUE TO THE RLL PROGRAM (c)				
Grade 1	$22.86	$7.13	$11.17	$14.37
Grade 2	$44.59	$63.93	$53.40	$53.65
Grade 3	$15.29	$38.19	$41.99	$31.42
Average	$27.55	$36.38	$35.48	$33.11

Sources: Control-group average EGRA scores at baseline and endline, and difference-in-differences statistics for RLL at endline are based on the results of the RLL impact evaluation study (see Attachment 9). The cost of one year of primary education in Mali is estimated from World Bank (2013) EdStats database indicators on Malian GDP per capita for 2008, 2009, 2010, and 2011 and on per-student cost of primary education as % of GDP per capita for the same years, deflated to 2009 USD and averaged across years.

(a) Average "business as usual" inter-grade gains represent the average of inter-grade gains observed in the control group at baseline and at endline for each interval and overall.

(b) Estimation of the "typical" cost of one point gain for each EGRA subtask represents the average per-student cost of one year of primary education multiplied by 33% to represent reading as a proportion of all skills children learn during the early grades, divided by the average "business as usual" inter-grade gain for that subtask.

(c) Estimation of the monetized additional gain due to RLL represents the "typical" cost of one point gain, multiplied by the average difference-in-differences obtained for RLL at endline.

By comparing average control-group inter-grade gains to the difference-in-differences gains attributable to RLL participation at endline, we can appreciate that in most instances, participation in the RLL program has added roughly the equivalent of a full year's worth of

schooling, and in some cases more, above and beyond what typical schooling alone produced. We turn next to exploring whether this advantage appears to be "worth" its cost.

Applying the costs of the RLL program and its estimated monetized gains, or benefits, in an internal rate of return model, we can obtain rough estimates of the **cost-benefit** of the program, relative to business as usual. Three sets of assumptions are applied in the models below, to illustrate the sensitivity of the analysis and to provide a range of outputs for consideration.

An important point to note is that in any investment, including education, the highest costs are typically incurred early in the process, and the benefits then flow for a period of time. Thus, to fully appreciate the comparison between costs and benefits of an investment such as RLL, one has to consider impact over a reasonably long period: usually the "useful life" of the change that was created by the investment.

In the scenarios below, we posit a conservative 10-year useful life, under the assumption that on average, teachers reached by the RLL interventions would likely continue teaching in the early grades for another 10 years. The tables below also present internal rates of return for shorter periods, to illustrate the sensitivity of the rate of return calculation to the useful life assumption, as well as the losses that can be incurred when an effective program is discontinued after just a few years.

Table 8. Simulation / Estimation of RLL program cost-benefit: Scenario 1 (low end)

SCENARIO	Year	Cost of RLL program	Benefit of RLL program	Benefit - cost	Internal Rate of Return(a)
Scenario 1: "MODEST" Assumes average Letter Knowledge level of benefit (from Table 7). Full value of this benefit is reached only at Year 4. Training, support visits AND materials at Year 3 level continue through period of simulation.	Year 1	$33.09	$0.00	-$33.09	- - -
	Year 2	$25.66	$9.19	-$16.47	- - -
	Year 3	$17.22	$18.39	$1.17	- - -
	Year 4	$17.22	$27.58	$10.36	-44%
	Year 5	$17.22	$27.58	$10.36	-23%
	Year 6	$17.22	$27.58	$10.36	-11%
	Year 7	$17.22	$27.58	$10.36	-4%
	Year 8	$17.22	$27.58	$10.36	1%
	Year 9	$17.22	$27.58	$10.36	5%
	Year 10	$17.22	$27.58	$10.36	**8%**

NOTE: "Cost of RLL program" for Years 1, 2, and 3 presents actual costs in the year incurred, with no assumption of prorating or previous discounting (but using real 2009 dollars).

(a) The IRR presented on a given line represents the IRR that would be achieved over the entire period from Year 1, ending in the year in which it is presented.

Scenario 1 assumes a relatively modest level of RLL benefit (taking the average Letter knowledge level estimated in Table 7), and a relatively high level of additional input to sustain this benefit after Year 3. In this scenario, the RLL program would begin to show a positive rate of return after 8 years only, and would reach a modest 8% rate of return if allowed to run for 10 years. If this scenario were extended over 15 years (not shown), its internal rate of return would reach 13%.

To appreciate these IRR estimates as well as those presented in the next two tables, note that the median rate of return of World Bank projects over the period 1980-2004 was 15%; for education sector projects it was 19% (Herrera, 2005). A standard rule of thumb is that development projects should reach a minimum 12% rate of return. Scenario 1, even over a 15-year period, barely meets this standard.

Contrast this result with Scenario 2, presented in Table 9.

Table 9. Simulation / Estimation of RLL program cost-benefit: Scenario 2 (mid level)

SCENARIO	Year	Cost of RLL program	Benefit of RLL program	Benefit - cost	Internal Rate of Return(a)
Scenario 2: "MODERATE" Assumes average Oral Reading Fluency level of benefit (from Table 7) Full value of this benefit is reached only at Year 4. Only support visits and materials continue at Year 3 level through period of simulation.	Year 1	$33.09	$0.00	-$33.09	- - -
	Year 2	$25.66	$11.05	-$14.62	- - -
	Year 3	$17.22	$22.10	$4.88	- - -
	Year 4	$14.96	$33.15	$18.19	-25%
	Year 5	$14.96	$33.15	$18.19	-5%
	Year 6	$14.96	$33.15	$18.19	6%
	Year 7	$14.96	$33.15	$18.19	13%
	Year 8	$14.96	$33.15	$18.19	17%
	Year 9	$14.96	$33.15	$18.19	20%
	Year 10	$14.96	$33.15	$18.19	**22%**

NOTE: "Cost of RLL program" for Years 1, 2, and 3 presents actual costs in the year incurred, with no assumption of prorating.

(a) The IRR presented on a given line represents the IRR that would be achieved over the entire period from Year 1, ending in the year in which it is presented.

Scenario 2 assumes a moderate level of RLL benefit (applying the average Oral Reading Fluency subtask level estimated in Table 7), and a moderate level of additional input (only supervision and materials) to sustain this benefit after Year 3. In this scenario, the RLL program would begin to show a positive rate of return if the program were to run for 6 years, and would reach a respectable 22% rate of return if it continued over 10 years.

Finally, we turn to a more optimistic and ambitious scenario, presented in Table 10.

Table 10. Simulation / Estimation of RLL program cost-benefit: Scenario 3 (high-end)

SCENARIO	Year	Cost of RLL program	Benefit of RLL program	Benefit - cost	Internal Rate of Return(a)
Scenario 3: "AMBITIOUS" Assumes high Oral Reading Fluency level of benefit (Grade 2 level from Table 7) Full level of this benefit is reached only at Year 4. Training, support visits and materials return to (higher) Year 2 levels through period of simulation.	Year 1	$33.09	$0.00	-$33.09	- - -
	Year 2	$25.66	$17.88	-$7.78	- - -
	Year 3	$17.22	$35.76	$18.55	-36%
	Year 4	$25.66	$53.65	$27.98	6%
	Year 5	$25.66	$53.65	$27.98	23%
	Year 6	$25.66	$53.65	$27.98	32%
	Year 7	$25.66	$53.65	$27.98	37%
	Year 8	$25.66	$53.65	$27.98	40%
	Year 9	$25.66	$53.65	$27.98	42%
	Year 10	$25.66	$53.65	$27.98	**43%**

NOTE: "Cost of RLL program" for Years 1, 2, and 3 presents actual costs in the year incurred, with no assumption of prorating.

(a) The IRR presented on a given line represents the IRR that would be achieved over the entire period from Year 1, ending in the year in which it is presented.

Scenario 3 represents a relatively high level of RLL benefit (applying the Oral Reading Fluency subtask level estimated for Grade 2 in Table 7), but also a high level of additional input (training, supervision and materials at Year 2 level) to sustain this benefit after Year 3. In this scenario, the RLL program would begin to show a very respectable rate of return (23%) if it ran for just 5 years, and would reach a very high 43% rate of return if continued for 10 years.

The results of these models differ considerably – from an 8% rate of return over 10 years based on modest assumptions of program benefits and moderate continuing investments, to a 43% rate of return using an optimistic assumption of benefits but also a rather ambitious continued investment in the program. Such a broad range of possible outcomes illustrates the complexity of choices facing decision-makers. More importantly, it illustrates the sorts of considerations that can affect whether an investment such as those contemplated here is deemed to be socially profitable or not. At the same time, even with moderate assumptions, our simulations suggest that the RLL program (or programs with similar cost and impact profiles) would be a worthwhile investment if sustained for at least 10 years.

This last point underscores the importance of what seems too often lacking in the education sector: a commitment to long-term investment – not only of funding, but in terms of

continuing to implement a specific intervention demonstrated to be effective. When educational approaches are selected, launched, and changed mid-course for reasons of politics or convenience rather than for their technical soundness, any potential long-term returns they might have had, may never be realized. While the greatest costs are typically incurred in the present or near future, the benefits are fully reaped only over a longer period.

IV. DISCUSSION

The cost, cost-effectiveness, and cost-benefit estimations and simulations presented in this paper help to illustrate a number of issues that education developers, decision-makers, managers, and implementers face (or should be facing) as they design, select, and carry out educational programs.

Implications for viability and scalability of the RLL approach

STUDY QUESTION 4. What implications can be drawn from the results regarding the viability of the RLL approach, and its scalability to other implementers and settings?

According to the estimations presented here, the RLL program was effective in producing gains on the order of doubling the inter-grade gain achieved in non-program schools. These gains were produced at an average additional cost of about $21 (2009 USD) per student in the first year of the program (assuming 3-year useful life of training and support visits), dropping to under $18 per student per year by the third year. In other words, as a proportion of "business-as-usual" costs (estimated at $87.19), implementing the RLL program cost an additional 20%-24% per student, to obtain 100% additional gain. Furthermore, when all but the most pessimistic of cost-benefit scenarios were applied, the projection of program results into the future displayed moderate to high likely internal rates of return over a 10-year horizon. These estimations suggest that it would indeed be worthwhile to pursue the RLL program into the future, and extend it to non–program schools, rather than continue with the status quo.

At the same time, the observed low levels of reading skill even among RLL program "graduates", combined with the falling-off of effectiveness of the RLL program observed at Grade 3, suggest two critical caveats. First, the RLL program needs to be continued at least until children reach a minimum level of oral reading fluency and reading comprehension skills so that they can maintain these skills and apply them to further learning. Second, the pace of learning achieved even through the RLL program needs to be significantly accelerated, if children are to reach these levels by the end of Grade 3.

While the RLL program may be roughly twice as effective as business as usual, by Year 3 of program implementation, Grade 2 RLL students were still reading at less than 8 words a minute, and Grade 3 RLL students were reading at only 11 words per minute. In contrast, Mali's stated standards for these grade levels, which are similar to minimum levels proposed in the broader literature, are over three times the levels achieved by RLL students on average in this study.

In summary, RLL offers a program that is more effective than the status quo, and could be expected to pay for itself in terms of gains above business as usual, over a ten-year period. At $14 to $18 per student per year, or roughly 20% more than current average expenditure per primary school student, however, implementing the program at scale would represent a substantial additional cost to the system. Furthermore, the program is still not as efficient as desired in terms of creating learning skills at a rate adequate to achieve sustainable levels of skill by Grade 2 or Grade 3.

If RLL program implementation is extended on the grounds that it is more effective than business as usual, we would want implementers to continue to seek program improvements to accelerate the rate of learning produced, while also pursuing cost reduction strategies. On the first aspect, tightening the fidelity of implementation (found to vary in the larger evaluation study) could be expected to improve effectiveness, although other measures may also be needed. In terms of cost reduction, the program presents several possibilities.

Over the three years of the RLL program, most teachers and school heads received a total of 14 days of group training in the RLL approach across 4 separate training sessions, at an average participant / trainer ratio of 13 to 1. In a scale-up scenario, it is reasonable to posit that a slight reduction in the number of days, coupled with an increase in the participant / trainer ratio, could produce considerable reduction in cost of the training component without great loss of quality. For example, reducing the number of days to 12 across 3 training sessions, and increasing the participant / trainer ratio to 18 / 1, could be expected to produce a cost reduction for the training program of roughly 20%.

In the initial years, weekly school support visits constituted the largest portion of RLL program implementation costs, representing roughly 50% of all implementation costs in years 1 and 2. With judicious reduction in the frequency of visits and the cost of an individual visit, IEP was able to substantially reduce the overall cost of the support visit element of the program, such that by Year 3, this element of the program represented only 28% of total implementation costs. Assuming that Ministry staff would, in a scale-up, fully take over these support visits, and that they were re-deployed to this task from less directly-effective desk work, the additional cost of such visits could be reduced further by about half, since the cost

of labor for this task would already be accounted for in the basic cost of system maintenance.

Over the same period, provision of learning materials grew from 25% of total costs in Year 1, to 58% by Year 3. With most materials designed for single-year / single student use, the cost of this input could not be reduced by reducing in the number of units distributed per year. However, with scale-up of the program it would be reasonable to anticipate that economies of scale could be obtained, and some compromise on quality of paper and production could also be made, to reduce the unit cost of materials.

In other words, there is reason to posit that substantial cost reductions could be made to the RLL program in a scale-up phase using Ministry structures, with little change to the likely qualitative outcome. Development costs would also be much lower, as the basic material for the RLL program, including teachers' guides and student materials, now exists for four languages.

Compiling and maintaining data on costs

The importance of having reasonably accurate data on costs, expenditures, and units obtained for the expenditures made cannot be understated. Without these elements it would have been difficult if not impossible to produce any of the analyses presented in this report with any empirically-grounded confidence. And yet, many educational programs are implemented without accounting systems in place that facilitate the extraction or recovery of such elements, so recourse to collective memory and rough estimation is often needed. Greater coordination of technical and financial tracking approaches, such as incorporating a "technical usage" category to characterize a given purchase or expenditure when recording the expenditure, could be implemented to help improve the accuracy of cost estimates.

Developing cost awareness

One of the "intermediate" outputs of cost-effectiveness analysis, is the expression of costs not in terms of budget lines but in terms of the outputs and outcomes that "count" to developers, implementers, decision makers, and other stakeholders: the cost of "one teacher trained", "one school equipped", "one student reached", and "one (more) word read correctly". Even in the absence of comparison across different interventions, this way of expressing the costs of an intervention has the advantage of being directly meaningful to most stakeholders, and we believe it is motivating. As consumers, knowing the cost of something almost inevitably leads us to wonder, "Why does it cost this much to produce this outcome? ", and, "Could we obtain the same result at lower cost?".

These are useful questions that can lead program developers and implementers to others that they can and should be asking themselves as they work. In the case of IEP, the following questions have arisen:

> **Conception / development costs** (of each type of intervention): What essential features need to be designed or further developed, at what level of effort and over what time frame? What modalities have worked best and are worth continuing (ideal proportion of expert / generalist / end-user participation, degree of "participatory development", amount of testing)? What are reasonable tradeoffs, in terms of both cost and quality of results?
>
> **Educator training and support approaches:** What are the cost- and quality trade-offs between centralized vs. more localized training venues? What is optimal group size and participant-to-trainer ratio for effective training? What are effective ratios of time (and resources) spent on grouped training, cluster-based peer coaching, and district-provided follow-up support?
>
> **Materials development and production parameters:** Which materials are essential? Which materials will require initial development or significant revision in a given time frame? Which materials will require only minor revision or adaptation of existing materials? What is the real durability (quality and expected life) of materials intended for multi-year use? What quality (and cost) is required for materials intended for single use only?

Judicious consideration of these kinds of questions can help developers and implementers to control and reduce costs without sacrificing quality. IEP has embarked on this process.

Growing demand and opportunities for further cost analysis

With heightened awareness of cost and cost-effectiveness trade-offs, it is hoped that decision makers and implementers will become interested in demanding and practicing more careful and systematic budgeting and cost accounting going forward, and pursuing more cost-effective combinations of inputs.

And as demand and standard methods for cost accounting and cost analysis become more widespread in developing country contexts, there is reason to hope that comparative cost analysis will also become more readily feasible.

REFERENCES

Abadzi, Helen (September 2011). *Reading Fluency Measurements in EFA FTI Partner Countries: Outcomes and Improvement Prospects* (Education For All Fast Track Initiative Working Paper Series). Washington, DC: The World Bank EFA / FTI Secretariat.

Belfield, Clive & Henry M. Levin (January 2013). Cost-effectiveness in school education. New York: The United States Sutdies Center, Alliance 21, and The Grattan Institute.

DeStefano, Joseph, Ash Hartwell, Audrey-Marie Schuh Moore, and Jane Benbow (2005). *Meeting EFA: Cost-Effectiveness of Complementary Approaches (Equip 2 Working Paper).* Washington, DC: Academy for Educational Development, 20 pp.

Friedman, Willa, François Gérard, and Wendi Ralaingita (December 2010). Independent Evaluation of the Effectiveness of Institut pour l'Education Populaire's "Read-Learn-Lead" (RLL) Program in Mali: Mid-Term Report. Washington, DC: Research Triangle Institute.

Gove, Amber and Peter Cvelich (2011). *Early Reading:Igniting Education for All. A report by the Early Grade Learning Community of Practice*. Revised Edition. Research Triangle Park, NC: Research Triangle Institute.

Herrera, Santiago (2005). The Economic Rate of Return of World Bank Projects. Washington, DC. The World Bank. Accessed on 28 November 2013 at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/07/04/000333038_20120704035431/Rendered/PDF/704270WP0P09810C00err0and0cba0in0WB.pdf.

IEP (2009). Read - Learn - Lead Annual Report 2008-2009 Submitted by IEP to Hewlett Foundation. Kati, Mali: Institut pour l'Education Populaire, June 2009.

IEP (2010). Read - Learn - Lead Annual Report 2009-2010 Submitted by IEP to Hewlett Foundation. Kati, Mali: Institut pour l'Education Populaire, June 2010.

IEP (2011). Read - Learn - Lead Annual Report 2010-2011 Submitted by IEP to Hewlett Foundation. Kati, Mali: Institut pour l'Education Populaire, June 2011.

Levin, Henry M. (2001). Waiting for Godot: Cost-Effectiveness Analysis in Education. *New Directions for Evaluation, no. 90*, Summer 2001, 55-68.

McEwan, Patrick J. (2011). *Cost –effectiveness analysis of education and health interventions in developing countries: Impact-Evaluation Guidelines* (Technical Note No. IDB-TN-332, December 2011). Washington, DC: Inter-American Development Bank.

McEwan, Patrick J. (2013). Improving Learning in Primary Schools of Developing Countries: A Meta-Analysis of Randomized Experiments. (Manuscript).

MEALN (2011). Décision No. 04336 / MEALN-SG portant standards en lecture dans les classes de l'Enseignement fondamental. Bamako : Ministère de l'Education, de l'Alphabétisation et des Langues Nationales, Secrétariat Général.

Research Triangle Institute (2010a). Independent Evaluation of the Effectiveness of Institut pour l'Education Populaire's "Read-Learn-Lead" (RLL) Program in Mali: Baseline Report. Washington, DC: Research Triangle Institute.

Research Triangle Institute (2010b). Implementing school-based management in Indonesia: The DBE1 Experience 2005-2010 Impact Study.Jakarta: USAID / Indonesia, IQDBE Project.

Spratt, Jennifer, Simon King, and Jennae Bulat (June 2013). Independent Evaluation of the Effectiveness of Institut pour l'Education Populaire's "Read-Learn-Lead" (RLL) Program in Mali: Endline Report. Washington, DC: Research Triangle Institute.

Tietjen, Karen (1999). *Community schools in Mali: A comparative cost study (SD Publication Series Technical Paper No. 97).* Washington, DC: USAID Bureau for Africa, Office of Sustainable Development, Division of Human Resources and Democracy.

World Bank (2013). *Education Statistics Database* (EdStats). Washington, DC: The World Bank. Available at : (http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=education-statistics-~-all-indicators)

ATTACHMENTS

Attachment 1. Persons contacted

Prénoms et Nom	Fonction / Poste	telephone	email
Maria DIARRA KEITA	Fondatrice et Directrice IEP	76-74-9140	mariadiarra2002@yahoo.com
Deborah FREDO	Fondatrice et Conseillère Technique	76-74-9142 US: 301-767-7828	debfredo@yahoo.com
Cheick Oumar COULIBALY	Directeur Adjoint IEP	78-16-4847	cheickcoul61@yahoo.fr
Oumou KAMISSOKO	Directrice Administrative et Financière	66-75-3988	oumoudili5@yahoo.fr
Almoudou COULIBALY	Gestionnaire Comptable	76-07-6653	coulibalyalmoudou@yahoo.fr
Saran BOUARÉ SAGARA	Responsable Rapports et études	76-36-5708	saranbouare@hotmail.com
Souleymane BALAHIRA	Coordinateur Zone Bamanankan	76-49-9514	sesoul2001@yahoo.fr
Lazare COULIBALY	Chargé de suivi et évaluation	66-79-7491	zikola207@yahoo.fr
Joseph THERA	Chargé de suivi et évaluation	75-36-4301	papathera@yahoo.fr

Attachment 2. Elements for cost estimation of key IEP-RLL inputs established on the basis of Phase 1 discussions with IEP

2a. Teacher training and post-training support: List of relevant program description and costing elements to be collected

IDENTIFICATION / DESCRIPTION OF THE TRAINING

- Title of the training program
- Profile of training recipients
- Month and Year of implementation
- Implementation site
- Pre-service or in-service training? (yes-no)
- Certification upon completion of the training? (yes-no)
- Total number of educators trained
- Duration of the training (hours per person trained)

TRAINING AND SUPPORT PROGRAM DESIGN AND DEVELOPMENT

- Profile of the designer(s)
- Nature of the work
- Length of work (days)
- Number of IEP staff involved
- Number of IEP staff requiring per diem during design phase
- Average daily salary for staff concerned
- Number of external personnel (Ministry or other) involved
- Number of external personnel requiring per-diem during design phase
- Average daily salary for external personnel
- Number of consultants involved
- Number of consultants requiring per-diem during design phase
- Average daily rate of consultants
- Cost of meals (person-day)
- Per-diem rate(s)
- Transportation costs
- Materials (amount per person or total)
- Other development costs (amount)
- Description of other development costs

IMPLEMENTATION: TRAINING OF TRAINERS

- Profile of trainer of trainers
- Length of TOT (days)
- Number of IEP staff involved as TOT or trainers
- Number of IEP staff requiring per diem during TOT
- Average daily salary for staff concerned
- Number of external personnel (Ministry or other) involved as TOT or trainers
- Number of external personnel requiring per-diem during TOT
- Average daily salary for external personnel
- Number of consultants involved as TOT or trainers
- Number of consultants requiring per-diem during TOT
- Average daily rate of consultants
- Cost of meals (person-day) provided during TOT
- Per-diem rate(s) for TOT and trainers
- Transportation costs per participant

Documents (cost per person or total)
Other materials (costt per person or total)
Other TOT costs (amount)
Description of other TOT costs

IMPLEMENTATION: TRAINING OF TEACHERS AND SCHOOL HEADS
Profile of teacher / school head trainers
Total number of educators (teachers and/or school heads) trained
Number of participants requiring per diem during training period
Length of training (days)
Number of IEP staff involved as trainers
Number of IEP staff requiring per diem during training period
Average daily salary for staff concerned
Number of external personnel (Ministry or other) involved as trainers
Number of external personnel requiring per-diem during training period
Average daily salary for external personnel
Number of consultants involved as trainers
Number of consultants requiring per-diem during training period
Average daily rate of consultants
Cost of meals (person-day) provided during training period
Per-diem rate(s) for trainers and participants
Transportation costs per trainer or participant
Documents (cost per person or total)
Other materials (cost per person or total)
Other teacher / school head training costs (amount)
Description of other teacher / school head training costs

IMPLEMENTATION: POST-TRAINING PEDAGOGICAL SUPPORT TO TEACHERS
Description of pedagogical support visit
Profile of pedagogical support agent
Average daily salary of IEP pedagogical support agent
Average daily travel cost for IEP staff pedagogical support agent
Average daily salary of Ministry (CAP) pedagogical support agent
Average daily travel cost for Ministry (CAP) staff pedagogical support agent
Cost of materials used in average support visit to a school
Number of schools visited on average per day

CALCULATIONS / ESTIMATIONS PRODUCED FROM THE ABOVE DATA
Number of trainees per trainer
Total cost of design / development of training and support program
Total cost of training of trainers
Total cost of training of teachers or school heads
Total cost of pedagogical support visits
Cost per trainee of TOT
Cost per trainee of teacher / school head training
Cost per school of pedagogical support visit

2b. Development and production of pedagogical materials: List of relevant material description and costing elements to be collected

IDENTIFICATION / DESCRIPTION OF THE MATERIAL
- Title
- Month and year of publication
- Language
- Type of material (book, booklet, other)
- Number of pages per unit
- Useful life (in years; indicate “1” if item remains with first student user)
- Primary user (teacher, student, school head, etc)
- Number of users per unit per year

DESIGN / DEVELOPMENT WORKSHOIPS
- Number of staff concerned in development workshop
- External personnel involved in development workshops
- Length of workshops (number of days)
- Staff person-days (calculated)
- External personnel person-days (calculated)
- Unit cost of meals during workshop
- Per diem costs for staff
- Per diem costs for external personnel
- Lodging costs for involved actors requiring lodging
- Unit cost of materials per workshop participant
- Transportation costs for workshop participants

OTHER DEVELOPMENT COSTS
- Non-workshop level of effort, IEP staff
- Non-workshop level of effort, consultants
- Average IEP staff daily rate (salary)
- Average consultant daily rate
- Layout and formatting costs
- Other materials design / development costs

PRODUCTION AND DISTRIBUTION COSTS
- Unit cost of printing / duplication for each type of material
- Unit cost of distribution for each type of material

Attachment 3. Cost estimation instruments used to complete data collection

3a. ENQUETE ANALYSE DES COUTS - FORMATIONS DES ENSEIGNANTS DE L'ENSEIGNEMENT PRIMAIRE

IDENTIFIANTS			
ENTITE ENQUETÉE		PRÉCISION:	
	Prénoms et Nom:	Titre:	Date Interview:
PERSONNE INTERVIEWÉE			

DESCRIPTION DU PROGRAMME DE FORMATION			
TITRE DU PROGRAMME			
Mise en oeuvre au cours de l'ANNEE		Date début de la formation - MOIS	
Nbre total d'HEURES par participant		SITE(S)	
Formation Initiale ou Continue?		Certification à la sortie?	
Profil du participant à l'entrée			
Durée de la période de formation (nbre de mois)		mois	
NOMBRE TOTAL DE PARTICIPANTS		NOMBRE DE PARTICIPANTS AYANT ACHEVÉ LE PROGRAMME	
TOTAL (Femmes & Hommes)	FEMMES	TOTAL	FEMMES

COÛTS (DÉPENSES) DE CONCEPTION / ELABORATION DU PROGRAMME (si engagés au cours de la même année)		
Durée de validité du programme (estimation du nombre d'années):		ans
ELEMENT	Estimation du coût total (FCFA)	Source et base d'estimation (décrire)
Salaires		
Honoraires consultants		
Matériel et fournitures		
Frais d'atelier (per diem, transport, salle, etc.)		
Frais de mission (per diem, transport, etc.)		
Autre		
SOUS-TOTAL		

COÛTS (DÉPENSES) DE LA FORMATION DES FORMATEURS (si engagés au cours de la même année)			
Nbre de formateurs formés - TOTAL		Nbre formateurs formés - FEMMES	
ELEMENT	Estimation du coût total (FCFA)	Source et base d'estimation (décrire)	
Salaires			
Honoraires consultants			
Matériel et fournitures			
Frais d'atelier (per diem, transport, salle, etc.)			
Autre			
SOUS-TOTAL			

COÛTS (DÉPENSES) DE MISE EN OEUVRE DU PROGRAMME AU COURS DE L'ANNÉE CONCERNEE		
ELEMENT	Coût total (FCFA)	Source et base d'estimation (décrire)
Salaires		
Honoraires consultants		
Documents et fournitures		
Frais d'atelier (per diem, transport, location salle, etc.)		
Frais de mission (per diem, transport, etc.)		
Autre		
SOUS-TOTAL		

3b. ENQUETE ANALYSE DES COUTS - MATÉRIEL DIDACTIQUE

IDENTIFIANTS			
ENTITE ENQUETÉE		PRÉCISION:	
PERSONNE INTERVIEWÉE	Prénoms et Nom:	Titre:	Date Interview:
INFORMATIONS RELATIVES À L'ANNEE:			(Indiquer l'année concernée)

DESCRIPTION DU MATÉRIEL DIDACTIQUE			
TITRE DU MATÉRIEL :		Date d'édition - Année :	
		Date d'édition - Mois :	
Langue :		Nbre éléments par exemplaire :	
Type de matériel (livre, CD, kit...) :		Utilisateur (destinataire) principal :	
Durée de vie par exemplaire (ans) :		Nbre utilisateurs / an / exemplaire :	
PRODUCTION - DIFFUSION durant l'année scolaire concernée	Nbre d'exemplaires produits	Nbre d'exemplaires diffusés	Nbre d'utilisateurs desservis

COÛTS (DÉPENSES) DE CONCEPTION / ELABORATION DU MATÉRIEL (si engagés au cours de l'année concernée)		
Durée de validité du matériel (estimation du nombre d'années):		ans
ELEMENT	Estimation du coût total (FCFA	Source et base d'estimation (décrire)
Salaires		
Honoraires consultants		
Matériel et fournitures		
Ateliers (per diem, transport)		
Missions (per diem, transport)		
Autre		
SOUS-TOTAL		

COÛTS (DÉPENSES) DE PRODUCTION / DIFFUSION ENGAGÉS AU COURS DE L'ANNÉE CONCERNÉE		
ELEMENT	Coût total (FCFA)	Source et base d'estimation (décrire)
Coût total production		
Coût unitaire production		
Coût total diffusion		
Coût unitaire diffusion		
Autre		
SOUS-TOTAL		

Attachment 4. Information on IEP – RLL service learning and community mobilization activities

Given the state of development and implementation of these activities during the period of the cost study, the Service Learning and Community Mobilization dimension of the study as initially planned, was subsequently removed from consideration. First, on the basis of IEP staff descriptions and available documentation, the majority of these activities were in an early pilot phase and their specific inputs and parameters were not yet stabilized. Second, most of these activities were confined to a few schools or communities, thus positing a contribution to the learning effects found in the sample schools of the broader impact evaluation would have been tenuous at best.

The range of kinds of activities was nonetheless explored in Phase 1 of the cost study, as shown in the following table.

TITRE DE L'ACTIVITÉ	Lancement	Durée	Site	Objectifs et description
Activités de lancement du programme - Presse; dépliants; théatre; film; pagnes imprimés	Sep 2009	3 jours	Kati (les autres zones ont été invités à participer	Sensibilisation sur les objectifs et méthodes du programme RLL
Comités de reconnaissance / renforcement des capacités des CGS	2010	2-3 réunions par zone; 1 fois remise de prix	Toutes les Zones RLL	Sensibilisation des collectivités, encouragement (remise des prix); prise de décisions sur la resolution de problèmes relatifs à la qualité de l'éducation dans la zone
Camps de vacances sur la Cinquantenaire du Mali - Vague 1	Avril 2010	10 jours	Zone Bamanan kan	Sensibilisation des enfants autour de la cinquantenaire,
Camps de vacances sur la Cinquantenaire du Mali - Vague 2	Juin 2010	25 jours	Zone Bamanan kan	Sensibilisation des enfants autour de la cinquantenaire,
Formation des acteurs stratégiques pour leur prise de conscience sur les possibilités de soutien de l'éducation dans leur communauté			Zone Bamanan kan	Prise de conscience des acteurs stratégiques sur les possibilités de soutien de l'éducation dans leur communauté
Formation des acteurs			Zone	Prise de conscience des

TITRE DE L'ACTIVITÉ	Lancement	Durée	Site	Objectifs et description
stratégiques locaux sur l'apprentissage de la lecture chez l'enfant			Bamanankan	acteurs stratégiques sur l'apprentissage de la lecture chez l'enfant
Programme de service-apprentissage pour la mise en place des tuteurs-paires en lecture et en maths			Zone Bamanankan; Tominian dans la zone Bomu; la zone Gao	Mobiliser la communauté à appuyer Appui aux élèves du primaire en lecture, ecriture et maths, surtout lors des grèves d'enseignants, mais aussi à tout moment
Programme de service-apprentissage avec l'Université de Bamako et IFM			Zone Bamanankan	Appui dans la domaine de l'agriculture et de la protection de l'environnement, et la conception de livrets d'élève du Primaire à ce sujet
Soutien de l'initiative de l'Association des Étudiants de Sonikini (zone Bam) dans leur appui aux tuteurs d'élèves			Sonikini dans la zone Bamanankan	Encourager les initiatives locales d'appui aux jeunes apprenants.
Service-apprentissage des étudiants Maliens et ceux provenant des Universités d'autres pays (SIT-US; UMich-US; HVA-Pays Bas)	Juillet 2009	5 mois (en deux vagues d'un mois pour les étudiants américains)	Bamanankan, Bomu (Tominian)	Les étudiants ont travaillé dans le suivi, l'évaluation, interviews et observations de l'approche RLL
Bibliothèque mobile pour promouvoir un environnement lettré et l'émergence de jeunes leaders dans ce sens dans chaque communauté touchée	Juin 2010	Continu	Kati	Un animateur mène un programme dans les villages, il fait des animations sur la lecture, en se servant des élèves présents, pour identifier des leaders parmi eux pouvant animer leur communauté, créer un environnement lettré et un engouement pour la lecture.

TITRE DE L'ACTIVITÉ	Lancement	Durée	Site	Objectifs et description
Coins de lecture pour promouvoir un environnement lettré	Janvier 2009	Depuis le début du projet	École laboratoire - Kati	Créer d'autres livres et les mettre dans la classe. (Voir ; former les enseignants à l'animation / l'utilisation du coin de lecture
Utilisation de la Radio communautaire pour diffuser des émissions d'une heure sur l'approche Ciwara Lisent	Sep 2009	Continue (irrégulier e..)	Kati (ville et villages)	Sensibilisation, informations, mobilisation, valorisation des communautés, par rapport à leur leadership potentiel en matière de la lecture et de l'utilisation des langues nationales au sein de l'école formelle

Attachment 5. Teacher and school head capacity development: Estimated input unit costs and number of units provided, by year and type of input

TYPE OF COST	UNIT	Annualized Unit Cost, Year 0 (2009 USD)	Annualized Unit Cost, Year 1 (2009 USD)	Annualized Unit Cost, Year 2 (2009 USD)	NUMBER OF UNITS PROVIDED TO EXPERIMENTAL SCHOOLS		
					RLL Program Year 0 (July 2008 - June 2009)	RLL Program Year 1 (July 2009 - June 2010)	RLL Program Year 2 (July 2010 - June 2011)
GROUPED TRAININGS - Bamanankan language		(5 days)	(3 days)	(3 days)			
Training of trainers	Teacher trainers	103.99	109.03	96.95	5	10	7
Training of School Heads - early (Oct-Dec)	School heads	89.70	114.97	119.10	19	6	25
Training of teachers - early (Oct-Dec)	G1, G2 Teachers	89.70	114.97	119.10	42	59	6
Training of teachers - late (Apr-Jun; Cost applied in following year)	G1, G2 Teachers	89.70	114.97	119.10		59	59
GROUPED TRAININGS - Bomu language		(5 days)	(3 days)	(3 days)			
Training of trainers	Teacher trainers	123.25	158.11	165.54	2	3	2
Training of School Heads - early (Oct-Dec)	School heads	115.48	145.14	149.40	0	8	8
Training of teachers - early (Oct-Dec)	G1, G2 Teachers	115.48	145.14	149.40	12	16	2
Training of teachers - late (Apr-Jun; Cost applied in following year)	G1, G2 Teachers	115.48	145.14	149.40		16	16
GROUPED TRAININGS - Fulfulde language		(5 days)	(3 days)	(3 days)			
Training of trainers	Teacher trainers	123.25	158.11	165.54	1	2	2
Training of School Heads - early (Oct-Dec)	School heads	115.48	145.14	149.40	0	5	5
Training of teachers - early (Oct-Dec)	G1, G2 Teachers	115.48	145.14	149.40	0	10	1
Training of teachers - late (Apr-Jun; Cost applied in following year)	G1, G2 Teachers	115.48	145.14	149.40		10	10
GROUPED TRAININGS - Songhai language		(5 days)	(3 days)	(3 days)			
Training of trainers	Teacher trainers	123.25	158.11	165.54	2	5	3
Training of School Heads - early (Oct-Dec)	School heads	115.48	145.14	149.40	0	13	13
Training of teachers - early (Oct-Dec)	G1, G2 Teachers	115.48	145.14	149.40	21	32	3
Training of teachers - late (Apr-Jun; Cost applied in following year)	G1, G2 Teachers	115.48	145.14	149.40		32	32

Attachment 6. Pedagogical support visits and materials: Estimated unit costs and number of units provided, by year and type of input

TYPE OF COST	UNIT	SHELF LIFE (years)	Annual-ized Unit Cost, Year 1 (2009 USD)	Annual-ized Unit Cost, Year 2 (2009 USD)	Annual-ized Unit Cost, Year 3 (2009 USD)	NUMBER OF UNITS PROVIDED TO EXPERIMENTAL SCHOOLS (For multi-year materials (see "Shelf Life"), units show cumulative distributions, with previous year's total reduced by 10% for loss)		
						RLL Program Year 1 (July 2009 - June 2010)	RLL Program Year 2 (July 2010 - June 2011)	RLL Program Year 3 (July 2011 - June 2012)
SCHOOL SUPPORT / FOLLOW-UP VISITS								
Bamanankan-language schools - IEP & CAP	Visit to 1 school (2 schools / day)	- - -	32.96	45.43	51.81	953	946	313
Bomu-language schools - IEP & CAP	Visit to 1 school (2 schools / day)	- - -	32.96	45.43	51.81	288	254	60
Fulfulde-language schools - IEP & CAP	Visit to 1 school (2 schools / day)	- - -	32.96	45.43	51.81	142	125	28
Songhai-language schools - IEP & CAP	Visit to 1 school (2 schools / day)	- - -	32.96	45.43	51.81	462	414	
TOTAL for Bamanankan, Bomu, Fulfulde language experimental schools only:						1383	1325	401
TOTAL for experimental schools in all four language groups:						1845	1739	401
MATERIALS - Bamanankan Language								
RLL Student Book 1	Student (G1)	1	2.34	2.26	2.49	3515	3454	3526
RLL Student Book 2	Student (G2)	1	1.86	1.80	1.97	0	3705	3526
RLL Teacher's Guide Book 1 + Skills progression matrix	Teacher (G1)	3	3.34	3.23	3.54	68	23	0
RLL Teacher's Guide Book 2 + Skills progression matrix	Teacher (G2)	3	1.90	1.83	2.01	0	54	32
Set of RLL picture-cards (500 cards)	Set of 500 cards	3	20.09	18.53	20.33	25	48	43
Short booklets / readers	Booklet	3	0.56	0.54	0.59	11216	20378	18341
RLL student writing workbooks - G1 x 2	Student (G1)	1	2.16	2.09	2.29	1281	984	954
RLL student writing workbooks - G2 x 2	Student (G2)	1	2.16	2.09	2.29	0	1019	1101
MATERIALS - Bomu Language								
RLL Student Book 1	Student (G1)	1	2.34	2.26	2.49	928	540	895
RLL Student Book 2	Student (G2)	1	2.23	2.15	2.36	0	988	895
RLL Teacher's Guide Book 1 + Skills progression matrix	Teacher (G1)	3	3.34	3.23	3.54	20	6	0
RLL Teacher's Guide Book 2 + Skills progression matrix	Teacher (G2)	3	1.90	1.83	2.01	0	20	6
Set of RLL picture-cards (286 cards)	Set of 286 cards	3	11.49	10.60	11.63	13	20	18

TYPE OF COST	UNIT	SHELF LIFE (years)	Annual-ized Unit Cost, Year 1 (2009 USD)	Annual-ized Unit Cost, Year 2 (2009 USD)	Annual-ized Unit Cost, Year 3 (2009 USD)	NUMBER OF UNITS PROVIDED TO EXPERIMENTAL SCHOOLS (For multi-year materials (see "Shelf Life"), units show cumulative distributions, with previous year's total reduced by 10% for loss)		
						RLL Program Year 1 (July 2009 - June 2010)	RLL Program Year 2 (July 2010 - June 2011)	RLL Program Year 3 (July 2011 - June 2012)
Short booklets / readers	Booklet	3	0.56	0.54	0.59	0	0	2580
RLL student writing notebooks - G1	Student (G1)	1	2.16	2.09	2.29	290	275	265
RLL student writing notebooks - G2	Student (G2)	1	2.16	2.09	2.29	0	285	253
MATERIALS - Fulfulde Language								
RLL Student Book 1	Student (G1)	1	$ 2.23	$ 2.15	$ 2.36	520	370	452
RLL Student Book 2	Student (G2)	1	$ 2.90	$ 2.80	$ 3.08	0	523	452
RLL Teacher's Guide Book 1 + Skills progression matrix	Teacher (G1)	3	$ 3.34	$ 3.23	$ 3.54	14	2	0
RLL Teacher's Guide Book 2 + Skills progression matrix	Teacher (G2)	3	$ 1.90	$ 1.83	$ 2.01	0	11	6
Set of RLL picture-cards (316 cards)	Set of 316 cards	3	$ 12.70	$ 11.71	$ 12.85	8	12	11
Short booklets / readers	Booklet	1	$ 0.56	$ 0.54	$ 0.59	0	0	1792
RLL student writing notebooks - G1	Student (G1)	1	$ 2.16	$ 2.09	$ 2.29	299	145	122
RLL student writing notebooks - G2	Student (G2)	1	$ 2.16	$ 2.09	$ 2.29	0	167	140
MATERIALS - Songhai Language								
RLL Student Book 1	Student (G1)	1	$ 2.50	$ 2.42	$ -	1794	1566	
RLL Student Book 2	Student (G2)	1	$ 2.32	$ 2.24	$ -	0	1655	
RLL Teacher's Guide Book 1 + Skills progression matrix	Teacher (G1)	*3*	$ 3.28	$ 3.17	$ -	34	14	
RLL Teacher's Guide Book 2 + Skills progression matrix	Teacher (G2)	*3*	$ 1.90	$ 1.83	$ -	0	33	
Set of RLL picture-cards (415 cards)	Set of 415 cards	*3*	$ 16.68	$ 15.38	$ -	15	27	
Short booklets / readers	Booklet	*1*	$ 0.56	$ 0.54	$ -	0	0	
RLL student writing notebooks - G1	Student (G1)	1	$ 2.16	$ 2.09	$ -	895	486	
RLL student writing notebooks - G2	Student (G2)	1	$ 2.16	$ 2.09	$ -	0	463	

Attachment 7. Experimental schools, teachers and students reached by the IEP-RLL program, by program year, school language group, and grade level

LANGUAGE GROUP	Schools	Grade level	Teachers			Students		
			Year 1 (2009-2010)	Year 2 (2010-2011)	Year 3 (2011-2012)	Year 1 (2009-2010)	Year 1 (2009-2010)	Year 1 (2009-2010)
Bamanankan	25	Grade 1	28	30	28	1705	1823	1590
		Grade 2	26	29	28	1731	1798	1855
Bomu	8	Grade 1	7	8	8	493	462	463
		Grade 2	7	8	8	413	503	408
Fulfulde	5	Grade 1	6	5	5	283	222	202
		Grade 2	5	5	6	221	286	234
Songhai	13	Grade 1	15	15	15	930	841	
		Grade 2	13	13	13	824	769	
All groups	51	Grade 1	56	58	56	3411	3347	2255
		Grade 2	51	55	55	3189	3356	2497
		TOTAL	106	112	110	6600	6703	4752
Bamanankan, Bomu, and Fulfulde only	**38**	Grade 1	41	43	41	2481	2506	2255
		Grade 2	38	42	42	2365	2587	2497
		TOTAL	**79**	**85**	**83**	**4846**	**5093**	**4752**

Source: IEP and RTI study administrative records.

Attachment 8. RLL program effectiveness estimations at Year 1

(Recalculation from Friedman et al. 2010, excluding Songhai language group and controls)

STATISTIC	Grade 1		Grade 2	
	Baseline (2009)	Year 1 (2010)	Baseline (2009)	Year 1 (2010)
RLL schools	28		28	
Comparison schools	30		30	
EGRA SUBTASK:	**Number of letters recognized in one minute (CLSPM)**			
RLL Student n	472	562	545	557
Comparison n	500	601	565	590
RLL Mean score	4.476	10.634	12.424	19.701
Comparison Mean score	5.624	4.928	12.679	14.567
RLL s.d.	9.081	11.134	14.078	15.404
Comparison s.d.	8.089	7.204	13.641	15.224
Difference-in-Differences	6.855		5.389	
Effect size	0.763		0.369	
Pooled s.d.	8.988		14.615	
EGRA SUBTASK:	**Number of familiar words read correctly in one minute (CWPM)**			
RLL Student n	472	562	545	557
Comparison n	500	601	565	590
RLL Mean score	0.56	1.61	2.62	5.06
Comparison Mean score	0.32	0.19	2.20	2.63
RLL s.d.	2.75	3.31	5.83	6.83
Comparison s.d.	1.59	1.15	5.58	5.95
Difference-in-Differences	1.180		2.006	
Effect size	0.502		0.331	
Pooled s.d.	2.348		6.063	
EGRA SUBTASK:	**Number of invented words read correctly in one minute (CNWPM)**			
RLL Student n	472	562	545	557
Comparison n	500	601	565	590
RLL Mean score	0.499	0.708	2.038	2.774
Comparison Mean score	0.197	0.109	1.332	1.687
RLL s.d.	2.448	2.212	5.639	4.937
Comparison s.d.	0.901	0.725	3.809	4.419
Difference-in-Differences	0.297		0.381	
Effect size	0.173		0.080	
Pooled s.d.	1.718		4.736	
EGRA SUBTASK:	**Oral reading fluency (ORF)**			
RLL Student n	472	556	545	549
Comparison n	500	600	565	585
RLL Mean score	0.360	0.827	2.507	3.450
Comparison Mean score	0.457	0.143	2.035	2.312
RLL s.d.	2.653	3.037	8.516	7.068
Comparison s.d.	4.051	0.888	7.593	7.424
Difference-in-Differences	0.781		0.666	
Effect size	0.275		0.087	
Pooled s.d.	2.837		7.663	

Attachment 9. RLL program effectiveness estimations at Year 3 (from Spratt, King, and Bulat, 2013)

STATISTIC	Grade 1		Grade 2		Grade 3	
	Baseline (2009)	Year 3 (2012)	Baseline (2009)	Year 3 (2012)	Baseline (2009)	Year 3 (2012)
RLL schools	37		34		29	
Comparison schools	37		26		25	
EGRA SUBTASK:	**Number of letters recognized in one minute (CLSPM)**					
RLL Student n	624	597	669	551	494	484
Comparison n	613	616	520	424	432	400
RLL Mean score	4.059	7.242	11.574	16.450	19.428	22.735
Comparison Mean score	5.301	3.871	13.003	8.881	16.206	16.427
RLL s.d.	8.242	8.777	14.661	15.085	18.847	18.851
Comparison s.d.	7.851	5.914	13.137	9.526	15.166	14.712
Difference-in-Differences	4.614		8.998		3.086	
Effect size	0.594		0.664		0.180	
Pooled s.d.	7.764		13.552		17.167	
EGRA SUBTASK:	**Number of familiar words read correctly in one minute (CWPM)**					
RLL Student n	624	598	669	551	494	484
Comparison n	613	616	520	424	432	401
RLL Mean score	0.450	1.004	2.268	5.442	5.141	9.226
Comparison Mean score	0.319	0.370	2.153	0.812	3.754	5.143
RLL s.d.	2.421	3.218	5.867	10.263	10.077	12.867
Comparison s.d.	1.629	2.214	5.078	2.790	7.977	9.539
Difference-in-Differences	0.503		4.514		2.696	
Effect size	0.207		0.672		0.260	
Pooled s.d.	2.432		6.722		10.358	
EGRA SUBTASK:	**Number of invented words read correctly in one minute (CNWPM)**					
RLL Student n	624	597	669	551	494	483
Comparison n	613	616	520	424	432	401
RLL Mean score	0.394	1.197	1.870	4.357	3.453	7.611
Comparison Mean score	0.199	0.382	1.332	0.865	2.589	4.424
RLL s.d.	2.139	3.400	6.025	7.974	7.102	10.685
Comparison s.d.	0.918	1.875	3.477	2.761	6.001	7.778
Difference-in-Differences	0.618		2.954		2.323	
Effect size	0.274		0.524		0.285	
Pooled s.d.	2.253		5.641		8.138	
EGRA SUBTASK:	**Oral reading fluency (ORF)**					
RLL Student n	624	598	669	551	494	484
Comparison n	613	616	520	424	432	401
RLL Mean score	0.387	3.876	2.117	7.804	5.475	10.971
Comparison Mean score	0.482	2.997	1.910	3.962	3.994	7.361
RLL s.d.	2.729	4.992	8.780	11.738	12.047	15.266
Comparison s.d.	4.079	4.642	6.391	5.383	10.251	10.802
Difference-in-Differences	0.974		3.635		2.129	
Effect size	0.232		0.421		0.172	
Pooled s.d.	4.190		8.626		12.361	