PRODUCING EDUCATIONAL MATERIALS IN LOCAL LANGUAGES:
COSTS FROM GUATEMALA AND SENEGAL

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Abstract

This paper examines production costs of local language materials, budgetary implications of such programs and cost saving strategies that have and can be usefully employed in Guatemala and Senegal. Information from Guatemala indicates that investments in bilingual education programs are time-intensive but not prohibitive. The Senegal case study estimates the impact on the unit cost of local language materials if production is expanded to include all potential students in two neighboring countries, Senegal and The Gambia, that share a common local language. Results indicate that inter-country cooperation is beneficial, especially when factoring in demand constraints in any single country.

Keywords: Guatemala, Senegal, educational policy, language of instruction, instructional materials, costs.
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I. INTRODUCTION

About 22 percent of the world's population are identified as speakers of local languages - a
language which is spoken by one or a few minority groups in a country and which is not the
language of social and economic mobility in that country. Investments in local language
education are justified on the basis of greater student participation in schooling as well as
improved student learning and achievement. Although evidence confirming the benefits of
mother tongue instruction is varied, research indicates that mother-tongue (MT) instruction
results in improved learning achievements, lower dropout rates, better adjustment to school,
cultural preservation, and self-confidence in children (Okonkwo, 1979). It is also believed
that children are best able to learn a second language if they are well grounded in their first,
especially if they have learned to read in their mother tongue (Dutcher, 1983).

However, despite these advantages, demand for local language instruction is limited. Also,
the time period and resources required to introduce local language or bilingual education
programs (simultaneous or phased instruction in local language and in the majority language)
in a country can be substantial. Countries may not view local language instruction as an
investment, necessitating long term commitment, planning and funding. Therefore, before a
country can invest in bilingual education, it is necessary to consider not only the demand for
such education, but also the cost of specific components of such a reform, including the
production of learning materials in local languages and teacher training in the use of these materials.

Estimating the cost of producing learning materials in local languages is highly problematic. This is not only because of data limitations, but also because this cost is infinitely variable. Given different sizes of local language groups in different countries and their demand for local language materials (LLMs), the cost of producing titles for a majority in one country can be lower or higher than the cost of producing titles for a minority in another country. Moreover, unless the same titles are produced in a local and non-local language, ideally in the absence of a specific program for LLM production, relative costs of LLMs versus majority language materials are difficult to gauge. Generally, in addition to the variables affecting the cost of producing learning materials, the cost of producing LLMs depends on: the development and experience of the publishing industry in the country, type of production process employed, the development, standardization and universalization of the local language orthography, development of the curriculum, availability of experts in the local language and time taken to build consensus on materials to be published in the local language.

Additionally, program development costs can play a significant role in the cost of producing LLMs, as LLMs are usually produced under specific programs. These program costs are determined by, among other factors, the development of the national education policy and curriculum, the context of the textual development of the language and the specialized teacher training required for bilingual education. These issues delay the process of learning material development in local languages and involve costs that are difficult to measure.
Information on LLM production costs is scarce because of the existence of hidden costs (for example, the operating expenses of NGOs or government agencies that are involved in LLM production). Also, private publishers are often hesitant to share cost information. There is also little or no history of recording data on cost of producing in local languages, especially in countries where the task is undertaken by small non-profit organizations with limited capacity to monitor costs. Moreover, relative costs of local language materials and non LLMs are problematic often because the two are produced under different conditions, for different audiences.

Given these complexities and data limitations, this paper sheds light on the cost of producing local language materials in two countries, Guatemala and Senegal. In the Guatemala case study, cost data for the production of indigenous (Mayan language) materials has been analyzed to assess budgetary implications of introducing bilingual education in Guatemala. The Senegal case study, on the other hand, tests the validity of recommendations for cost-efficient production of LLMs, including regional cooperation in production.

II. THE ECONOMIC AND POLITICAL CONTEXT OF LOCAL LANGUAGE MATERIAL PRODUCTION

A. Economic Context

The market for LLM production is generally a mix of government monopoly and uncoordinated production by community organizations. However, in many Latin American nations, LLMs are produced in a more transitional market environment with increasing participation by private publishing houses. A reason for the conspicuous absence of large-
scale producers in LLM production market is that LLMs are often produced for minority
groups, often with limited demand. Commercial publishers are more willing to produce
educational materials published in a language of wider communication\(^2\) for which there exists
a larger market, within and outside the country. Commercial publishers are also unwilling to
produce materials that might not be affordable for ethnic groups. Distribution and marketing
of LLMs is often not very effective, driving private companies away from the market.

Whether the supplier of LLMs is the government or the private sector or some combination of
the two, and assuming that there is demand for local language instruction, determining the
optimum quality and number of materials to produce in any given year depends on a variety
of factors. The quality of a textbook depends on the content of the book (aptness of the
subject matter), presentation (suitability of language, appropriateness for the classroom),
design, illustrations and the quality of the materials used. The number of books required is
dependent on the estimated population of users (a function of demand), the number of subjects
taught, the number of titles to be produced, the proposed student/textbook ratio, and the
assumed life span of the book. Decisions on the number of books to be produced of a
particular title in a given year are a function of the new copies needed, the number of copies in
stock, replacement estimates and book usage practices (which may depend on the training of
teachers in the use of the books and the policy of head teachers regarding distribution of
books) (Bgoya, 1997). Production costs depend on the estimated number of books to be
produced and production technologies employed. Significant gains have been realized in
publishing LLMs because of improved technologies, including the use of computers for
desktop publishing and cost-efficient digital duplication technologies. To determine the
quality/cost mix of a textbook, the specified manuscript has to be produced in a collaborative exercise between the editors, illustrators and publishers of the book. It is also important for producers to consider economies of scale in printing, which implies that a large print run will result in lower unit cost of a book (not the total cost of production). Underlying such analysis is efficient information management. This would comprise information on the above-mentioned variables, including cost of producing LLMs given specific quality guidelines, estimated student population, number of new titles required, number of books in stock, life span of books and book usage practices.

B. Political Context

The use of mother tongue as a medium of instruction in a country is largely dependent on the language policy of the government. Decisions on national language policy can be political in nature, as the stakeholders involved (ministries of education, parents, students, local language communities, teachers, unions, local and international publishers) are diverse (Bgoya, 1997). It is important to note that effective introduction of local language education is very time-intensive, therefore requiring a long-term perception. Many governments may not decide to allocate resources to local language investment primarily because this decision is manifested in consistent recurrent expenditures over a long time period. Short-term political goals may not accommodate such a long-term investment focus.

A rational decision to promote local language education based on allocative efficiency grounds may not result in the most appropriate implementation of a language policy (which may include several local languages): parents may not wish that their children learn local languages in a country where the language of wider communication is different from the local
language and where acquisition of the language of wider communication is perceived to be the way to realize social and economic mobility. Teachers may lack training in teaching in the local language they are expected to teach, or adequate quantities of good quality materials may be limited in the local languages selected as media of instruction. An additional issue, common in most African countries, is the lack of a single local language-how does the government decide which local language(s) to decree as national language(s) and which local language(s) to support in education? Given the cognitive gains that can be realized through mother-tongue instruction, it seems that choice of a language for a particular language group may be based on the child's familiarity with the script. When more than one language can qualify as the language of instruction and where the selection of the language of education is dependent on political endorsements, educational materials production may be centralized because private publishing agencies may become unwilling to take the risk of unsold stocks due to a change in regime or political endorsements.

While often problematic, even if one of a number of local languages is selected as the language of instruction, the language may require a process whereby its vocabulary is "modernized" to suit current educational needs (Smith, 1977). If the selected language does not have a written system, then the language would need to adopt a standard orthography (Hoben, 1984). Reaching consensus on the spelling may be controversial, may take a long time and hamper the development and production of teaching and learning materials in the local language. Writing systems of many African languages were created either by colonial administrators or missionaries in the nineteenth century. This development was haphazard and political in nature, with preference given to some languages over others (Hoben, 1984).
A great deal of work has also been done in the twentieth century on language development by linguists, local communities, missionaries, non-governmental organizations, and other groups. However, this trend of external intervention is manifested today in the continued support of historical colonial rulers in the publishing and educational materials production industry, either as donors or as influential international publishers. In some cases, bilateral donors continue to promote educational materials and development of languages in accord with their national interests rather than in accord with the interests and preferences of local communities (Bgoya, 1997). Many developing nations which have diverse local languages and which may want to enhance their cultural identity might not resist such post-colonial policies because: (i) they depend heavily on the West for knowledge creation and distribution-mostly produced in international languages, for instance English, French or German; (ii) donor funding is a critical source of financial support given constrained resources; (iii) the elite favor education in a foreign language that they have acquired; (iv) economic growth goals necessitate the promotion of a labor force proficient in a language of wider communication. People proficient in languages spoken internationally can be qualified to work abroad and can earn foreign exchange for their country (Chiswick, 1998). Countries may also not be able to institute mother tongue education programs because the initial cost implications of an education system reform may be too costly for the government.

III. FACTORS AFFECTING THE COST OF PRODUCING LOCAL LANGUAGE MATERIALS

Local Language materials are more expensive to produce than non-local language materials. Table 1 below shows unit costs of materials produced in Guatemala and Senegal for the
instruction of selected local languages. Although all teacher’s guides in Guatemala were produced in Spanish, the guides for the study of indigenous languages were relatively more expensive than teachers’ guides for Spanish instruction. Similarly, unit cost of a textbook produced in French is much lower than the unit cost of a textbook produced in any of Senegal’s national languages (see Table 1). While the data for Senegal is from 1986 and may not reflect cost savings generated from the use of innovative technologies, it reflects the unit cost differentials that may result from producing LLMs for limited markets.

Local language materials are more expensive on the average because their production involves additional expenses not necessary for the production of majority language materials. These expenses include the salaries of linguists, specialized teams to assist in the development/standardization of the language, as well as expenses incurred to prepare specialized materials suitable and acceptable to the local language communities. Substantial time may be taken to assess community needs and contexts as well as to convince communities that their languages can be written. In many cases, scripts and often specialized vocabularies might need to be developed to translate theoretical concepts and scientific terms, resulting in additional time taken to complete the textbook production process. It is also possible that an effective and efficient process of textbook authorship and publication could not be followed due to inadequate numbers of experienced linguists. Delays may also be caused because publishing houses have limited capacity in page layout and typesetting in local languages. All these factors result in higher unit costs of local language materials. Countries that have attempted to introduce LLMs will attest that although LLMs may not cost significantly more than non-LLMs, the time taken to develop, produce and introduce such
materials in the formal education system is significant, spanning over decades. Also important to note is that the fixed costs of developing the materials are spread over a limited number of LLMs, resulting in higher unit costs.

The unit costs of producing LLMs are especially higher than those of majority language materials because the quantity of local language materials produced is almost always smaller than the quantity of books produced in the majority language. Therefore, fixed costs of producing books (all costs incurred before the first copy is printed) have to be spread over a limited number of copies. This implies (see Figure 1) that unit cost of production is inversely related to the size of the print run. That is, as the size of print run is increased, the cost of production per copy printed decreases. However, it is important to note that after a threshold printing level is reached, the unit cost of production decreases at a decreasing rate. Thus, if production costs are similar to those in Figure 1, production economies would be maximized between print run sizes of 5,000 and 10,000 materials. This may be true in some cases, but may vary tremendously between different types of materials, quality of paper used, illustrations and color.

While unit production cost is a declining function of the number of print runs, total cost of production increases as the size of print run is increased, due to variable costs of production, distribution and teacher training. Again, although unit production cost can decrease with a larger print run, the optimum size of the print run depends on market demand as well as production cost structure.
IV. FINDINGS FROM CASE STUDIES

Case studies on Guatemala and Senegal indicate that for both local language and non-local language materials production, manufacturing costs (cost of typesetting, page layout, printing and binding) represent the largest proportion of total materials production costs and recurrent cost components outweigh capital cost components. Information from Guatemala indicates that introduction of a national bilingual program is very time intensive, but not financially prohibitive, that reprinting well-developed materials is cost-efficient, and that it is crucial to involve linguists, communities, publishers and policy makers throughout the LLM production process. Information from Senegal indicates that unit costs of LLMs are higher than those of non-LLMs, increasing the size of the print run reduces the unit cost of production and inter-country cooperation can be an effective mechanism to realize cost savings.

A. Guatemala

Drawing on the lessons learned from the bilingual castellanización program of 1965, Guatemala established a pilot national bilingual primary education program in 1980. Under this program, a bilingual curriculum was introduced in a transitional mode in ten pilot schools for each of the four majority Mayan languages—K'iche', Mam, Kaqchikel, or Q'eqchi' (Quiche, Mam, Kakchiquel or Kekchi). At the termination of the pilot program an administrative structure was established in 1985 for the provision of bilingual education, Programa Nacional de Educación Bilingüe (PRONEBI) (Richards, 1996).

This case study analyzes information on the cost of production of two types of learning materials in the four majority Mayan languages: (i) approximately 500,000 textbooks developed by the Dirección General de Educación Bilingüe Intercultural (DIGEBI, formerly
and (ii) 28,000 supplementary reading materials produced by the Universidad Rafael Landivar's Linguistics Institute, the largest producer of Mayan-language materials in Guatemala.

1. Production Cost and Issues (DIGEBI project)

The total cost of production of 26 titles for 60,000 first grade bilingual primary school students is estimated at $561,819 (see Table 2). Unit costs of production of bilingual materials ranged from $0.98 to $2.00 under this program.

Apart from the cost of typesetting and page layout, textbook production components involve mostly recurrent costs (e.g. salaries) and, depending on the length of time taken to complete a LLM production program, can involve a sustained burden on the government budget. The DIGEBI bilingual education project under study was undertaken over a four year time period. Annual expenditure accounted for 0.06 percent of the recurrent education budget and 0.13 percent of the recurrent primary education budget in 1995.

Although the DIGEBI bilingual textbook production program comprised a very small percent of the overall recurrent education budget and serviced 60,000 bilingual students, it increased the unit cost of primary education by 9 percent over the cost of Spanish-only curriculum. These numbers may underestimate the DIGEBI share of recurrent education budget. This is because overall program costs have been spread over four years rather than three (DIGEBI was delayed by a year because previously prepared textbooks were revised in the third year because they were found to be inappropriate). On the other hand, these numbers may
overestimate the recurrent cost implications for future bilingual education development in Guatemala. This is because they include overall program development costs for DIGEBI, which might actually be much lower in subsequent years, after the initial technical assistance costs and program development costs have been incurred by DIGEBI.

Among the diverse issues faced in the development of these Mayan language teaching and learning materials, a challenge for the Ministry of Education was to develop a curriculum which was tailored to suit the interests and needs of the different communities. The Ministry resolved this dilemma partially by holding training sessions for the technical experts and language communities that were unaccustomed to developing pedagogical materials. The direct and indirect costs incurred in holding these sessions increased the overall cost of production. Also, time spent in coordinating these sessions involved hidden costs not calculated in the production cost estimate.

Additional issues that increased the overall cost of production include: lack of skilled linguists and Mayan language curriculum developers and time taken to make decisions on the choice of language for teacher guides and development of new words. Perhaps most significant of all was the decision to revise the manuscripts once they were already produced, resulting in a year's delay in the production process and subsequent recurrent costs.

2. Books Produced by Universidad Rafael Landivar

Since the introduction of bilingual education pilots in Guatemala, a majority of materials written in or about Mayan languages have been produced by the Universidad Rafael Landívar’s Linguistics Institute (Richards, 1996).
Information from the Linguistics Institute at the Universidad Rafael Landivar on the production cost of 28,000 cultural texts serving as supplementary reading materials is provided in Table 3. The overall cost of producing 1,000 copies each of the 28 titles was $180,126. Production costs are primarily recurrent in nature as illustrated in Table 3, except for the fixed cost of typesetting and page layout for book printing. Since the learning materials for this project were developed over a two-year time period, it is estimated that a similar project, involving the production of 28,000 materials would represent an annual expenditure of about $90,000. Note that this expenditure is much lower than the estimates from the DIGEBI data for several reasons, including the extensive experience that the Linguistics Institute at Rafael University has in development and publication of Mayan language materials.

The unit cost of production of these books (roughly 35 pages each) is $6.43. Once these books are printed, the reprinting cost is estimated at approximately $1 per book. This has implications for well-developed curriculums and textbooks that are expected to be utilized over a long time period. Cost of reprinting these books would be much lower if, for example, the same materials are reprinted after three years, resulting in an annual expenditure of approximately $28,000 (cost of re-printing) as opposed to $90,000 (assuming same production process and costs as for these supplementary readers). Assuming the same production process and cost structure, quantity and content of these books, the unit cost is expected to decrease by 84 percent when books are reprinted. Moreover, annually, cost savings of approximately 70 percent of original production costs can be realized through
reprinting. This is a significant cost reduction and should be considered, especially for the production of supplementary reading materials, which are less likely to change annually.

B. Senegal

Senegal has 28 local languages, all belonging to two groups from the Niger-Congo family and as a result are also widely spoken in other African nations. Among these languages, six (Wolof, Pulaar, Serer, Diola, Mandinka and Soninke) have the status of national languages. The Government of Senegal introduced a language policy in 1971, decreeing the use of the national languages in the education system. However, French is predominantly used as the language of education, government and administration (Woodhall, 1997).

Information from Senegal indicates that the unit cost of producing LLMs is higher than the unit cost of producing non-LLMs (see Table 4). Although the unit cost of LLMs is higher than that of French books, the production of LLMs (for the expected market, which may be very small) may not necessarily increase average unit cost of production of educational materials (in all languages) in a country. This is because, as can be seen in Table 4, the number of French books produced is significantly greater than the number of Wolof or Pulaar language books. A weighted average of the unit costs of books in all these languages would probably be closer to the unit cost of French language books than any others displayed in Table 4.

The unit cost of production of local language materials is higher in Senegal primarily because, holding book specification constant, the fixed cost of production and opportunity cost of time spent in page layout, typesetting and preparing the machinery for printing is spread over a
small number of learning materials. This implies that the unit cost of production can be reduced through spreading the fixed cost of production over a larger print run. To test the validity of this statement, cost-savings resulting from several approaches to increase the size of print run of LLMs are estimated.

The scenarios used in this study assume that first grade primary school students will be provided three sets of LLMs in Wolof, the language spoken by approximately 70 percent of Senegalese. The student/book ratio is assumed to be 1:1. Proportions of linguistic affiliations in the population have been used to estimate the proportion of first graders who may require the LLMs in the specific language. This may not be the case in reality, as children from one linguistic group may be under-represented in schools. Estimates of primary school enrollments have been used for enrollments in 1992, the latest available. Base unit cost was obtained for the production of 1,000 copies of a standard 32-page local language book in Senegal. These same unit costs are used for production of materials in The Gambia. Projections for unit cost variations have been calculated on the basis of increasing economies of scale: as the size of the print run is increased, the cost of producing each additional textbook will be lower because fixed costs of production will be spread over a larger print run. However, the advantage of a larger print run is decreased by the time the number of copies increases to a substantial number, because the change in unit cost is expected to decrease at a diminishing rate. This declining marginal cost structure is based on a rough calculation from an example of publishing in Africa (Bgoya, 1997). This calculation does not include estimation for factors outside of textbook production, including increased transportation cost of a larger quantity of materials and increased cost of teacher training. This calculation is also
likely to be different given different book specifications, equipment used for production and printing of materials and the ratio of fixed and variable costs in the production process.

An average 32-page Wolof-language book costs $0.94 to produce in Senegal (given a print run of 1,000 copies) (Bgoya, 1997). If the coverage of Wolof books is expanded to include all Wolof-speaking children in the first grade of primary education (86,000 students), the unit cost is expected to decline to $0.26, a 72 percent decrease from its original level of $0.94. Note this is an estimation for unit production cost, excluding the cost of distribution and teacher training and monitoring of the quality and classroom usage of these materials. However, for diverse reasons, not all Wolof-speaking children in the first grade of primary school will demand Wolof-language instruction and materials. Assuming that 50 percent of these children will reject instruction in Wolof, the potential number of students requiring materials in Senegal is estimated at 43,000. At this level of print run, the unit cost is also $0.26. Thus, given the cost estimates for Wolof-language books in Senegal, it appears that the threshold level for production of these materials is well below 43,000 copies.

Dependent on demand, this conclusion is encouraging for expanding LLM provision in a country such as Senegal where few Wolof-speaking students may have textbooks and especially supplementary reading materials in Wolof. Results of the analysis also indicate that provision of educational materials in Wolof may be cost-efficient primarily because the language is spoken by approximately 70 percent of Senegalese. While total production costs are expected to increase, unit cost reductions may not be as significant if all children are provided books in a language that is not as widely spoken as Wolof. Based on assumptions of economies of scale and results generated in this scenario, unit cost of production can be
substantially lowered if all first grade Wolof-speaking children who are assumed to demand Wolof-language books are provided Wolof-language books in Senegal.

Wolof also has the status of national language in The Gambia. The paper next considers whether it would be beneficial for The Gambia and Senegal to produce Wolof-language materials for those Wolof-speaking students who demand these materials. This discussion builds on the basis of common languages that transcend geographical boundaries. It is recognized that both Senegal and The Gambia have distinct educational systems, one mainly French and the other English, therefore resulting in different curricula and desired textbooks. However, it is also recognized that many local language groups may not fall into the traditional educational systems in either of these countries. Also, the case for coordinated publishing is built on the premise of sharing supplementary reading materials and instructional materials other than textbooks.

About 15 percent of Gambians can be categorized as Wolof-ethnicity. Assuming that about 50 percent of Wolof-speaking Gambian first graders would demand the Wolof-language materials, only about 1,200 students fall into this category. Given this small number, it does not seem beneficial for Senegal to expand production of Wolof language materials to include Gambian students. However, as is indicated in Figure 2, The Gambia can gain significantly by entering into cooperation with Senegal in the production of learning materials in Wolof. Expanding coverage in The Gambia from 1,000 materials to cover all Gambian first graders who may demand these materials (1,216), results in a unit cost reduction of 9 percent. However, if The Gambia also produces materials for first grade Wolof-speaking Senegalese students who demand these materials, unit cost of production is reduced by about 70 percent,
from $0.94 to $0.26. Note these numbers are not to be used as standards. They will be
different given different production processes, material type and complexity. Also, these are
unit cost estimates, not total costs of production, which include, among other things, the cost
of storage and distribution of LLMs.

The case study on Senegal further studies the benefits, in terms of cost-saving, that may
accrue to a country with a small local language population that produces in accord with a
country with a relatively higher population of that language group. Mandinka language
speakers account for about 14 percent of the Senegalese population while approximately 40
percent of the Gambian population identifies with the Mandinka language group. Results of
the analysis indicate that cost savings for Senegal through the production of Mandinka
language materials with The Gambia are higher than those for Wolof-language materials (4
percent as opposed to 0 percent). However, this gain is even more significant for The Gambia
(unit cost decline by 21 percent), which has a lower population than Senegal assumed to
require Mandinka language materials. While this scenario assumes that Senegal would
maximize cost savings by expanding production to cover its domestic market, additional
benefits could be realized through joint publications with The Gambia--through sharing of
knowledge and experience, both much needed for the new world of local language materials
production. The results also indicate that smaller nations such as The Gambia can benefit
significantly by cooperating with other nations in producing local language materials. It
appears that demand in these smaller nations may not be sufficient to reduce unit cost (or the
threshold point is not reached on the cost curve) and therefore they need to cooperate with
other countries to maximize the benefits of a larger print run.
V. Conclusion

Estimating costs of producing learning materials in local languages through standardized methodologies is highly problematic because this cost is infinitely variable. Factors affecting cost include level of development of the language, the size of the local language group demanding the materials as well as the technology employed in producing LLMs. The two country specific case studies illustrate that local language materials publication is more expensive than the production of non-local-language materials in those countries for the selected languages (see table 1). The production process involves a significant investment in time. Generally, time is spent in choosing the language that is to be used for instruction, in developing, modernizing and standardizing the orthography of that selected language, developing materials, training teachers in the use of these materials, distributing these materials and most importantly, time taken for parents and teachers to accept and promote local language instruction. It is crucial that the demand for local language instruction and therefore local language materials exists in a country. In most cases, despite the cognitive benefits that can be realized through local language education in the first few grades of primary school, parents may not be willing to send their children to learn in a language that the children speak before coming to school and which is not perceived to provide direct economic returns and social mobility. Materials may be produced in a local language but teachers may not use those materials in classrooms. Materials may not be of high quality, thus limiting the expected benefits on the learning achievements of children and therefore reducing the future demand for such materials and pedagogy. Thus, a necessary condition for local language materials production is the existence of demand for local language pedagogy.
In the absence of supplementary reading materials published in local languages, the benefits of local language instruction may be limited on the child educated under such a system.

It is important to note that local language materials production is not a simple manufacturing or printing exercise, but a time-intensive process and an investment requiring a long term focus and commitment. Guatemala has been experimenting with bilingual education for the last 30 years and it still has a long way to go to render local language materials production efficient. Although time intensive, this program in Guatemala comprised 0.13 percent of the primary education recurrent budget and increased unit cost of primary education by 9 percent annually (over the traditional Spanish-only instruction system). However, gains have been realized in terms of improved educational achievements and reduced wastage in the educational system through repetition and dropout (see Dutcher, 1995 and Patrinos, 1996).

Cost savings can be realized and wastage reduced through following a production process involving editors, printers, linguists and communities from the first phase of the production process. Economies in production can be realized through increasing the size of the print run and matching production estimates with the available technology in the country.

Local language materials are more expensive than non-local language materials generally because of the limited size of print run. Countries that have large local language groups may benefit from expanded coverage to all children of the language group, depending on demand. This advantage gained from increasing economies of scale of production may be limited if the total specific language population of the country is small. A strategy for cost-efficient production of learning and teaching materials would be to manufacture books (specially
supplementary reading materials) for target groups that encompass language groups beyond national boundaries. This strategy, however, is rarely accepted by nations. Countries may consider their culture, language use and curriculum unique and thus not get involved in such a program. Results of the Senegal analysis, however, indicate that the gains from inter-country cooperation (cost savings) cannot be ignored, especially because often the market served in any one nation is too limited to render the production and sale of local language materials profitable. Given distinct educational and political contexts, this conclusion is more applicable for joint publication of supplementary reading materials. Building partnerships with other countries that share the same local languages would not only increase the size of the print run and therefore render the production process less costly, but would also make the process more efficient by introducing opportunities for production based on comparative advantages of the countries involved.
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Figure 1

Unit Cost of Local Language Learning Materials:
A Declining Function of Size of Print Run

Size of Print Run (000s)
Figure 2

Unit Production Cost of Wolof Language Materials

- Unit Cost in Senegal
- Unit Cost in The Gambia
Table 1: Unit Cost of Producing Educational Materials in Local and Majority Languages

<table>
<thead>
<tr>
<th>Country (year)</th>
<th>Type of Material</th>
<th>Unit Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guatemala (1996)</td>
<td>Teachers' Guides in Spanish for instruction in:</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Spanish</em></td>
<td>1.24</td>
</tr>
<tr>
<td></td>
<td><em>Kîche</em></td>
<td>1.91</td>
</tr>
<tr>
<td></td>
<td><em>Mam</em></td>
<td>2.28</td>
</tr>
<tr>
<td></td>
<td><em>Qêqchi</em></td>
<td>1.91</td>
</tr>
<tr>
<td></td>
<td><em>Kaqchikel</em></td>
<td>1.91</td>
</tr>
<tr>
<td>Senegal (1986)</td>
<td>Textbooks:</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>French</em></td>
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</tr>
<tr>
<td></td>
<td><em>Wolof</em></td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td><em>Diola</em></td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td><em>Serer</em></td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td><em>Soninke</em></td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td><em>Mandinka</em></td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td><em>Pulaar</em></td>
<td>1.14</td>
</tr>
</tbody>
</table>

Sources:
Guatemala: DIGEBI office in Guatemala and World Bank team.
Senegal: World Bank 1986
Table 2: Component-Wise Cost Data from A Bilingual Education Project in Guatemala

<table>
<thead>
<tr>
<th>Components</th>
<th>Cost (US$)</th>
<th>Percent of total production cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Curriculum Development</td>
<td>209,095</td>
<td>37</td>
</tr>
<tr>
<td>salary of DIGEBI personnel</td>
<td>10,000</td>
<td>2</td>
</tr>
<tr>
<td>salaries: curriculum writers, researchers and linguists:</td>
<td>34,095</td>
<td>6</td>
</tr>
<tr>
<td>costs of holding seminars to develop and finalize the curriculum</td>
<td>15,000</td>
<td>3</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>150,000</td>
<td>27</td>
</tr>
<tr>
<td>II. Manuscript Development and Publication</td>
<td>302,724</td>
<td>54</td>
</tr>
<tr>
<td>salaries: author, illustrator, manuscript designer</td>
<td>5,000</td>
<td>1</td>
</tr>
<tr>
<td>textbook printing</td>
<td>40,000</td>
<td>7</td>
</tr>
<tr>
<td>(including $15,000 for revising book)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manufacture, distribution</td>
<td>257,724</td>
<td>46</td>
</tr>
<tr>
<td>III. Teacher Training</td>
<td>50,000</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Cost of Production</strong></td>
<td><strong>561,819</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Compiled by authors from information from DIGEBI personnel (Guatemala) and World Bank staff
Table 3: Breakdown of Production Cost of 28,000 Supplementary Reading Materials by Universidad Rafael Landívar (Guatemala)

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost (in US$)</th>
<th>Percent of production cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator, Researchers, Translators, Mayan Writers</td>
<td>72,916</td>
<td>40</td>
</tr>
<tr>
<td>Illustrators/designers</td>
<td>31,338</td>
<td>17</td>
</tr>
<tr>
<td>Institutional support and Administration</td>
<td>38,539</td>
<td>21</td>
</tr>
<tr>
<td>Printing costs</td>
<td>37,333</td>
<td>21</td>
</tr>
<tr>
<td>TOTAL</td>
<td>180,126</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: University Rafael Landívar, Linguistics Institute, Guatemala
Table 4: Cost of Producing Grade 1 Textbooks in Senegal

<table>
<thead>
<tr>
<th>Language of Book</th>
<th>Quantity Produced</th>
<th>Unit Cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>153,050</td>
<td>0.35</td>
</tr>
<tr>
<td>Wolof</td>
<td>4,140</td>
<td>0.85</td>
</tr>
<tr>
<td>Diola</td>
<td>532</td>
<td>0.98</td>
</tr>
<tr>
<td>Serer</td>
<td>404</td>
<td>1.00</td>
</tr>
<tr>
<td>Soninke</td>
<td>346</td>
<td>1.03</td>
</tr>
<tr>
<td>Mandinka</td>
<td>289</td>
<td>1.06</td>
</tr>
<tr>
<td>Pulaar</td>
<td>177</td>
<td>1.14</td>
</tr>
</tbody>
</table>

For the purposes of this discussion, a local language is defined as one spoken by one or a few minority groups in a country and which is not the language of social and economic mobility in that country. It may also be referred to as a minority language, mother tongue, ethnic language or vernacular. This language has not been traditionally developed for educational and societal use. Lingua francas which, while spoken by many people across nations, may not be perceived as languages of economic mobility can also be included in this definition.

For the purposes of this discussion, defined as the language of social and economic mobility in a given country.