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Impact of Teachers' Practices on Students' Reading Comprehension Growth in Guatemala

Fernando Rubio, Leslie Rosales de Véliz, María Cristina Perdomo Mosquera, Ventura Salanic López

Abstract

This article discusses an educational intervention, with a strong emphasis on reading development in a bilingual context, in the Western Highlands of Guatemala (WH), a highly disadvantaged region, where the majority of the population is of Mayan origin and primary education is poor. The majority of the students in the Western Highlands speak a Mayan language as their mother tongue, yet they are generally taught in Spanish. We assisted in the development and implementation of a bilingual/intercultural education model including teacher training at the university level and bilingual materials development. Implementation included education for administrators and teacher coaching. For this intervention, aimed at improving reading outcomes, we report data for the first 3 years of implementation, and offer insights for system-wide interventions in low-resource areas. © *2017 Wiley Periodicals, Inc.*

Introduction: Local Context and the Guatemalan Policy Environment

This article discusses an educational intervention, with a strong emphasis on reading development in a bilingual context, in the Western Highlands of Guatemala (WH). This region is a highly disadvantaged area, where the majority of the population is of Mayan origin and primary education is poor. The majority of the students in the Western Highlands speak a Mayan language as their mother tongue, yet they are generally taught in Spanish. The intervention aims to improve reading outcomes in the region.

The Western Highlands of Guatemala is representative of much of rural Guatemala, a multicultural, multilingual country where more than 20 languages, including Spanish, are spoken (Ethnologue, 2015). The country has one of the highest inequality levels in the Americas, with extreme poverty concentrated in the rural and indigenous areas (World Bank Group, 2015). Teachers are poorly trained, as elementary school teachers have only a high school education and are trained in Spanish. Few instructional materials exist, even in Spanish, and parents often feel unable to help children to learn owing to their own limited knowledge of Spanish. These conditions lead to more than one third of children in rural areas not completing first grade.

Although the 1996 Peace Accords, which ended the country's 36-year civil war, stressed the importance of a bilingual and intercultural society, only recently has bilingual education become an emphasis. Through several different political administrations, the ministry of education (MOE) has focused on improving educational quality at the elementary level. In 2006, national grade-level standards were established and national achievement tests, aligned with the standards and the national curriculum, were developed (Fortín, 2013).

In 2010, Guatemala's National Council of Education adopted four education strategies to guide ministerial work (Ministerio de Educacion, 2012): (a) empowering communities, (b) building teachers' capacity, (c) meeting the needs of culture and quality, and (d) demonstrating accountability (Consejo Nacional de Educación, 2010). Moreover, in 2013, a new policy went into effect that required elementary teachers to be trained at the university level, rather than only through high school, and in 2014, the last cohort of elementary teachers trained under the previous policy graduated.

In response to these policies, in 2012, the National Reading Program was created by ministerial agreement number 423–2012 (Ministerio de Gobernación, 2012). This program has two components: community reading awareness and student reading acquisition. Awareness activities include oral reading by community actors, storytelling through radio, print publications, and literacy contests. Schools were required to have specific reading spaces, such as school and classroom libraries; the ministry was to provide

all schools with books for every grade level; and teachers were required to augment the daily 60-minute language arts period with a specific daily 30-minute period of planned reading development activities (Ministerio de Educación, 2012).

The Western Highlands Reading Intervention Projects

This article deals with the partial results of technical assistance projects funded by the U.S. Agency for International Development that have supported the MOE objectives. The Education Reform in the Classroom project assisted in the development of a bilingual/intercultural education model and in the design of a national program to train teachers at the university level. The Lifelong Learning (LLL) project has supported the development of bilingual instructional materials, undergraduate university training in-service programs in teaching reading and writing in bilingual situations, graduate programs in bilingual education administration for regional administrators that include coaching teachers, and reading awareness efforts in local communities. The projects have not intervened directly in a group of schools but rather provide assistance to different stakeholders in local offices of the MOE, municipalities, and universities.

Finally, the projects have monitored and evaluated the results of program implementation. The results of such monitoring and evaluation, for the first 3 years of implementation, are reported here, along with the process through which this work was conducted. The information will continue to guide the work of the Lifelong Learning Project and provide insights for other system-wide intervention projects in low-resource areas.

Research Design and Methodology

This study's hypothesis was that students of teachers who employed project intervention components would show greater growth in reading than teachers who did not report using such interventions. To test the hypothesis, a yearlong study was carried out in 2013. Student growth, as opposed to a single measure of achievement, was used as the outcome variable. Student growth is preferable to a single measure of achievement, as it allows for controlling socioeconomic factors outside control of the school, taking into account within-subject variation (Betebenner, 2008).

Sample and Participants. The sample consisted of 114 Western Highlands elementary schools that agreed to participate in the study. Data were collected over a 1-year period from 326 teachers serving about 6,000 students. Teachers averaged 36 years of age and ranged from 19 to 62 years old. Sixty percent of the sample was female.

Measures. Teacher use of interventions was measured through a self-report questionnaire about specific intervention components. The instrument consisted largely of forced choice, yes/no questions. It had been

developed and piloted with a different group of similar teachers in the region prior to use in the present study. Versions of the instrument in Mayan languages were available for teachers who preferred to respond in their mother tongue.

Progress Estimation. Student progress in reading comprehension was measured with the Ministry of Education National Reading Assessments for Elementary Grades at the beginning and end of the school year. The national assessments (*Pruebas Nacionales*) are generally administered at the end of the school year, in first, second, and third grades. The assessments measure reading in Spanish, with an emphasis on reading comprehension and are criterion-referenced through alignment with the National Curriculum and educational standards for each grade (DIGEDUCA, 2010).

Based on the test responses, each student's ability was estimated at each point in time, using the Rasch model (Bond & Fox, 2015). The result of this estimation was a logistics or theta score. Equating was unnecessary as students took the same test at the beginning and end of the year.

We employed three different approaches to estimate growth, aggregated by teacher, using Ho and Castellano's (2013) definition of growth as requiring that performance be measured at more than one time point within the same individual or cohort (also see Linn & Betebenner, 2009).

Growth Relative to Self. Under this approach, growth was calculated by subtracting students' theta at the end of the year from the theta at the beginning of the year. This is known as the "gains model" (DePascale, 2006; Ligon, 2008). Student gains were aggregated by teacher using the mean of gains of all students. In this study, students took the same test at the beginning and end of the year; therefore, equating of tests, as required by the model, was unnecessary.

Growth Relative to Academic Peers. Under this perspective, a student percentile of growth (SGP) was estimated using quantile regression (Betebenner, 2008). The SGP describes the location of a student's current score in relation to students with similar start points. For example, a student receiving an SGP of 85 progressed as well or better than 85% of peers in the norm group. Student growth percentiles were aggregated by teacher, using all students' median percentile.

As an example, the basic formula for estimating a percentile rank in the SGP model is the following (Ho & Castellano, 2013, p. 94):

$$\begin{aligned}\text{Percentile rank} = {} & (\text{Number of students at or below a given score} \\ & +(0.5 * \text{Number of students in the given score}))/ \\ & (\text{Number of students in the academic peer group}) \times 100\end{aligned}$$

Growth Relative to First-Grade Standard. Under this approach, students' deviation from the standard was calculated by subtracting student

Table 4.1. Percentage of Teachers Whose Students Demonstrated Growth, by Model

	Growth Relative to Self	*Growth Relative to Others**	*Growth Relative to a Standard*
Growth	82.5%	68%	66.2%
No Growth or Decline	17.5%	32%	33.8%
N	268	269	269

*At least above 40th percentile

ability from the standard cut point and aggregating by teacher, using the mean difference from the cut score (Ho & Castellano, 2013).

Analytic Procedures. Student growth results aggregated by teacher, under the three models, were associated with each of the following variables of a bilingual education model: (a) reading instruction in a bilingual setting; (b) reading materials available in the classroom, specifically the presence of a library in the school; (c) educational coaching; (d) parental involvement; (e) frequency of formative assessment in the classroom; and (f) teachers' preservice and inservice training. It was expected that students of teachers reporting participation in interventions or applying intervention components would show greater growth than those whose teachers reported not applying interventions. *T* tests were performed to assess whether progress was significant between teachers who benefited from intervention components and those who did not.

Results

Implementation of intervention components varied, as was expected for a system-wide, diffuse intervention. Components tied to linguistic diversity appeared to be the hardest to implement. We present student growth results aggregated by teacher, under the three growth perspectives for the variables of interest.

Table 4.1 presents student growth results aggregated by teacher. Results for a significant percentage of students declined despite a year of instruction. Progress and decline can be explained by implementation of intervention components that resulted in more student growth compared to those whose teachers did not report practicing intervention components (See Figure 4.1 for details). Following are the results for each of the components of the intervention.

Language of Instruction. Results of the teacher questionnaire indicated that reading instruction was not consistently conducted in the mother tongue. Most teachers (93%) taught in Spanish, although a sizable percentage (36.50%) reported having a Mayan language as a mother tongue. Only 20.5% of teachers thought literacy must be taught in the Mayan

Figure 4.1. Significance of Each Intervention Component, by Model ($p < 0.005$)

	Percentage	N	Effect	Growth relative to self	Growth relative to others	Growth relative to a standard
Teacher's mother tongue						
Mayan	36.50%		▼	T (267) = 1.864	T (267) = 4.705	T (267) = 5.959
Spanish	63.50%	274		p= 0.063	p= 0.000	p= 0.000
Teach in the mother tongue						
Mayan	7%		▼	T (207) = 2.397	T (207) = 2.797	T (207) = 2.708
Spanish	93%	213		p= 0.017	p= 0.006	p=0.007
Teach reading in the mother tongue						
Yes	65.70%		▼	T (241) = 1.835	T (241) = 1.652	T (241) = 1.935
No	34.30%	248		p= 0.068	p= 0.100	p= 0.054
School library						
Yes	65.10%		▲	T (262) = 1.012	T (262) = 1.535	T (262) = 0.908
No	34.90%	269		p= 0.313	p= 0.126	p= 0.365
Coaching visits from PADEP tutor						
Yes	79.10%		▼	T (64) = 1.072	T (64) = 0.705	T (64) = 1.741
No	20.90%	67		p=0.288	p=0.483	p=0.086
Coaching visits from MOE						
Yes	42%		▼	T (267) = 1.561	T (267) = 2.495	T (267) = 2.618
No	58%	274		p= 0.120	p= 0.013	p= 0.009
Parent support						
Yes	69.20%		▲	T (243) = 0.809	T (243) = 1.034	T (243) = 0.133
No	30.80%	250		p= 0.419	p= 0.302	p= 0.894
Frequency of diagnostic assessment						
Weekly	33.60%					
Monthly	19.40%		▲	F(4,202)= 0.748	F(4,202)= 0.472	F(4,202)= 0.286
Every two months	42.20%	211		p= 0.560	p= 0.756	p= 0.887
Every semester	3.80%					
Other	0.90%					
Pre-service training						
Yes	75%		▼	T (262) = -0.499	T (262) = -1.109	T (262) = 1.046
No	25%	263		p= 0.618	p= 0.268	p= 0.296
Teacher currently studying						
Yes	28.60%		▲	T (228) = -0.381	T (228) = -0.230	T (228) = 0.352
No	71.40%	234		p= 0.704	p= 0.818	p= 0.725

Note: PADEP = *Programa Académico de Desarrollo Profesional Docente.*

language rather than Spanish. The majority (54.3%) stated that teaching literacy should be done in both languages at the same time.

Using the mother tongue to teach reading in Spanish had significant negative effects on student reading gains. Teachers whose mother tongue was Spanish also had students with more growth, either marginally significant or highly significant, depending on the growth model in use (See Figure 4.1). These results suggest that teachers were using the Mayan language to teach Spanish but not to teach reading in the Mayan language.

Availability of Reading Materials in the Classroom. The use of the school library as a resource for reading instruction had been adopted in the majority of schools. Sixty-five percent of teachers reported having a school

library, and nearly half (46.9%) used the libraries for individual reading or reading aloud activities.

Under all three models, the presence of a library in a school had positive effects on students' growth in reading, although these were not statistically significant (see Figure 4.1).

Teachers' Preservice and Inservice Training. Most teachers had a degree in teaching (75%) from the traditional training program provided at the high school level in the country. Inservice teacher training, at university level, in the region has been provided through the ministry professional development program. Slightly more than half of the teachers (55.2%) reported receiving this training. Some also reported receiving training on curriculum topics (18.4%), intercultural education (13%), and intercultural bilingual education (10%).

Preservice, or high school, teacher training showed no effects on student growth in reading. However, students of teachers who reported currently pursuing higher education (28.60%) showed higher growth results. As noted, none of these results were statistically significant (see Figure 4.1).

Educational Coaching. Coaching has been promoted as an integral part of teacher inservice training programs. Teachers reported receiving visits to support their teaching. As expected, the coaching element showed the highest level of presence, with 79% of teachers reporting having received such support from the program tutors; the MOE program requires coaches to visit teachers at least three times in a year. Somewhat unexpected was the percentage (42%) of teachers interviewed who reported visits from MOE supervisors.

Visits from tutors or supervisors translated into mixed results. On the one hand, coaching visits under the MOE professional development program had positive effects on student reading gains, under both the models of growth relative to self and relative to others. However, these differences were not statistically significant and were only marginally significantly different from results under the growth relative to standard model. On the other hand, teacher visits from MOE supervisors had negative effects on student reading gains under two of the three models: growth relative to self and others (see Figure 4.1).

Parental Involvement. Teachers responded to questions about parent involvement in student learning. A high percentage of teachers (69.20%) reported support from parents. Moreover, 47.8% stated they had meetings monthly with parents; 39% reported quarterly meetings, and only a few reported other frequencies of parent meetings (9.5%, every 15 days; 3.7%, only twice a year). For those teachers who perceived having greater support from parents, students showed more growth in reading than those of teachers who perceived not having support from parents (see Figure 4.1).

Formative Assessment. Project-promoted assessment tools have been widely adopted. Nearly all (95.2%) teachers reported using reading diagnostic assessments as frequently as weekly to every 2 months. This

component of the intervention had positive effects on student growth. As shown in Figure 4.1, those teachers who assessed their students as frequently as every 2 months showed greater growth than any of the other frequencies of assessment use.

Conclusions. The majority of teachers in the region have adopted intervention components, and the MOE strategies promoting reading and change of practice in literacy instruction are underway. Overall, implementation of intervention components resulted in greater student growth compared to those students whose teachers did not report practicing intervention components.

Capturing whether positive change is in fact occurring is difficult. On the one hand, we have shown that intervention elements are being adopted, that implementation is in fact occurring, and that the majority of the students are progressing in literacy skills. On the other hand, this study uncovers an inconsistent pattern of results that link these improvements on reading skills to the intervention components.

The significant percentage of students who showed a decline in growth, despite a year of instruction, is worrisome. Identifying variables associated with this decline is a challenge, that is, perhaps, even more important than establishing causal links between interventions and results. Some children have shown growth in reading, and we have gained information that can lead us to improved approaches to those who have not. So success, even without clear causality, is a move forward in improving education for the children in this region where the educational needs are great.

Discussion

This study has shown that duration of implementation is important. It has shown that having a consistent intervention over a period of years is starting to show results in an impoverished region, on a broad region-wide basis.

This intervention did not start with pilot schools and look for ways to bring the program to scale. Rather, the program was implemented, in conjunction with ministry and regional authorities, on a region-wide basis from the start. It used research to refine the interventions iteratively based on evidence gained. The results reported here were a continuation of an earlier project that gathered data that demonstrated to the ministry that students not only were not meeting the national standards but also were not progressing toward the standards. This gave impetus to implement a teacher training and support intervention that, it was hypothesized, would be crucial to student learning growth. Initial results, reported here, show that growth has been promising, although clearly this work must be ongoing to continue to have an impact.

This study's results confirm that teachers require training at university level, and that training should be accompanied by ongoing support from coaches willing to help them improve their practice. However, the

coaching component of the intervention showed mixed results. It is unclear what the role of the coach was prior to the intervention. It may have been to supervise the work of the teacher, which could be perceived as potentially punitive or threatening and may have caused negative results compared to not having the coach visit the teacher. An alternative explanation is that teachers who were identified by coaches as those who needed the most support were the ones who reported having more visits.

It is still unclear from our results how teachers use the mother tongue instructionally. One possibility is that teachers are using the mother tongue to teach Spanish language and reading in Spanish, rather than teaching children to read in the mother tongue.

Encouraging the MOE to develop and provide reading and assessment materials in the different languages of instruction is beginning to give positive effects, as the mere fact of having the materials available had positive effects on students' reading progress. Building capacity for the appropriate use of such materials should translate into better learning. Parents' participation in reading is beginning to affect growth as well.

Using an approach of providing technical assistance to local implementing institutions has implications for the study design chosen to investigate intervention outcomes. The literature is clear that experimental or quasiexperimental designs with counterfactual groups are the strongest type of methodology to determine causality. However, for implementing a project in collaboration with local ministries and districts, as was the case for the LLL project, this may not be feasible. We were unable to choose specific schools; instead, ministry officials selected regions. Although such regions can be compared with counterfactual regions, some contamination of results is inevitable with time, and sources of contamination are many. For example, the national reading program reaches all teachers, and training of supervisors on coaching techniques is department wide. Additionally, teacher training programs incorporate project contents, a percentage of teachers move between schools, and teachers have regular exchanges on their way to and from work as they often share transportation. These realities invalidate controlled experimental or quasiexperimental designs.

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