

The Kom Experimental Mother Tongue Education Project Report for 2010

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Introduction

The year 2010 marks the third year of the operation of the experiment in mother tongue based multilingual education in the Boyo Division of North West Province, Cameroon. In the design, 12 experimental schools have been selected as sites for the implementation of a curriculum using the mother tongue (Kom) as the primary language of instruction. Twelve (12) matched schools were selected as control schools. These 12 schools implement the standard model of instruction of the area in which English is used as the medium of instruction for all subjects and grades. The schools participating in the experimental program were matched by type (private or public), location (remote village, small town), and size (smaller or larger) with schools in the standard program. There was a small amount of selection bias in that poorer performing schools were somewhat more likely to be included in the experimental program to reduce or eliminate any concerns about hand-picking better schools for inclusion in the experimental group of schools.

Reports for the two previous years indicated significant gains in educational efficiency for children in the experimental schools in all subjects. Last year (2009), however, there was some indication that the standard schools were catching up with the experimental schools. Quite naturally, this finding increased the level of interest in what the outcomes would be after the third year of program operation. IF the standard schools were to further close the performance gap by the end of the third year of instruction, we would have an obvious argument for terminating the mother tongue component after two years. On the other hand, if the gap between the two programs widened during the third year, we might treat the finding for Class 2 in 2009 as an anomaly. Further, there might even be grounds for suggesting that the local language should be used as a medium of instruction for longer than 3 years—a question of high interest within the Kom community.

This version of the 2010 report is going to be somewhat abbreviated in order to get results of the testing done in 2010 back to the Kom community for its consideration. A more complete technical report will be forthcoming which investigates in greater detail some of the more subtle details of the research findings.

Summary test results from 2010

Table 1 summarizes the major findings for all three classes for 2010. The testing model used for Class 3 varied somewhat from that used in Classes 1 and 2 so the table will appear to be slightly irregular. We will compensate by providing some additional detail on the performance of Class 3 children in all schools.

Table 1. Performance on standardized tests administered to both Standard and Experimental (KEPP) schools in 2010.

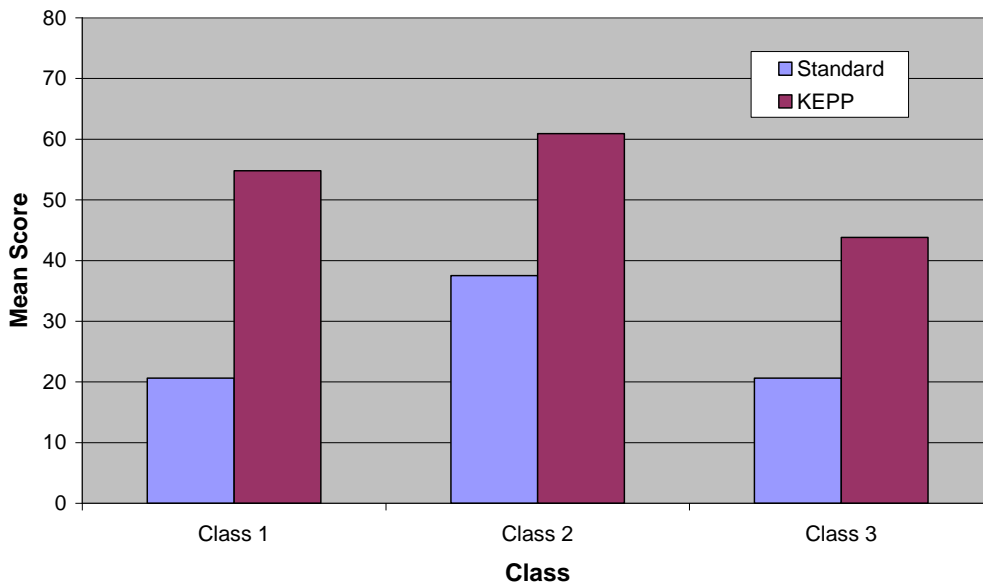
Test Component	Class 1			Class 2			Class 3		
	Standard	KEPP	Gain (%)	Standard	KEPP	Gain (%)	Standard	KEPP	Gain (%)
Language Arts	8.5	61.8	627	27.5	62.0	125	19.9	40.6	104
Math	11.1	44.9	305	26.0	66.5	156	21.8	49.5	127
Oral English	40.8	55.5	36.1	53.1	56.1	5.6	*	*	*
Overall Test	20.6	54.8	166	37.5	60.9	62	20.6	43.8	113

Several brief notes seem in order. First, when we look at performance on the Language Arts task across the classes, we note a very large advantage in Class 1 (627 percent) for the experimental schools but this advantage appears to decrease as the children advance in school dropping to just 104 percent in Class 3. However, the result for Class 3 is somewhat misleading. The Class 3 test was given to all students including the KEPP students entirely in English. The fact that the children in the experimental schools still scored more than twice as high as those in the Standard program is strongly suggestive of the learning advantage of being taught in the first language. (Table 8 below will clarify this finding because there was an additional test (in Language Arts) given to the children in the KEPP program to monitor their reading development in their first language.)

Second, no test in Oral English was given to children in Class 3. Therefore, we cannot make a comparison of development in this area. The reason for this omission was that the entire test for children in Class 3 was in English so a separate oral test was not deemed necessary.

Figure 1 compares overall performance by class and program on the tests given. There is clearly a large differential in Class 1 but a substantial differential persists through Class 3.

Figure 1. Comparison of overall performance across classes and programs.



Results for Class 1

Results for Class 1 are drawn from 12 schools in which English is the medium of instruction (the standard model for North West province) and 12 experimental schools in which Kom, the mother tongue of most children in the area, is the language of instruction. At the end of the year, a very basic test is given in an effort to measure progress towards mastery of the learning standards specified in the national curriculum. The test has two sections—language arts and math. In addition children are tested orally to assess their ability to speak English. The Kom-medium children take the same test as that given to the children in the English-medium schools with the caveat that the test is rendered in the Kom language rather than in English. Otherwise, the tests are the same in terms of numbers of questions, content, and structure. In administration, all instructions are given in Kom to maximize understanding. Test items in both languages are read to the children to reduce the problem of poor performance because of limited reading ability. Even so, it seems very likely that reduced reading ability is an issue in test performance.

Results of the testing

The following table contains the results of the testing done in Class 1 broken out by all major content areas of the testing.

Table 2. Detailed listing of test results from Class 1 by program.

	English-medium	Kom-medium (KEPP)	Statistics
Language Arts	8.5	61.8	P = 0.000
Word recognition	5.4	66.3	
Grammar	12.0	57.7	
Reading comprehension	8.8	60.3	
Math	11.1	44.9	
Counting	18.6	54.9	
Place value	9.5	40.5	
Addition	11.6	48.4	
Subtraction	9.5	42.6	
Written Test	9.2	54.3	
Oral English	40.8	55.5	
Social communication	72.3	82.7	
Following instructions	55.2	76.3	
Free response	15.8	27.9	
Overall	20.6	54.8	

The data indicate a very large testing/learning advantage (54.8 percent vs. 20.6 percent) for those in the Kom-medium program. The differential advantage is greatest for the written part of the test and much less for the Oral English section of the test (55.5 percent vs. 40.8 percent). The latter finding is somewhat surprising given the common assumption that children in an English-medium program 'should' learn more English than those in a program using the mother tongue as a language of instruction with instruction in English limited to second language instruction. The evidence, however, does not support this 'common' assumption. Not too surprisingly, the greatest differences are in the area of language arts. One of the major objectives of Class 1 is to teach children to read. Since the children in the Kom-medium program are learning to read in a language they know, they should good progress in doing so.

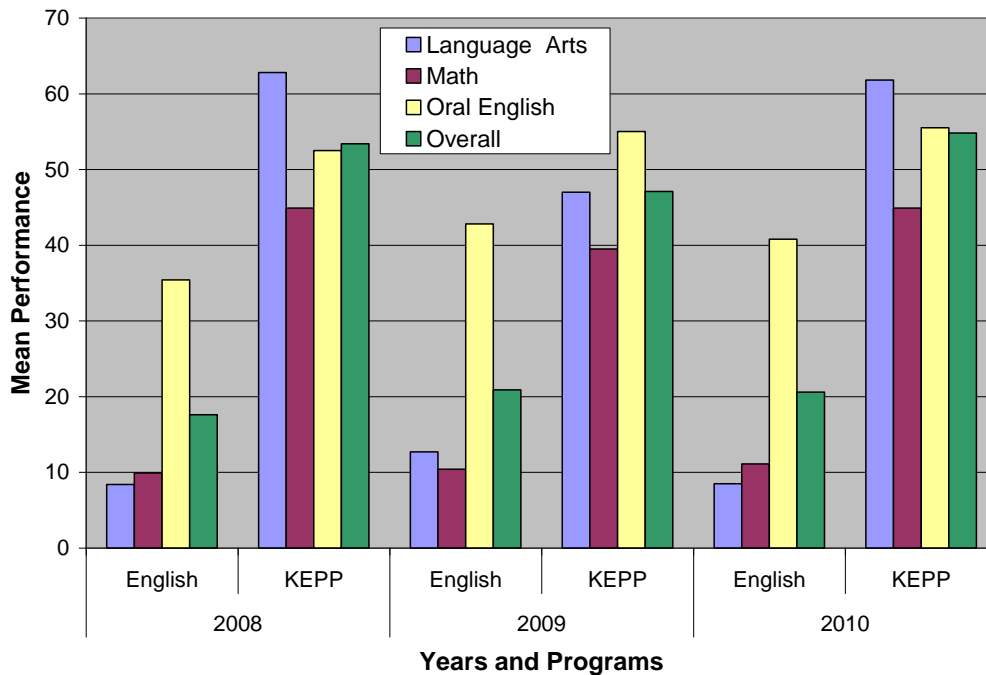
On the contrary, the children in the English-medium program are blocked from learning to read because they neither understand the instruction of the teacher nor know the language in which they are supposed to be learning to read. Therefore, they make little progress as reflected by the data.

Table 3. Class 1 results for three years (2008-2010).

	2008		2009		2010	
	English	KEPP	English	KEPP	English	KEPP
Language Arts	8.4	62.8	12.7	47.0	8.5	61.8
Math	9.9	44.9	10.4	39.5	11.1	44.9
Written test	9.1	53.8	11.7	43.7	9.2	54.3
Oral English	35.4	52.5	42.8	55.0	40.8	55.5
Overall	17.6	53.4	20.9	47.1	20.6	54.8

The test results for both programs have been quite stable from one year to the next. There was something of a drop-off in the performance of the KEPP program in 2009 which was traceable to two of twelve schools have major staffing problems (loss of teachers for sustained periods of time). In comparing the three years, it would appear that 2009 represents the most distinctive of the years with the English-medium program scoring slightly higher than in the other years and the Kom-medium program scoring somewhat lower than in the other two years. The pattern of results over a three year period of time strengthen the claim that the observed differences between the two models are, in fact, due primarily to the model-specific effects, i.e., the use (or not) of the mother tongue as a medium of instruction. Figure 2 provides a graphical presentation of the same data but only for the major measures.

Figure 2. Comparison of Class 1 students by year and by program.



Several features of differential performance are obvious from the graph. First, the English-medium program is performing at a level well below half of that of the Kom-medium program

overall. Second, the two programs are not far apart on the measure of oral English though the Kom-medium program is consistently the higher of the two. Third, the specific measure on which there is the greatest difference of performance is that of language arts. The Kom-medium program in Class 1 has generally outperformed the English-medium program on this measure by a factor of 7 to 1. In as much as reading is the most fundamental objectives of Class 1, a huge advantage accrues to children in the Kom-medium program.

Gender

Girls in Class 1 show a small but consistent advantage over males in most measures tested. This is true both in the English and Kom-medium programs with the advantage being greater in the English-medium program. In some cases, the difference approaches what would be characterized as statistical significance though we have little basis for explaining why this might be the case.

Fulfulde speakers

Since the data recorded whether students were Fulfulde speakers, we examined that as an independent variable. The obvious assumption—working hypothesis—is that these children would fare poorly in the Kom-medium classes and are, therefore, best served by English-medium instruction. The results are found in Table 4.

Table 4. Data on the performance of Fulfulde speakers by program.

	English-medium	Kom-medium
Fulfulde speakers	17.0	55.9
Non-Fulfulde speakers	20.7	54.8

These data, taken at face value, certainly do not support the view that Fulfulde-speaking children are benefited by attending an English-medium program OR harmed by attended a Kom-medium program. Fulfulde-speaking children in the Kom-medium outscored their peers in the English-medium program by a factor of three. At this point, however, we can't put too much weight on these findings as there were only 4 Fulfulde-speaking children in each program.

Results for Class 2

The testing scheme for Class 2 is very similar to that of Class 1. All students took a standard written test containing a section on language arts and a section of mathematics. The language of the test varied according to the language of instruction in each program. As a result, children in the standard program took the test in English while those in the experimental Kom-medium program took the test in the Kom language. In both cases, the content of the test was taken from the Class 2 curriculum. The content of the math section of the test was identical except for the language of presentation. In addition, all students took an oral English assessment. This assessment was the same for all students.

Table 5. Comparison of results for Class 2 by program.

	English-medium	Kom-medium (KEPP)	Statistics
Language Arts	27.4	62.0	P = 0.000
Grammar	29.0	54.5	
Reading comprehension	25.0	73.3	
Math	26.0	66.5	
Addition	27.3	70.1	
Subtraction	15.2	59.6	
Equational form	35.7	69.9	
Written Test	26.8	64.1	
Oral English	53.1	56.1	P = 0.078
Social communication	82.5	83.1	P = 0.667
Following instructions	48.5	58.5	
Free response	35.8	37.0	P = 0.629
Overall Test Result	37.5	60.9	

With the exception of oral English and the three components of oral English, all tested measures exhibit large differences between the two programs. Interestingly, the major section having the greatest difference was the measure of math (26.0 percent vs. 66.5 percent). The specific domain of knowledge or skill showing the greatest difference was that of *subtraction* in which the KEPP program showed a 300 percent gain in learning outcomes.

On the other hand, performance on the measure of oral English was very similar between the two programs with the interesting exception of the task *Following instructions*. By 'common logic' performance in the area of oral English should show a distinct advantage for those in the English-medium program. The fact that this is not the case calls into question one of the major arguments in favor of an LWC educational model.

Table 6 compares test results from 2009 with those of 2010. We have one less year to include in the comparison so observing any trend will be somewhat less difficult. Nonetheless we can make a few observations. First, we note that mean scores in both programs have improved

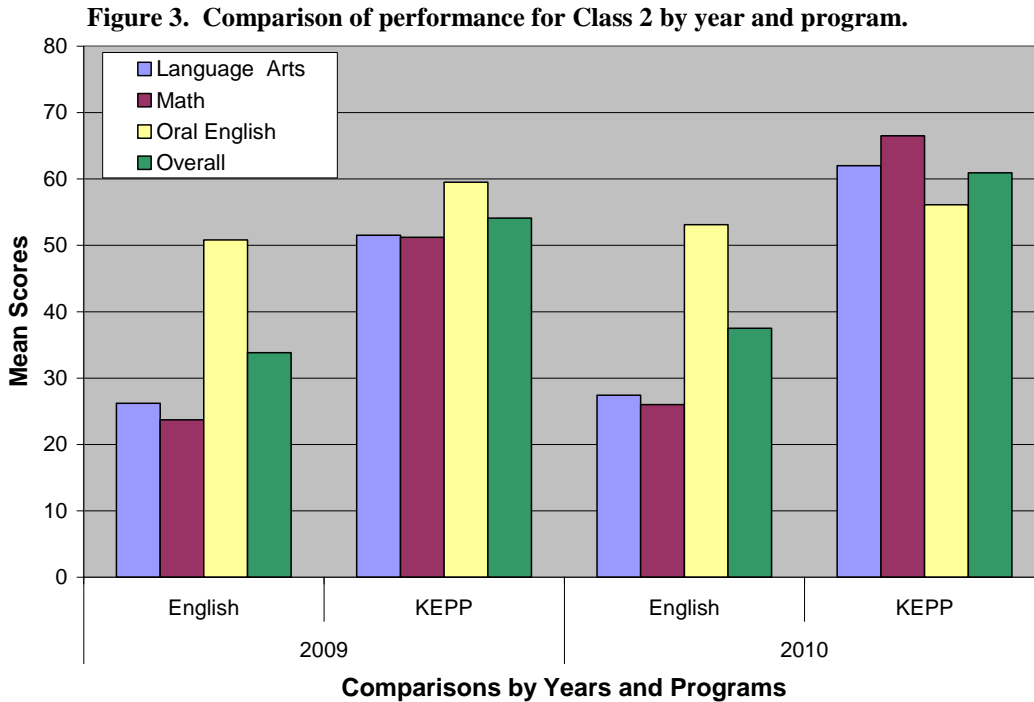
Table 6. Class 2 results for two years (2009-2010).

	2009		2010	
	English	KEPP	English	KEPP
Language Arts	26.2	51.5	27.4	62.0
Math	23.7	51.2	26.0	66.5
Written test	25.0	51.4	26.8	64.1
Oral English	50.8	59.5	53.1	56.1
Overall	33.8	54.1	37.5	60.9

between 2009 and 2010 with this improvement being quite substantial in the KEPP program. Second, we note that the only subject in which the children in the experimental program achieved a lower level of performance was oral English (59.5 percent down to 56.1 percent).

The data suggest that teachers may have given less attention to oral English instruction so that they could strengthen instruction in other areas.

Figure 3 provides a graphical presentation of the same information in Table X for Class 2 for the two years 2009 and 2010.



The main observation to be made from the graph is that children in the Kom-medium program manage to do as well as the children in the English-medium program in learning English even while doing markedly better in mastering the curricular content of Class 2. Another year's worth of data will help to establish whether the results from 2009 or 2010 best represent what is 'normal' for Class 2 children in the two programs.

Gender

On all major measures, female students scored slightly higher than male students but the difference was far from being statistically significant.

Fulfulde-speaking children

As in the case of Class 1, we are examining the performance of Fulfulde-speaking children in an effort to better understand the impact of the experimental Kom-medium program on these children. The results for Class 2 are show in Table 7.

Table 7. Performance of Fulfulde speaking students by program.

	Kom-medium program	English-medium program
Fulfulde-speakers	73.8	42.8
Non-Fulfulde speakers	60.7	37.3

As we have consistently observed, the Fulfulde-speaking children tend to score higher than other children regardless of the program they are in. What most stands out, however, is the fact that they are not at all compromised by attending Kom-medium classes. Contrary to what some have expected, it would appear that the Fulfulde-speaking children actually benefit more than Kom-speaking children by attending the Kom-medium schools.

Results for Class 3

The testing design employed for Class 3 allows us to answer some interesting questions about the relative effectiveness of the mother tongue component of the experimental program. This will be explained below.

In the research design, children in all 24 schools took the same test of knowledge and skills in language and math in English. In addition, children in the experimental Kom-medium schools took an additional test in Kom which tested the growth of language skills—including reading—in Kom. The test in English measured knowledge of English grammar, word recognition skills, and reading comprehension. The test in Kom measured only mastery of Kom grammar and reading comprehension in Kom. All test content for both tests came from the Class 3 curriculum. Neither test was a translation of the other so that there was unlikely to be any kind of direct transfer between the two tests. Otherwise, the tests were analogous in structure with 9-10 test items on grammar and comprehension texts followed by questions testing for comprehension of story content. The texts used for reading comprehension (in both languages) used local names and events to avoid potential threats to comprehension posed by using unfamiliar story content.

The testing design permitted a three way comparison as follows:

Skill development in English language arts by children being instructed only via English	Skill development in English language arts by children first taught to read in first language (Kom) with Kom as the primary language of instruction	Skill development in Kom language arts by children being taught primarily in the first language (Kom.)
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The results of this testing scheme are shown in Table 2. The mean score of those taught only in English (the Standard model) on the combined measure of language arts was 19.9 percent (out of 100). The score of the children being instructed in Kom on the exact same test in English was 41.5 percent, an improvement of 106 percent. In the third column we note that the mean score of the Kom-medium children on a Kom language assessment of language arts – structurally similar to the English test—was 65.6 percent, a level of performance more than 24

percentage points higher than the performance of the same children on the English-medium test of the same skills. The maximal advantage in reading skill is 230 percent (19.9 vs. 65.6 percent)

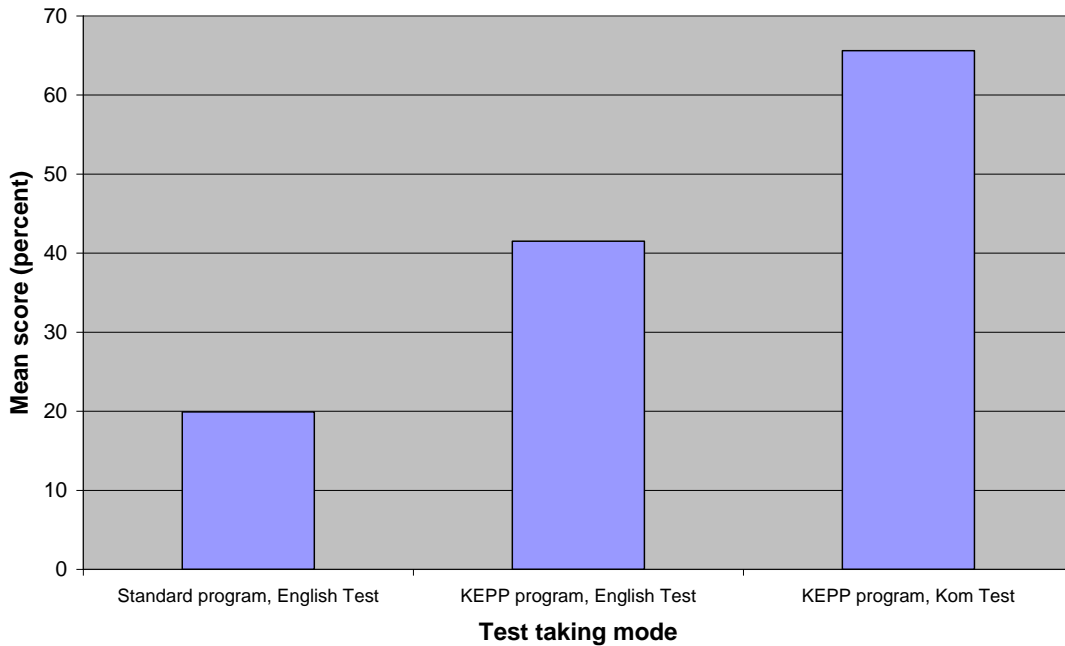
Table 8. Comparison of scores of Class 3 students in three different test modes.

	English medium instruction (N=314)		Kom-medium instruction (N=225)		Kom-medium instruction (N=225)	
	English-medium test		English-medium test		Kom-medium test	
	Mean	SD	Mean	SD	Mean	SD
Grammar	25.2	17.3	44.1	19.9	65.2	24.0
Comprehension	17.4	17.8	39.6	24.5	66.4	30.0
Language arts	19.9	13.0	41.5	17.0	65.6	23.2

The data are very suggestive of a set of conclusions though we need more data and experience to be confident in our conclusions. First, the Class 3 data clearly support the conclusion that the Kom-medium children are learning more and more efficiently than the children in the English-medium or standard classrooms. Second, these data clearly support the conclusion that the Kom-medium children are NOT being compromised in their mastery of the curriculum including the English curriculum since they scored more than twice as high as did the children in the English-medium classes. Third, the data suggest that reading skill is clearly superior when the language of reading and testing is a language the children know well rather than a second language.

Figure 4 presents in graphical form the same data found in Table 8 for the benefit of those who find a graphical format easier to grasp.

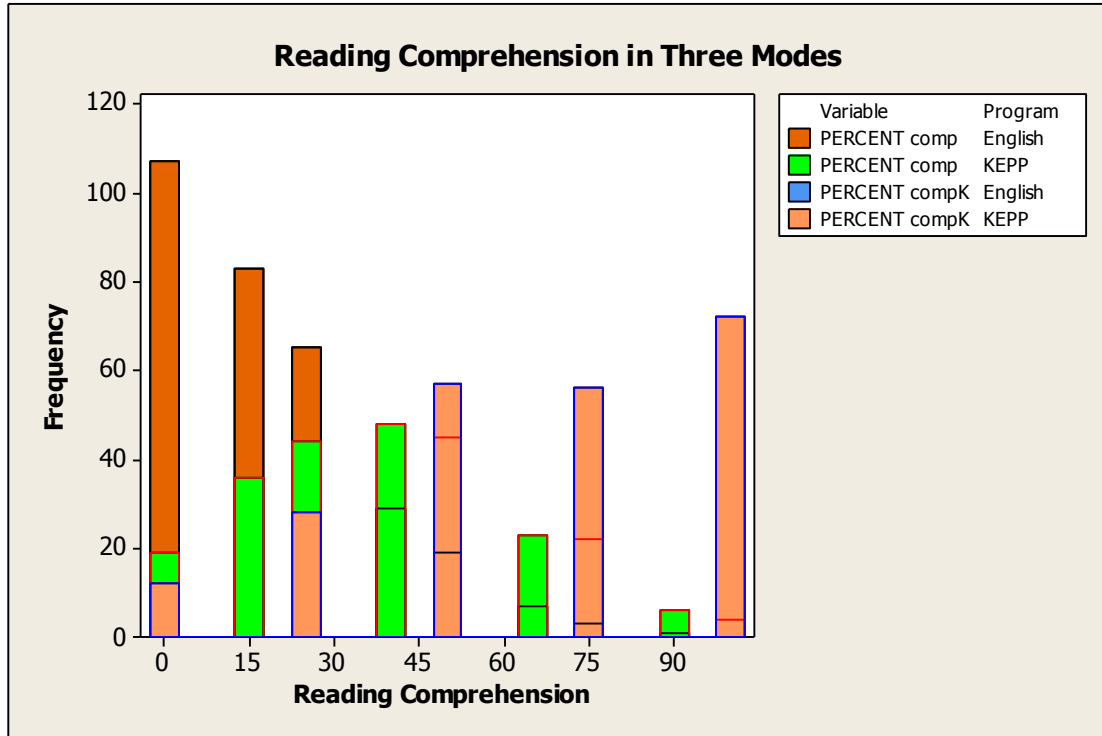
Figure 4. Comparison of performance on test of language arts for children in Class 3.



Reading Comprehension in Class 3

Since reading comprehension is a fundamental instructional objective of early primary, we examined more closely the evidence of progress towards being able to read with comprehension in the three different test modalities resulting from the assessment design for Class 3. We begin with a graphical rendition of the results as shown in Figure 5.

Figure 5. Reading comprehension levels in three different test modes in Class 3.



Again, the three test modes are: (1) English-medium children being tested for reading comprehension in English; (2) Kom-medium children being tested for reading comprehension in English (exact same test); and (3) Kom-medium children being tested for reading comprehension in Kom. To help clarify these data, look at Table 9.

Table 9. Progress towards becoming readers in Class 3.

	Non readers (zero comprehension)	Possibly incipient readers (greater than zero but less than 50 percent)	Passable to good readers (50 percent or higher comprehension)
English-medium, English test	34.1 percent	56.4 percent	9.6 percent
Kom medium, English test	7.7 percent	51.8 percent	40.5 percent
Kom medium, Kom test	5.3 percent	11.3 percent	74.9 percent

The red bars (and black lines in the green bars) show the results for mode 1 (English-medium children being tested in English). More than a third scored zero—they could not begin to read

the texts or answer the questions. More than half answered either 1 or 2 questions correctly. This may have been the result of beginning ability to read or the result of random guessing; we can't tell from the data. Only 30 of 314 students—less than 10 percent—read with a comprehension level of 50 percent or higher. This is actually lower than the 35 predicted by a random guessing model. Under the most optimistic interpretation of the data, about 10 percent of the children in standard Class 3 classrooms are reading with passable comprehension. A more cautious interpretation would suggest that perhaps 10-15 are reading with some comprehension. In the most negative scenario, it is possible to interpret the data (applying the probabilities of random guessing) to mean that 0 out of 314 children tested in this mode are able to read with comprehension. That is, choosing answers based on tossing a four-side die would have resulted in 35 papers in which students answered at least 4 out of 8 questions correctly.

When we compare the first and second rows in Table 9, the big difference is the small percentage of tested students in the 'zero' column of the second row (just 7.7) while we find 40.5 percent of students in the last column (passable readers). The only difference between the children in the first and second rows is that the children in the second row were taught to read in Kom and were able to transfer that skill to English without focusing excessively on learning to read in English. Their comprehension, however, is still relatively low since they were being tested in a second language.

The third row (Kom-medium children being tested in Kom) presents yet a different profile. The children in this row were taught to read and write in their mother tongue AND they were being tested for reading comprehension in the same language. Note that 75 percent of the children tested are reading with comprehension. In fact almost 30 percent of the children tested in this mode read with 100 percent comprehension compared to 0 percent in the first mode (English-medium, English test) and only 1.6 percent in the second mode (Kom-medium, English test).

The apparent conclusions to be drawn from these results are the following:

1. The children in the Kom-medium schools are readers by the end of Class 3 (based on the evidence from row 3 AND a comparison of rows 1 and 2 in Table 3);
2. By having learned to read in their first language, the children in the Kom-medium schools are able to apply those skills to reading in a second language even though their mastery of that language is limited (based on a comparison of rows 2 and 3);
3. Depending only on a second language to teach children to read appears to be a highly inefficient model (based on a comparison of rows 1 and 3). Unfortunately, this is the prevailing model in most developing countries.

Gender in Class 3

In reports from previous years it was noted that the variable of gender produced somewhat uneven and surprising results in the Kom data especially given the widely attested that observation that education in Africa seems to strongly favor males. The following table reports the findings from 2010 for Class 3.

Table 10. Comparison of Class 3 performance by Gender.

Metric of Comparison	Males	Females	statistic
Entire test population			
Language Arts	27.8	30.4	t = -1.72; P = 0.086
Math	31.5	37.0	t = -2.65; P = 0.008
Overall	29.1	32.8	t = -2.29; P = 0.022
English-medium (standard schools)			
Language Arts	20.1	19.7	t = 0.26; P = 0.798
Math	20.7	23.4	t = -1.35; P = 0.177
Overall	21.0	20.3	t = 0.49; P = 0.625
Kom-medium schools (English test)			
Language Arts	39.8	41.3	t = -0.70; P = 0.485
Math	48.1	50.8	t = -0.87; P = 0.385
Overall	42.8	44.7	t = -0.87; P = 0.383
Kom-medium schools (Kom test)			
Language Arts	62.8	68.0	t = -1.65; P = 0.101

The prevailing tendency is for females to outperform males in Class 3. The only constant is that females outscored males on the measure of math in all testing conditions. Both findings run somewhat counter to the prevailing view that male students normally outperform female students by substantial margins in developing countries.

Fulfulde-speaking students in Class 3

A common issue raised in discussions about the feasibility of mother tongue education is the problem of "mixed communities." If there are members of two different linguistic communities living together or interspersed one among the other, then, it has been argued, a mother tongue model is not possible. The only option is to educate everyone in a second language.

To our knowledge virtually no hard data exists describing likely outcomes under this condition of "mixed languages." The setting provides some data which can be presented to shed some light on this situation of "mixed languages." In some parts of the Kom area, one finds a sizeable population of Fulfulde speakers. Since there are no separate schools for the children of this language community, they attend whatever school is nearby. The 2010 data set tracked whether the child being tested was a speaker of the Fulfulde language. Interestingly, these children were approximately equally distributed between the standard and experimental schools. Table 11 reports our findings on this sub-population. Because this is not a large population (approximately 20 in total), it is not possible to draw major conclusions from the data. The results, however, are certainly suggestive.

Table 11. Test results for Fulfulde-speaking children in both control and experimental schools.

Metric of Comparison	Fulfulde	Non-Fulfulde	statistic
Entire test population			
Language Arts	34.3	28.8	P = 0.250
Math	45.5	33.6	P = 0.088
Overall	38.3	30.6	P = 0.125
English-medium (standard schools)			
Language Arts	21.0	19.9	P = 0.817
Math	24.1	21.8	P = 0.664
Overall	22.1	20.6	P = 0.721

Kom-medium schools (English test)			
Language Arts	44.0	40.5	P = 0.549
Math	61.0	49.0	P = 0.161
Overall	50.1	43.5	P = 0.260
Kom-medium schools (Kom test)			
Language Arts	62.9	65.7	P = 0.740

In all test modes but one, the Fulfulde children outscored the non-Fulfulde children. The difference was quite small when the Fulfulde-speaking children had attended an English-medium school and the test was being administered in English. In this instructional mode, the Fulfulde children scored almost as poorly as the non-Fulfulde children. However, when the Fulfulde children attended a Kom-medium classroom, they outscored their Fulfulde counterparts in the English-medium schools by approximately 150 percent—a huge advantage. In fact, they even outscored their Kom-speaking classmates on the English-based test by a considerable margin. The only measure on which the Fulfulde children fared worse than the Kom-speaking children was that of language arts when the test was administered in the Kom language (although the disadvantage was slight (62.9 vs. 65.7)).

What do we learn from this data? (1) Instruction in English serves the Fulfulde-speaking children no better than it does the Kom-speaking children. (2) The Fulfulde-speaking children attending a Kom-medium school benefit from this model almost as much as the Kom-speaking children. Why? The answer is almost certainly the fact that they have learned at least some of the Kom language from living in the community—at least enough to be effectively instructed in that language. Their education is NOT being compromised by going to Kom-medium schools. Quite to the contrary, those going to Kom-medium schools are doing vastly better than those going to English-medium schools.

Late entry into KEPP

Despite instructions and guidance from the research staff, there are students who entered the experimental program the second and third years having missed entirely the first year(s). While this phenomenon compromises the maintenance of a "clean" program for research purposes, it also offers an opportunity to observe the consequences of late entry. The relevant summary data are given in Table 12.

Table 12. Data on late entry into the experimental program.

	English-medium	Late entry KEPP	Full KEPP	Statistics
Language Arts	19.91	31.45	41.51	F = 142.27; P = 0.000
Math	21.84	37.66	50.70	F = 128.38; F = 0.000
Overall	20.60	33.68	44.81	F = 172.06; P = 0.000

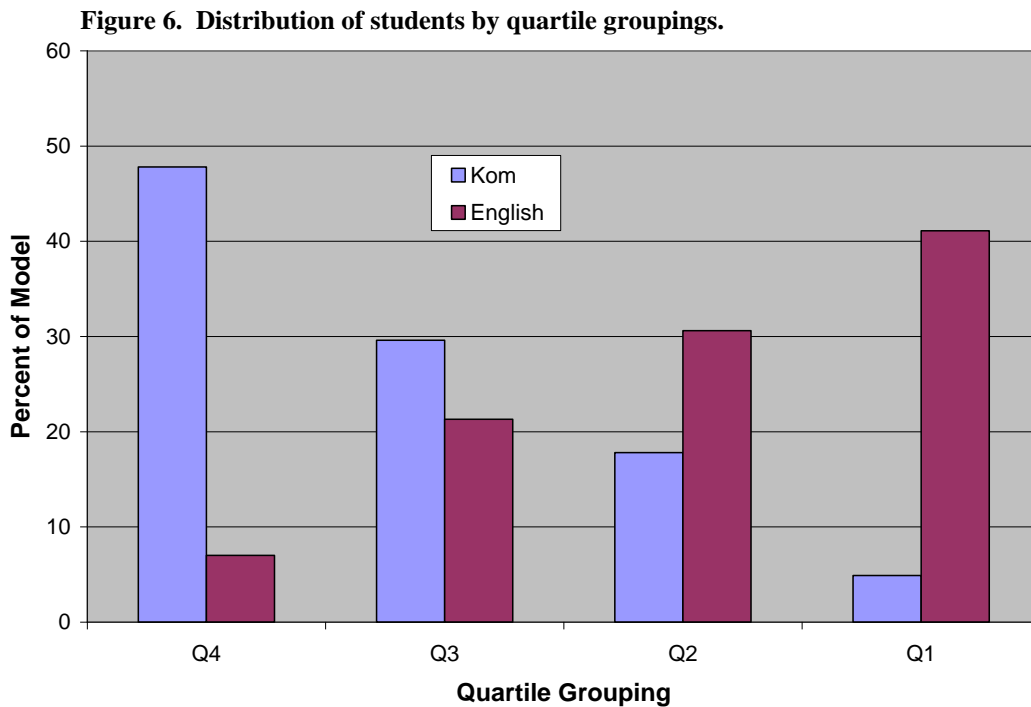
There were 22 such students identified in the testing done in Grade 3. All of these were students who entered at the beginning of the third year. The most obvious comment to be made is that the late entry students clearly outperformed the English-medium students. Interestingly, the mean performance of this group of late entry students is about 55 percent of the way towards the performance of the full KEPP students in each of the three points of measurement.

At this point it would seem we can make the broad generalization that the one year of Kom-medium instruction has definite value in terms of educational progress though it is not enough to make up the gap created by being the English-medium schools for Classes 1 and 2.

Performance Profiles

In this final section we present several different graphical devices to help clarify the difference in performance between children in the two programs. Or, we might also suggest that the differences manifested by the graphical devices serve to highlight the contrast between the instructional effectiveness of two different models of language use in the classroom.

The first two presentations are based on a ranking strategy somewhat similar to the idea of ranking children in a classroom from 1 to N based on the level of their academic performance (or some other criterion).

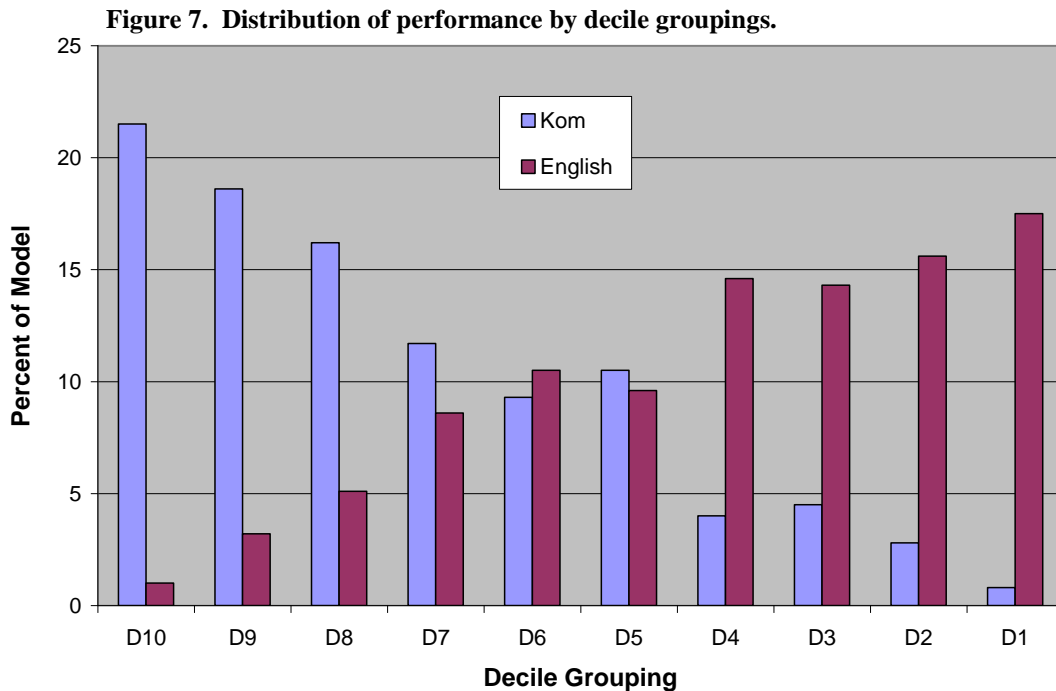


In a quartile grouping, the population of interest is ranked and then divided into four groups of equal size. When a research variable is present, this kind of ranking helps to make explicit the effect of this variable in the population of interest. In this case, the research variable is language of instruction. The entire population of students in the 24 schools tested were first ranked according to their level of performance and then divided into four groups of equal size—groups of 140 in this particular case. Then, within equal quartile grouping, the percentage of students from each model present in that quartile was computed. The graphing of the results is seen in Figure 6. To help make this more concrete, the group labeled Q4 consists of the 140 top-scoring students from the entire population of test takers—561 in all. Of this group, 118 (47.8 percent of all children in the KEPP program) were from the Kom-medium

schools and 22 (7 percent of all children in the standard program) were from English-medium schools. Each of the other groups is constitute in the same manner.

Looking at the graph overall, it is easy to see that the majority of the students in the top half of all students—(77.4 percent) are from the KEPP program. Clearly, the higher the quartile the larger the number of students from the Kom-medium program present in the quartile with the reverse being true as well. Since the test used to make this comparison was EXACTLY the same for both groups of students AND in English, we suggest that the graph represents very well, the educational effectiveness of the variable of language of instruction—Kom in this case.

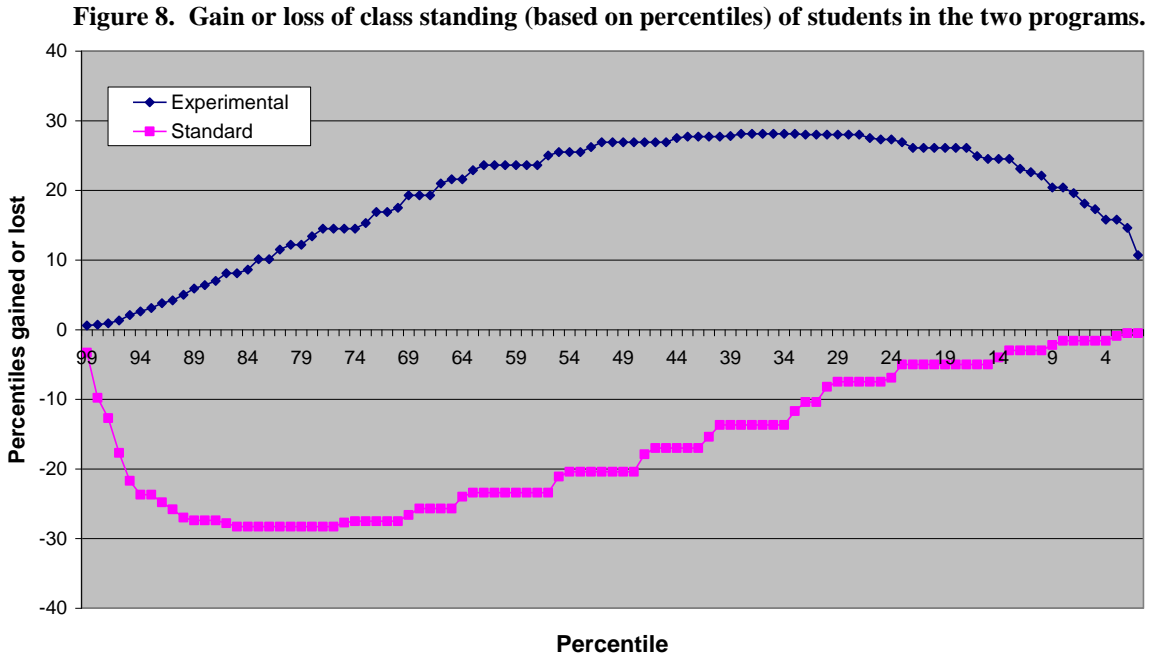
The next figure uses the same analytic strategy but is structured in deciles rather than quartiles. That is, rather than having 4 groups into which all students are divided, there are ten such groups. The use of deciles for mapping the distribution of students allows for a more detailed 'picture' of how students did in the two different programs.



The graph of distribution by deciles suggests a possible interpretation of the data in which there are three zones of performance: D7-D10, D5-D6, and D1-D4. A cumulative frequency histogram shows that the first four deciles (D7-D10) include 68.0 percent of the Kom-medium children, the next two include 19.8 percent, and the lowest 4 deciles include just 12.1 percent of the Kom-medium population tested. This profile somewhat approximates that of a population on a criterion-referenced test in which some 60-70 percent are expected to demonstrate mastery of test content, 15-20 are 'on the bubble' and 10-20 percent 'fail to meet the criterion.' In this particular case, the mean score of Kom-medium students in the cluster D7-D10 is 52.5, a rather low criterion of performance.

The distribution of students from the English-medium population is generally the inverse of that of the Kom-medium population. Sixty-two percent of English-medium test takers are in the bottom four deciles (D1-D4). The mean score of this group is 12.5 percent.

Figure 8 provides yet another means of comparing the results of the two populations of students on the testing done in 2010. The data are for Class 3 on the overall test result.



In Figure 8, students were first ranked against all peers in the same research mode—i.e. one ranking for all children in the English-medium program and one ranking for all children in the Kom-medium program. The underlying assumption is that the distribution of academic ability is essentially the same in both programs AND the distribution of ability between the two programs is essentially the same.

The second step was to combined both groups of students into a single group and then to redo the ranking using the overall test performance as the basis for the ranking. Then a scaling of these ranks was done based on the standard percentile scale of 1 to 99.

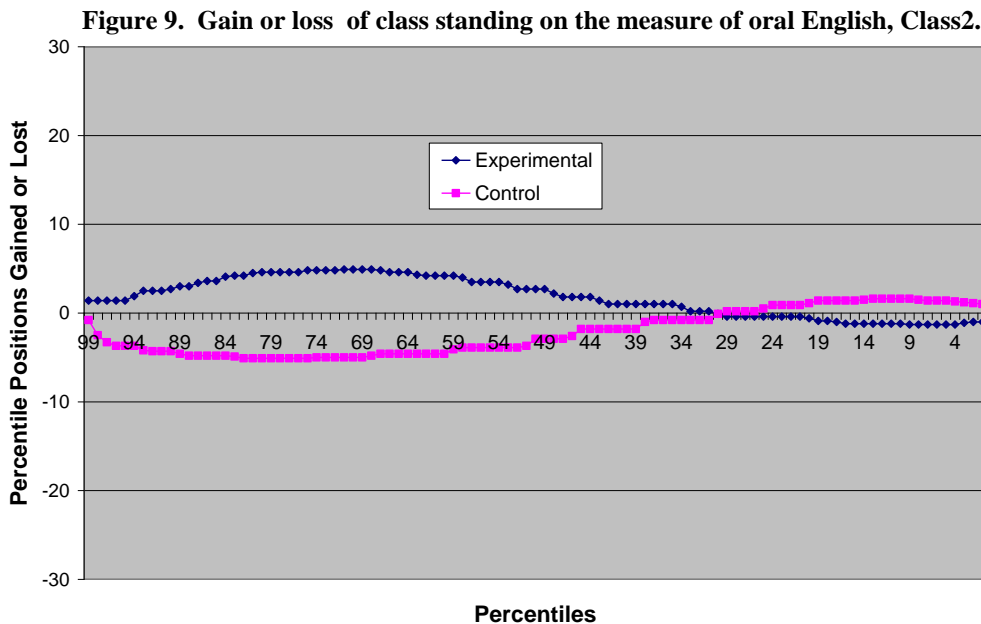
The third step, then, is to compare the within-group rankings with the between-group rankings on the basis of a percentile scale. The hypothesis is that any significant change in ranking of individuals going from the within-group ranking to the between-group ranking is, in effect, a measure of a gain (or loss) of educational standing (achievement) attributable to the variable which defines the difference between the two groupings—in this case, language of instruction.

In the figure, the distance of the two curves above or below the midline is a measure of the number of percentiles gained. By dropping or raising a vertical line from any point on the midline, it is possible to identify the impact of the experimental variable—language of instruction—for those associated with a given position of academic achievement. So, for example, a line dropped or erected vertically from the point marked as 54 identifies students who are in the 'average' category (the 54th percentile). We can then look at the number of

percentile positions gained or lost to estimate the extent to which students at given percentiles benefit (or not) from being in one program versus the other. Continuing the use of the above example, if we begin with the 54th percentile and go up vertically, we find that students in the experimental program experienced a mean gain of 25 percentile positions relative to those in the standard program. The curve for the Kom-medium program peaks at 28 percentile positions gained for those between the 24th and 44th percentiles. These data support the hunch of various observers including the authors that those most benefiting from mother tongue instruction are not the bright children but the average or even slightly below average children.

The strategy used to generate Figure 8 necessarily produces a complementary image of performance between the two programs. It also necessarily shows less contrast at the extremes since extremely high or low performers begin at the top or bottom and cannot climb higher (or fall lower). What this graphical device does show, however, is more precisely where benefit occurs in the research design and something of the extent of this benefit. The greatest benefit in the Kom-medium program was 28 percentiles. How much of a gain is 28 percentiles? If a person is at the 50th percentile (a totally 'average' student) and moves up 28 percentiles, that student is transformed from one who probably will not pass the Grade 6 Exit Exam to one with a strong likelihood of finishing secondary (college) and maybe even going on to University.

Figure 9 is included to show what an alternative profile might look like. The data for this differential profile comes from the performance of Class 2 students on the oral English assessment. The Kom-medium students showed a slight advantage but this advantage was not statistically significant. The profile generates a somewhat surprising insight into the nature of performance on this measure.



The mapping provided by Figure 9 contrasts significantly with that of Figure 8. First, we note minimal amplitude above or below the midline with the maximum amplitude being about 4 percentiles. Second, we note that there is a 'crossover' point between the two programs at the 30th percentile. At this point, students in the English-medium program showed a model-specific advantage over their peers in the Kom-medium program in oral English. The only immediate explanation is that students having lower levels of academic capacity benefit slightly

more from the increased exposure to oral English. This, however, does not translate into improved academic performance overall as the advantage (or oral English) is slight).

The schools

In all previous data from the Kom research project, we have observed substantial variation among schools within each model. This continues to be true in the Class 3 data as well. Table 13 gives the mean performance of Class 3 children by school and by program. Not surprisingly, the schools between programs reflect the model-dependent differences which have been observed and reported above at the level of individual children.

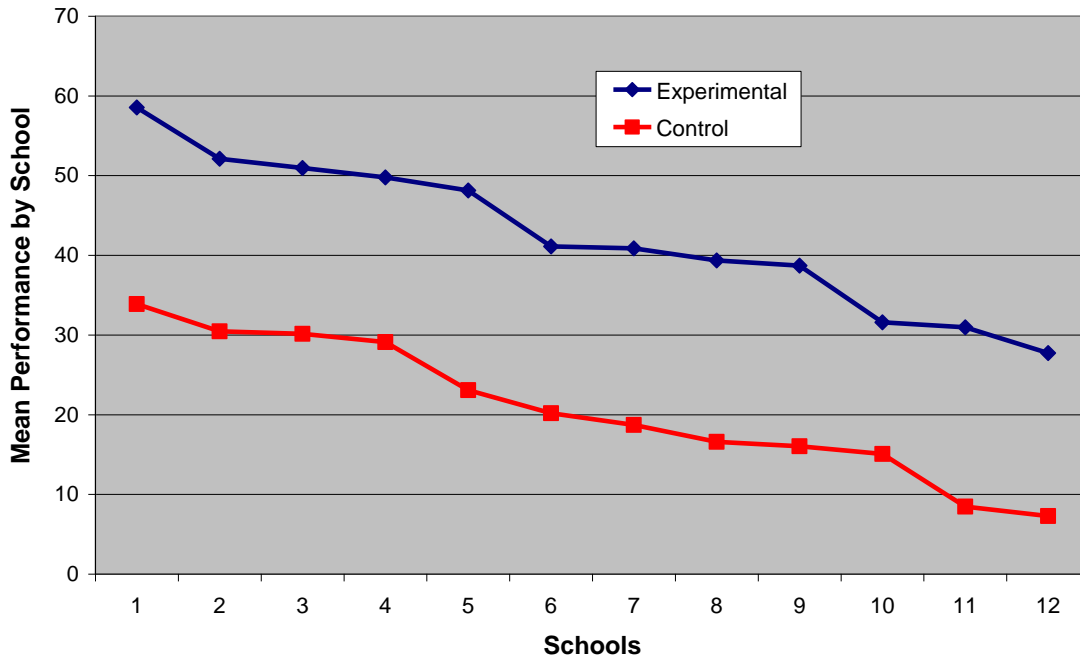
Table 13. Mean performance by school and by program.

Experimental Program (KEPP)		Control Program (English-medium)	
School	Mean Score	School	Mean Score
GS Mboh	58.55	CS Kindoh	33.88
GS Ilung	52.11	GS Atondum	30.46
CBC Kikfuini	50.96	PS Ngwah	30.13
GS Muteff	49.76	GS Fundong Village	29.11
GS Laikom	48.13	GS Baichu	23.08
GS Ngwah Aloin	41.11	GS Meli	20.19
GS Ameng	40.87	CS Wombong Ikui	18.70
CBC Fujua	39.36	BS Fundeng	16.58
GS Kitchu	38.69	CBC Wainchia	16.03
GS Bolem	31.59	GS Mentang	15.06
CBC Belo	30.97	GS Yuwi	8.47
GS Wombong Ikui	27.74	GS Njinikejem	7.28

The interested observer can look at the data and make generalizations about the relative performance of the stronger and weaker schools within programs and between programs. We will add just a few additional notes here that are not obvious from looking at the table. First, there is no obvious effect of class size as schools with small class sizes have done both well and poorly. The same is true of schools with larger class sizes. Second, there is some tendency for the schools in more remote rural locations to outperform schools in locations closer to population centers (market towns). It is these and other observations which have led us to tentatively attribute much of the variation in school performance to the quality and ability of the teacher. We have no separate measure, however, of teacher skill so cannot draw a stronger conclusion on this level of variation.

Figure 10 (below) maps the performance of all 24 schools ranked by performance and separated by program. A couple of comments are in order. First, the two plots of 12 schools (per program) are almost exactly parallel. Secondly, we note that there is nearly constant vertical difference between the two plots. The intercepts are 23.3 points apart—almost exactly the differential between the models reported in Table 1. These two observations support our earlier statement that the observed variation of schools within models would appear to be almost solely a function of variation in teacher capability. The impact of the model—use of the mother tongue as a medium of instruction—is marked by the vertical distance between the two plots.

Figure 10. Comparison of performance by schools and by program.



Conclusion and Discussion

Overall, the data from 2010 are consistent with the pattern observed and reported in 2008 and 2009. In general, children in the Kom-medium program show a collective gain in learning efficiency of about 125 percent over their peers in the standard English-medium program.

The Class 3 data (the first we have had from this program) both support the patterns seen in Classes 1 and 2 and add some additional insight into the educational effectiveness of the program. Some of this insight is fairly substantial while some is, at best, suggestive. The following notes summarize these points.

1. The fact that children in the Kom-medium program have learned to read appears to give them a very substantial advantage in reading in English even though the amount of exposure to English and explicit instruction in English is substantially less.
2. The data provide another type of evidence of the effectiveness of mother tongue instruction in the case of late entry into Kom-medium classes. Such students performed at a level about half way between those who had been in the program for three full years and those in the standard English-medium program.
3. The data about the performance of the Fulfulde children living in the Kom area provides some perspective on possible educational outcomes and options for such children. The data reported here clearly indicate that Fulfulde children did much better in Kom-medium classes than they did in English-medium classes. The sociolinguistic likelihood is that such children have learned some or, perhaps, much Kom from living in the Kom community. For this reason, they are not at all compromised by participating in the Kom-medium

program. It seems very likely, of course, that this would not have been the case if they had not learned the Kom language.

4. The fact that the Kom-medium children were much more proficient in reading Kom-language material indicates a high level of proficiency in reading after three years of schooling. This contrasts sharply with the performance of children from the English-medium program who still show very little reading skill after three years of schooling.

Now, we look forward to learning in what ways and to what extent the learning advantages gained by the end of Class 3 for those in the Kom-medium experimental program will extend into subsequent years of schooling since all children will return to English-medium instruction from Class 4 and on.