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The Expansion of Secondary Education and the Need for Teachers: How big is the gap?

Introduction

There is increasing pressure on Ministries of Education throughout the world to extend additional education to all students. Governments are acutely aware that in today's globalized society, knowledge and skills increasingly hold the key to a country's productive future (World Bank 2005). However, in many developing countries, young people are held back due to a lack of opportunities to pursue education beyond the primary level (World Bank 2005). Developing countries will need to turn their attention to expanding and improving secondary education to take advantage of its potentially transformational nature (Alvarez, 2003; Mulkeen, et al. 2005; SEIA, 2007; World Bank 2005; World Bank, 2006; World Bank, 2007).

There is consensus in the literature that secondary education—long neglected—is now the fastest growing segment of the education sector (SEIA 2001; UNESCO 2001; Mulkeen, et al. 2005; World Bank 2005; Di Gropello, 2006; World Bank, 2007). Movement away from seeing primary education as the terminal level of education towards policies that envision widespread completion of lower and upper secondary as the goals of education system development are well underway in many Latin American, African and Southeast Asian countries (De Ferranti, 2003; World Bank 2005). The change from the long-standing policy to focus on primary education only came in 1995 when the donors' strategic focus began to shift to “basic” education—which includes primary and lower secondary. Students today need secondary education to provide them with the technical, academic, and life skills to contribute to the economic prosperity of their countries (World Bank 2005). Yet, access to secondary education remains low throughout the developing world with stark regional differences, as illustrated in Table I¹.

Gross enrollment rates in primary education across the globe are edging closer to 100 percent. Average primary GER² varies from 118 percent in the LAC region to 94.9 percent in Sub-Saharan Africa (Edstats. World Bank). Participation rates for secondary education across the board are lower. In Latin America, Brazil has the highest secondary GER at 106 percent compared to Guatemala where only 51 percent of students enroll beyond primary education. Secondary participation rates in Sub-Saharan Africa (SSA) remain much lower than in Latin America, but have increased from 19 percent in 1999 to 30 percent in 2004 (SEIA 2007). Only a handful of SSA countries, such as Botswana, Cape Verde, Mauritius and South Africa, have achieved rates of access to secondary education as high as 80 percent for junior secondary. Countries such as Burundi, Burkina Faso, and Rwanda have not even achieved rates of 20 percent (UNESCO, 2006 as cited in SEIA, 2007). Most of the region is well below levels that approach universal access to secondary education. Secondary enrollment rates in East and Southeast Asia are low—approximately 62 percent for the region with stark differences among countries (i.e. 29 percent GER in Indonesia compared to 76 percent in Vietnam).

1 The countries included in this table represent the case study countries for this study. Rwanda, Burundi, South Africa and Mauritius were added to provide additional variation in the Africa region, but were not case study countries.

2 The regional Average GERs are calculated for the entire region based on data compiled by the EDSTATS, World Bank.



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Table I: Primary and Secondary GER for Selected Countries, 2005

Country	Primary GER	Secondary
Latin America	118%	88%
Brazil (2004)	113%	106%
Bolivia*	113%	86%
Guatemala	114%	51%
El Salvador	113%	63%
Nicaragua	112%	66%
East and South East Asia	112%	62%
Cambodia	134%	29%
Laos	116%	47%
Philippines	112%	85%
Sub-Saharan Africa	94.9%	31%
Burundi	85%	17%
Botswana	106%	73%
Ghana	88%	44%
Kenya	112%	49%
Malawi	122%	28%
Mauritius	102%	88%
Rwanda	120%	18%
Senegal	78%	21%
South Africa (2000)	106%	85%
Uganda	119%	19%
Zambia	111%	19%

*World bank Estimate

In addition to differences across these countries, girls and rural populations continue to face disadvantages due to fees, the lack of available spaces, biased selection processes, opportunity costs, and other social factors (SEIA, 2007; World Bank, 2005). In Uganda, girls' secondary GER is approximately 17 percent and represents about 44 percent of the total enrollment in secondary education. The Philippines and Thailand have female secondary GER rates of approximately 90 percent and 72 percent respectively, which represents 52 percent of the total secondary GER for those countries (Edstats, World Bank). The remaining countries in this study average between 40 and 52 percent secondary GER rates with approximately half of the secondary enrollment being female.

As governments begin to seriously consider secondary expansion, they will need to confront the same limitations faced in primary education, most significantly the lack of sufficient space, resources and teachers, while also confronting the issues of curricular relevancy. While the issues of financing, curriculum, and access are all expounded in the literature, how to contend with the challenge of ensuring sufficient numbers of teachers for secondary expansion is not sufficiently addressed. The literature fails to directly take on the most basic constraint to expansion of secondary education – will there be sufficient teachers and if not, how will educational systems deal with and encourage increased demand for secondary education?

The current approach to the expansion of education is an “inputs” paradigm, which focuses on the expansion of books, schools, and number of teachers. This approach implies that if we increase the inputs, we can expand the model to meet the needs of education reform. This paradigm allows planners to think in terms of outcomes, regardless of the model, but the

expansion of inputs, particularly in the case of secondary education, may not be the only answer, or the best path.

While it is easier to continue doing “more of the same,” this paper argues that expanding secondary education will be more challenging. The structure of the current system will not allow an inputs-oriented paradigm to meet the needs of students given the vast quantity of teachers required for secondary education, particularly in Sub-Saharan Africa. This paper argues that we need to begin changing how we think about the structure of secondary education.

This paper uses existing demographic and education system data from 14 developing countries to quantify the future demand for teachers and to examine the capacity of the education systems to produce teachers. It discusses whether existing supply mechanisms and inefficiencies prevent these countries from expanding access to secondary education. The paper also examines how primary completion, transition to secondary, secondary completion, entry to post-secondary teacher training, and/or higher education combine to determine the pool of potential teachers at the secondary level. These data are then used to illustrate how conditions inherent in the traditional system create a bottleneck at critical points of entry, in particular showing how low completion and low transition rates constrain the generation of adequate teacher supply. The paper concludes with a discussion of the policy implications for teacher preparation and recommendations for addressing the teacher gap in a complementary manner.

Overview of the Cases and Methodology

For the purpose of this study, secondary education is defined as post primary education at the International Standard Classification of Education (ISCED) Level 2 and Level 3. This study only uses data from the formal education sector at these levels, and does not account for students enrolled in non-formal education. In most SSA and Asian countries secondary education is divided into lower and upper secondary schools, while in Latin America lower secondary is part of the basic education cycle.

The fourteen cases researched represent developing countries around the world where the government is advocating for expanded secondary education. The cases were selected based on the following criteria:

1. Regional representation;
2. Secondary school age populations projected to increase between the year 2000 and 2015;
3. Data on student enrollment are available;³ and
4. Data on number of teachers being trained at primary and secondary level.⁴

The 14 countries meeting these criteria and included in this analysis are:

- Bolivia, Brazil, El Salvador, Guatemala, and Nicaragua in Latin America;
- Cambodia, Laos, and the Philippines in Asia; and
- Ghana, Kenya, Malawi, Senegal, Uganda, and Zambia in Sub-Saharan Africa.

³ Data was collected from international sources such as Global Monitoring Report, Education Policy and Data Center, Education Automated Statistical Information System Toolkit (ED*Assist), UNESCO Institute of Statistics, World Bank and other existing sources. In some instances data available on Ministry of Education websites were also used to supplement the figures not available elsewhere.

⁴ Data on the number of teachers entering and completing TTCs were only available for Zambia, Uganda, Brazil and Laos.

To quantify the overall demand and supply of teachers for this study, a cohort methodology was used to estimate current and future student enrollments. The enrollment projections served as the basis for the quantification of the demand for teachers. Repetition, drop-out, and transition rates were used to develop scenarios of improved student flow and transition from primary to secondary education in each country. Three main scenarios were developed and analyzed for the study:

1. **Scenario 1, Baseline Projection: Gross Intake Rate⁵ (GIR) for Primary Education Reaching 100 percent by 2015:** Internal flow (drop-out and repetition rates) and transition rates from one level to the next are held constant. For the 13 countries where GIR exceeds 100 percent, the rates were gradually lowered to 100 percent during the projection time period. This implies the systems stabilizing at 100 percent of entry-age students entering primary school and no longer having large numbers of overage students entering the primary cycle. In Ghana, where the current GIR is 86 percent, the baseline scenario assumes it increases to 100 percent by 2015.
2. **Scenario 2, Moderately Improved Flow⁶ and Transition:** This scenario begins with the baseline projection, and adds a 25 percent reduction in dropout and repetition rates for all levels of primary education and a 25 percent increase in transition rates from primary to lower secondary. This assumes that improvements in the factors that lead to reduced inefficiency also lead to improved transition—more students are able to succeed because better flow creates greater pressure for higher rates of transition.
3. **Scenario 3, Dramatically Improved Flow and Transition:** This scenario models a 50 percent reduction in dropout and repetition rates at the primary level and a 50 percent increase in transition rates to secondary education.

In all the scenarios, the pupil–teacher ratios are held constant at the base year levels. Furthermore, the affects of HIV/AIDS, conflict, unforeseen policy changes, changes in economic conditions, and other factors that could alter the trajectory of the development of the education system are not reflected in the projections. Lastly, teacher projections are not disaggregated by subject-matter, although the literature affirms that shortages of math, science, and technology teachers for secondary education are expected to continue.

Secondary Education Teacher Recruitment and Retention

In a large number of developing countries around the world, the projected demand for teachers exceeds the projected supply required for expanding secondary education (World Bank 2006). The literature generally acknowledges the lack of teachers, but fails to quantify the teacher gap and discuss the implications that the lack of qualified teachers will have as more and more students begin to enter the education system. Among the constraints are the limited number of potential teacher candidates and the lack of space and funding in the TTIs, which together currently prevent countries from producing sufficient numbers of qualified teachers. In addition to limited capacity to produce teachers, governments are also constrained in their ability to assign and keep teachers in remote and otherwise underserved areas, and lack the resources to support the higher wage bill implied by a dramatic expansion of the teaching force (DeStefano, Moore, Balwanz, and Hartwell 2006).

5 Gross Intake Rate refers to the total number of new entrants in the first grade of primary school regardless of age expressed as a percentage of the total population of children at the official entrance age. This number was used to project the number of students in first grade.

6 Flow is defined as the increased number of students enrolled in the subsequent year of schooling, or improved grade-level gross enrollment rate.

Teacher recruitment and retention is one of the most critical factors to ensuring that students have access to secondary education. Recent publications and studies highlight the following challenges facing teacher recruitment and retention in secondary education across developing countries (Lewin and Caillods 2001; OECD 2002; Mulkeen, Chapman, DeJaeghere, Leu, and Bryner 2005; World Bank 2005; SEIA 2007; World Bank, Africa Human Development Department 2007):

1. **Bottlenecks in teacher preparation systems:** High rates of attrition throughout the education system dramatically constrain the numbers of students successfully advancing through secondary education, thereby reducing the pool of potential teacher candidates for secondary education.
2. **High attrition:** Low salary and poor teaching conditions cause teachers to leave the field within 1–3 years of entering service. Those teachers posted to rural areas often seek immediate transfer back to urban areas or fail to show-up to teach on a consistent basis.
3. **Difficulties attracting teachers to hard to reach areas:** These difficulties arise because of low compensation (other professions requiring similar educational qualification offer higher compensation); poor working conditions; lack of professional development opportunities; little mobility to better positions; inadequate professional support and supervision; unprofessional treatment of teachers; and lack of incentive systems to stimulate and motivate teachers to remain in the teaching field.
4. **Lack of teachers in specific subject areas such as mathematics and science:** Secondary education teachers require more subject-specific knowledge and few choose or are able to successfully specialize in science and math, and those that do are in high demand in other employment sectors.

This paper quantifies the impact of teacher demand. Data are insufficiently disaggregated to allow an analysis of the supply and demand of teachers within specific subject areas or regionally within countries, where we know that national statistics mask large regional disparities.

For each country, projected demand for secondary teachers is quantified not just in absolute terms, but also with respect to the pre-existing patterns of growth in the teaching force. Specifically, for each country the projected required annual rate of growth in the supply of teachers is compared to what that rate has been in the past several years. Overall, what this analysis shows is that in the Latin America and Asian countries included in this study, secondary teacher supply can continue to grow at the existing rates of expansion—or slightly lower—and meet the demand for secondary places, even if transition to secondary education increases. This is not the case for the six countries in Sub-Saharan Africa, where existing rates of teacher growth will need to accelerate if transition to secondary education is even only moderately expanded.

It is important to note that in all these cases, teacher supply needs to increase each year. Continued expansion of the secondary teaching force, even at a constant rate of growth, implies additional resources each and every year, even to assure moderate improvement in the transition from primary to secondary. In the cases where the rate of expansion of the teaching force must increase dramatically over that which has prevailed during recent years, the need for additional resources is even greater. Details of these projections are discussed below.



Analysis of the results

Overall, the fourteen countries included in this study will need more than 740,000 new secondary teachers (mainly lower secondary) to meet the demands of increased secondary education enrollment if student flow and transition is improved by 25 percent.

Latin America and the Caribbean

Throughout the 1990s, Ministries of Education in many Latin American countries implemented significant reforms to improve access, equity, and the quality of their secondary education systems (Di Gropello, 2006). These reforms focused on improved service delivery, with particular emphasis on decentralization and demand-side financing (Di Gropello, 2006). While the reforms increased access, the quality of education in LAC remains low with noticeable regional disparities. Countries in Latin America face a high percentage of overage students in primary education, as well as higher repetition and drop out rates than students in East and Southeast Asia, which impact the completion and transition rates to secondary education (Di Gropello, 2006). Secondary GER in the LAC region has increased from 49 percent to 88 percent from 1990–2005 and shows little sign of reducing, as the economies require more skilled workforce. As more and more students continue to enter the secondary system, these countries will require the teacher education systems to continue supplying teachers at a similar rate to what has historically held for the country. This situation is particularly relevant for countries such as Brazil, El Salvador, and Bolivia, where lower secondary education has been made compulsory.

The Bolivian secondary education system had 45,930 teachers in 2005 with a historical growth rate in the teaching force of approximately 2.5 percent. A 25 percent improvement in student flow and transition to secondary education will require an increase of 6,895 teachers in the system and 9,853 new teachers if the system improved flow and transition by 50 percent. Attaining these increases would require the teacher training institutions to maintain an 11–12 percent growth rate through 2015—significantly higher than the historical growth rate.

In Guatemala, a 25 percent improvement in student flow and transition will require the system to produce approximately 800 new teachers for lower secondary and nearly 13,000 new teachers for upper secondary. A 50 percent increase would require the number of teachers to expand by 3 percent annually to meet the demands of lower secondary students and 6 percent annually to meet the demands of upper secondary.

In Brazil, El Salvador, and Nicaragua, the need for additional teachers will still be present if student flow and transition improves by 25–50 percent; however, the system will need to expand at a much lower rate than the historical patterns. A 50 percent improvement in student flow and transition in Brazil and El Salvador will only require an approximate 1 percent annual increase in the number of secondary teachers—down slightly from the historical growth rates. In these countries, the push for secondary expansion happened in the 1990s resulting in near universal secondary education presently. Thus, expansion will happen at a slower pace as quality improvements reduce repetition, dropout, and overage students in the system.

East and Southeast Asia

East and Southeast Asia parallel the LAC model in many respects. Both regions invested highly in secondary education reforms in the 1990s, increasing secondary GER from 40 to 51 percent in East Asia and from 47 to 72 percent in Southeast Asia from 1990–2005 (Edstats, World Bank). Both regions face high primary overage enrollment ratios and low secondary completion rates with little more than half of the children who start primary school completing secondary education (Di Gropello, 2006). Quality is low but the private returns to secondary and, particularly, tertiary

education are quite high, providing students who successfully complete higher education with a high earning premium (Di Gropello, 2006). In addition to the low quality, there are noticeable income and urban-rural disparities. In rural areas in particular, where many students drop out across education cycles, a lack of schools and specialized teachers constrain access at present and limit the prospects for expansion of secondary education. These constraints occur more often in lower- and lower-middle-income countries in this region.

Cambodia, Laos, and the Philippines serve as examples from this region and show that the need for additional teachers will still be present through 2015, though at a slower pace than historically was needed.

In Cambodia, a 25 percent improvement in the flow and transition of students into secondary education would lead to a need for 13,541 new teachers at an annual growth rate of approximately 5 percent—lower than the historical 6 percent annual growth rate present in Cambodia from 1999–2005. A 50 percent increase in flow and transition would require the Cambodian education system to maintain their historical 6 percent growth rate in teacher supply. Similar improvements in the Philippines would require slightly fewer teachers over time to keep up with the demand for secondary education.

Improvements in student flow and transition in Laos would require an increase in the number of teachers that the current system produces. A 25 percent improvement in student flow and transition would require a 3.8 percent annual increase in the growth of the teaching force, while a 50 percent increase would require nearly 5 percent more teachers annually to meet the demand—a five fold increase annually over historical growth rates, which have hovered at 0.7 percent.

Table II illustrates the results of the projection scenarios, showing in the first column the current number of secondary teachers, followed by the projected number of teachers that will be required by 2015 in each of the three projection scenarios.

Sub-Saharan Africa

Sub-Saharan Africa faces a much different situation than both the LAC and Asian regions. In most Sub-Saharan countries, the demand for secondary teachers will significantly exceed the projected supply and historical annual growth rates of the teaching force. Factors such as teacher attrition, HIV/AIDS, and bottlenecks in the teacher preparation system constrain most of these countries from expanding even lower secondary education (Mulkeen, et al. 2005).

Based on the moderate scenario of improved flow and transition, Malawi and Kenya will need to nearly double the number of teachers in lower secondary education to meet the demands of an expanding system. In 2005, the Ministry of Education in Kenya announced that it would focus on increasing the transition rate into secondary education from 47 percent to 70 percent by 2008, Assuming that there are no changes or improvements to GIR, student-teacher ratios, or student flow through primary education, our projection model shows that Kenya will need more than 96,000 new teachers to meet that goal, an unrealistic prospect.

Table II: Additional Secondary Teachers Required for Expansion (2015)

Country	Number of Teachers in Base Year	Number of Teachers Needed in 2015			Historical Annual TGR (1999-2005)	Required Annual TGR (2005-2015)
		Scenario 1 GIR to 100%	Scenario 2 Improved Flow and Transition by 25%	Scenario 3 Improved Flow and Transition by 50%		
Latin America and the Caribbean						
Bolivia	19,460	50,247	52,825	55,783	2.5%	11%-12%
Brazil	521,571	459,693	516,705	577,891	3%	-1%-1%
El Salvador	15,001	15,849	18,646	22,039	1%	-3%-1%
Guatemala lower secondary	36,200	32,553	37,006	41,735	6%	1%-3%
Guatemala upper secondary	22,143	29,374	35,327	42,252	5%	2%-6%
Nicaragua	12,214	11,525	12,847	14,304	4%	-1%-1%
East and South-East Asia						
Cambodia lower secondary	18,724	25,498	32,017	35,116	6%	2%-6%
Laos lower secondary	8,958	10,369	15,259	15,622	0.7%	1.2%-5%
Philippines	166,021	167,213	188,839	198,273	2%	-.05%-1.5%
Sub-Saharan Africa						
Ghana lower secondary	51,419	90,053	90,053	94,507	5%	5%-5.6%
Ghana upper secondary	16,527	35,250	35,250	36,459	6%	7%-7.4%
Kenya	47,584	94,321	118,818	144,708	3%	7%-12%
Malawi lower secondary	6,079	6,821	11,147	16,468	-3%	10%
Senegal lower secondary	10,357	17,632	23,866	30,811	11%	5%-10%
Uganda lower secondary	32,649	37,876	56,399	80,171	3.4%	1%-9%
Zambia lower secondary	9,047*	17,520	21,278	25,046	5%	7%-10%

TGR = Teacher Growth Rate

*Of 13,596 total teachers in lower and upper secondary schools, EQUIP2 projected disaggregated figures using teacher qualification data.

More moderate improvements in flow and transition rates in Kenya over a longer period of time (25 percent from 2006–2015) would lead to a demand for 118,818 additional teachers in secondary education in 2015—a gap of approximately 71,234 teachers based on the historical

rate of growth in teacher supply. To meet this projected additional enrollment, the annual growth rate in teacher supply would need to increase from 3 percent to approximately 8 percent per annum. Scenario 3, which projects a 50 percent improvement in flow and transition, would require a 12 percent annual growth rate (four times the existing rate) in the supply of teachers for 10 years to ensure that over 97,000 new teachers can be hired.

The historical teacher supply growth rate for lower secondary education in Malawi from 1999–2004 was approximately -3 percent. Despite the negative growth rate for teachers, the education system continued to expand, primarily through dramatically increased class sizes. Moderate improvements in current student flow and transition rates will require significant growth in teacher supply in lower secondary education—approximately 11,147 new teachers by 2015. The teacher training institutions would need to increase the supply of teachers by 10 percent each year to meet the increased demand.

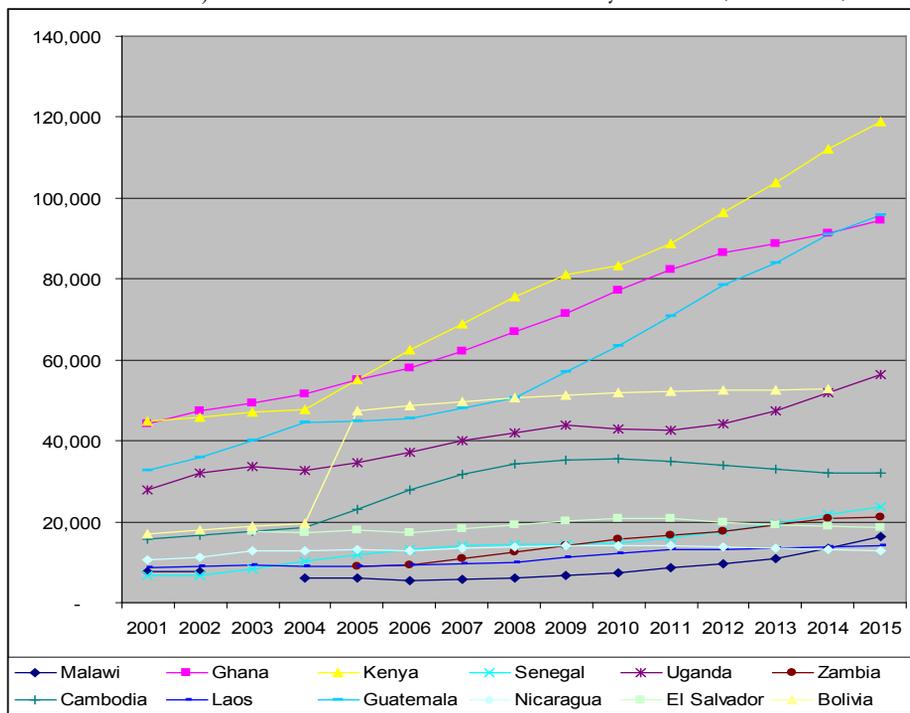
The historical teacher supply growth rate for lower secondary education in Uganda from 1999–2004 was approximately 3.4 percent. Based on the various scenarios, moderate improvements in student flow and transition rates would translate into a need for between 37,876 and 56,399 additional teachers by 2015 and a required growth rate in teacher supply of 5–6 percent per year. An improvement of 50 percent over the next ten years in both flow and transition would require Uganda to supply more than 80,000 new teachers—translating into a 9 percent net annual growth rate in teacher supply. It is important to note that the high estimates in this projection only increase the rate of transition from primary to secondary to 55 percent. Policymakers in Uganda are considering universal and free access to secondary education, like they did for primary education. That would mean a 100 percent transition rate. If Uganda moved to a policy of universal lower secondary, the country would need approximately 141,000 additional teachers in 2015. To meet this demand would require a 14 percent net growth rate in the supply of teachers to the lower secondary system each year. To meet universal secondary by 2010 would require approximately 90,000 new teachers and an annual growth rate of 15 percent in the teacher supply.

In Zambia, moderate improvements in student flow and transition to secondary education would lead to a shortfall of approximately 21,258 teachers in 2015. To meet the shortfall would require net annual growth rates of approximately 8 percent - a percentage increase of 60 percent over the existing rate of growth in teacher supply. Like Kenya, Zambia has set a target of reaching 70 percent transition into lower secondary by the end of 2007. To meet this target would require nearly 12,000 additional new teachers for lower secondary. While both Uganda and Zambia currently have a small excess of teachers, this oversupply will be quickly absorbed by the impending demand for lower secondary teachers as both countries move to expand the system. Chart I illustrates the growth required to expand lower secondary education in each country based on moderate improvements to student primary flow and transition to lower secondary scenarios. Regional differences are easily seen in this graph.

Based on the moderate projections, Kenya, Ghana, and Guatemala will require the most number of teachers to meet the expanding needs of secondary education with growth rates between 7–15 percent. The regional differences are clearly articulated in the chart. As previously discussed, the countries for which we have data in both LAC and Asia are seeing a tapering off of secondary enrollment as GERs in these countries near 80–90 percent. The number of teachers required to meet future demands while still needing to increase, will need to do so at a slower rate than countries in Sub-Saharan Africa.



Chart I: Projected Growth of Demand for Secondary Teachers (2001-2015)



Note: 2001-2005 are based on actual numbers. 2006-2015 are projections based on moderate improvements in student flow and transition to lower secondary.

Countries in Sub-Saharan Africa—particularly those seeking to universalize secondary education, such as Kenya and Uganda—will need to find creative ways to utilize existing teachers while dealing with the bottlenecks in teacher preparation in their countries if they want to meet the projected demands. While LAC and Asia are now able to focus increasingly on quality, the countries in Africa will be much more focused on meeting demands for access and expansion of the system.

As countries increasingly reach universal primary education and employers begin to require increasing skill levels in the labor force, the confluence of the push-pull factors in education will continue to force countries to expand secondary options for young people. As these projections have shown, countries in Sub-Saharan Africa will need to significantly increase the annual output of their training institutions, often doubling what have been their historical rates of growth in teacher supply, or find alternative sources of potential teachers to meet these demands. The following section discusses the policy implications of the demand for teachers in secondary education.

Policy Implications

Given the growing demand for teachers at the secondary level, how will countries meet the needs of secondary education? What are the options for tapping larger pools of potential teachers? What alternatives are there to lengthy pre-service training in teacher training institutions? What might be required to appropriately support alternatively recruited teachers? Are there lessons from other countries that have successfully expanded secondary education that can be applied or adapted?

Qualified teachers in both the developed and developing world are quickly becoming the hardest segment of the teaching profession to attract and retain and are the most expensive to educate (World Bank 2005). Research also indicates the often extensive employment of under-qualified or contract teachers in secondary schools operating outside of the public system (Lewin, 2005; UIS, 2006). Yet, relatively few studies have analyzed the shortfall of qualified teachers as an impediment to growth in the system, particularly for secondary education (Scott 2001; Lewin, 2002). As the projection analyses presented in this paper demonstrate, many of the countries included in this study, particularly in Sub-Saharan Africa, will need to more than double their teaching forces in the next eight years to successfully expand secondary education. The looming shortfall in teachers for secondary education is fueled by limitations inherent in most education systems.

The first limitation is that education systems must produce their own future labor forces. The degree to which the system is able to efficiently move learners through educational levels determines whether schools will have the necessary labor force to continue to expand. Too often, repetition and drop-out rates limit the number of potential candidates that are able to continue through the education system and enter the labor force, thus limiting the number of potential teachers that can be trained. The case of Zambia serves as an example of the losses that happen throughout the system. In 2005, approximately 467,000 students entered Grade 1. Of these first graders, approximately 104,000 will complete secondary education in 2016, if the current repetition and dropout rates continue. In 2005, of the approximately 43,000 students that completed Grade 12, only 4,430 entered the TTIs to become primary teachers with an additional 2,185 entering TTIs to become secondary teachers. Of the 2,185 who enter TTIs, 2,100 graduate. Compared to the 2,100 TTI graduates in 2005, there were 43,000 secondary completers—the latter number representing a pool of potential lower secondary teachers that is 19 times greater than the former.

High repetition, high dropout, and low rates of completion all impact the final pool of potential candidates. These issues are in part due to poor teaching and learning, leading to a cycle that is difficult to break. These inefficiencies are compounded by poor quality at the secondary level which is still an issue even in the LAC and Asian regions. The flow of students all the way through the system is therefore constrained.

The second limitation is the existing approach to teacher development. Pre-service teacher training as it is currently organized is constrained by limited space in teacher training institutions; the length of time required to train teachers—particularly specialized secondary education teachers; the high cost of running TTIs; competition from other labor market options; and the impact of HIV/AIDS. For example, in Kenya the pre-service primary teacher training program lasts for two years and includes the study of 13 compulsory subjects. To qualify for the award of a teacher's certificate the trainee must pass at least eight of the thirteen required subjects and satisfy the teaching practice component. While this set of requirements ensures that teachers have certain expertise, the process also greatly reduces the number of teachers who successfully graduate and enter the teaching force. University degree programs are also required for secondary school teachers who must specialize in at least two subjects.

The literature discusses two broad approaches that have traditionally been taken to address teacher shortages in developing countries: accelerating pre-service teacher training and permitting the recruitment of unemployed graduates and the use of contract teachers with no formal teacher training (World Bank 2005).



Accelerating the pre-service program shortens the amount of time required to get a teacher into the classroom and reduces the per student costs. However, in some cases, this approach has also impacted the quality of education and increased regional differences (World Bank 2005). Bed space in the TTIs also limits the number of teachers that can be trained at any given time, which is a particular constraint in Sub-Saharan Africa. Similar concerns about quality have been raised when using contract teachers or teachers with no formal training. The following discussions present policy options that would support countries in meeting the demands of an expanding secondary education sector, while building on these existing approaches to recruiting and training additional teachers.

Teacher Policy for General Basic Secondary Curriculum

Several countries in the LAC region took the link between education and economic development to heart in the 1990s and moved to make lower secondary more general and compulsory for all students. Underlying the reforms was the idea that schooling should provide students with strong foundational skills and allow firms in the labor force to teach employees the more specific skill sets they require (Becker, 1993). Several World Bank and OECD reports indicate that this process is already beginning to take place as lower secondary increasingly becomes an extension of primary education (OECD, 2004; World Bank, 2005; World Bank, 2006). Such an approach has interesting policy implications for countries struggling to meet the demand for teachers in secondary education.

If governments are willing to move towards a lower secondary education system that is an extension of basic education, the approach allows Ministries of Education to use different approaches to training additional teachers. One approach is to draw teachers from the primary education system for lower secondary education. In the early 1990s, the Ministry of Education in Mexico expanded secondary education. The Ministry began to recruit an average of 2,000 teachers per year from the existing primary teaching force to teach in secondary education (UNESCO, 1997). When this pool was exhausted, the Ministry shifted recruitment efforts to lower levels including college graduates in all subjects, who were targeted and recruited directly into the teaching force and Technical Education Institutions at the secondary level in Mexico recruited local technicians to serve as instructors (UNESCO, 1997). The combination of recruitment efforts helped Mexico move from a secondary GER of 58 percent in 1995 to a secondary GER of 104 percent for lower secondary and 80 percent GER for overall secondary education in 2005. Several other LAC countries (e.g. Brazil, El Salvador) will have increasing surpluses of primary education teachers in the coming eight years, allowing these countries to draw on approaches similar to those in Mexico.

A second approach is to target upper secondary students and recruit them directly into the TTIs. Some countries, such as Uganda, already recruit Grade 9–10 graduates into the teacher training institutions to help meet the needs of the education sector. Tapping into these existing primary teacher and student populations for both primary and secondary teachers allows countries to draw from a larger pool of candidates. However, in such cases, ministries of education would need to increase in-service and instructional support to ensure that the quality of teaching did not decline.

In addition to using trained primary teachers for lower secondary, moving towards a more general curriculum that reinforces foundational reading and math skills will allow ministries of education to tap potential teachers at earlier points in the education system (i.e. upper secondary graduates). For example, upper secondary teaching students would not be required to have subject-specific knowledge and would therefore require less pre-service training. The training these students would receive could be accelerated and focused on pedagogy, instructional skills, and slightly

advanced numeracy and literacy instruction. Several countries in the LAC and Asian regions have already begun to defer specialization until upper secondary and have extended compulsory education to include lower secondary, which tends to be a more general curriculum. In these cases, teacher support personnel could be efficiently deployed to support these teachers since they would only need to provide support in the core subject areas rather than specialized subjects like science, history, geography, or technology. Under these circumstances, the lessons from complementary education programs (i.e. increased instructional support and supervision for locally recruited teachers) could be applied to lower secondary education (DeStefano, et al. 2006). This option would allow a) more efficient use of existing teachers, and b) the system to recruit and support teachers with less formal pre-service training such as those with only upper secondary education.

Using Existing Teachers More Effectively

Evidence from the literature (Lewin, 2002, Mulkeen, et al. 2005) suggests that existing teachers are often used inefficiently within schools, teaching fewer class hours at the secondary level. Ministries of education could also utilize existing teachers more efficiently by having teachers teach multiple subjects and by sharing teachers across schools (Mulkeen, et al., 2005; World Bank 2005). In Kenya, it was estimated that increasing the teaching load from 18 to 25 hours per week, using part-time teachers to teach non-core subjects, increasing teacher ratios to 45:1, expanding existing schools to at least three parallel streams, and sharing teachers across schools would enable a 50 percent increase in secondary education enrollments without adding new teachers. Policies to support these changes would need to be developed and would include support to hiring contract and/or part-time teachers, and the likely provision of incentives for teachers to work together across schools (i.e. time for joint planning and rewards for working together). These changes would require ministries of education to invest more resources in supporting secondary education. The percentage of current educational expenditures invested in secondary education ranged from a low of 15 percent in Zambia to a high of 30 percent in Laos, compared to 35–59 percent invested in primary education.⁷ More resources will be needed to meet the expanding needs of secondary education.

Teacher Preparation and Training in Existing Models of Secondary Schooling

Countries that want to expand access to formal, academically oriented secondary schools will be faced with the kinds of teacher shortages that the projections in this paper estimate. If the lower secondary curriculum remains sub-divided into areas of academic specialization—math, science, language, social studies, etc.—then it is hard to foresee how lower qualified teachers could be recruited and supported across a variety of subject areas. Teacher workloads dictated by instructional requirements for different subject areas could also continue to create inefficiencies in teacher deployment and use. Aggregate student–teacher ratios tend to be reasonable for secondary education—averaging about 22–23 to 1 for the countries included in this analysis—yet class sizes can be extraordinarily large because teachers are responsible only for the hours of instruction in their subject area. Some teachers may only teach a few hours. While targeting secondary school students for teaching careers, employing contract teachers, and increasing salaries may alleviate some pressure on the profession, it will only slightly lower the gap in secondary education (Mulkeen, et al. 2005). Mulkeen, et al. (2005) suggests some modifications to the existing teacher preparation system that could also contribute to increasing the efficiency and quality of the existing teacher production system:

⁷ Based on available data on EDSTATs, World Bank. Data were not available for most of the countries in this study.



- As countries look at alternative approaches to teacher training, consider using periods of teaching interspersed with periods of study. This approach would be particularly effective if drawing on less qualified, locally recruited teachers.
- Consider shortening pre-service training and increasing in-service training to get teachers into the schools sooner and provide them with on-going support. Many complementary education programs focus on providing in-service support to less qualified teachers and can serve as a model for the government system. A study of nine complementary education programs demonstrated that this investment contributed to better or equal student performance for students of teachers with less formal pre-service qualifications when compared to students in the formal system with qualified teachers (DeStefano, et al. 2006).
- Re-design teacher training programs to improve the skills of educators in both content areas and pedagogical areas so that quality of delivery is improved in the classroom. Include skill-building and knowledge of the secondary education environment, which differs substantively from that of primary school students.
- Develop stronger supervisory structures that ensure qualified and less qualified teachers receive instructional support. Possible options include placing principles and/or instructional supervisors in schools or in clusters of schools.
- Consider developing mentoring and peer teaching clusters to ensure that teachers can exchange and share ideas locally.

In response to insufficient numbers of teachers, scarce resources, and inefficient deployment practices, these investments would assist many countries in producing additional teachers to support the system, while ensuring that the quality of education remained front and center.

Consider the Case of Alternative, Non-Formal Post-Primary Education

Non-formal forms of post-primary education require teachers/facilitators with something besides academic training and teacher certification. The one example from the complementary education cases referred to earlier in this paper that profiles non-formal lower secondary education is the *Educadores* program in Honduras. These non-formal centers offer primarily overage students and adults the opportunity to obtain the equivalent of a lower secondary education. Centers are organized in whatever settings are available—work places, churches, other community buildings—and community members are recruited on an ad hoc, voluntary basis to serve as facilitators in the centers. This kind of alternative program opens up a wealth of possibilities for lower cost, less formal approaches to secondary education, and for which a variety of different actors can serve as teachers. In addition, distance education technologies—radio broadcasts in the case of *Educadores*—can enhance the instructional repertoire of less trained, not formally certified teachers (Moore, 2005).

Several countries have used these alternative, non-formal approaches to expand the reach of secondary education. In Mexico, *Telesundaria* targets graduates of elementary education in rural areas where secondary schools are not available and provides them with lower secondary education (i.e. grades 7–9). Students in the program watch coursework on televisions at the local facility and the curriculum focuses on providing students with education on values, good habits, skills and aptitudes, general studies, industrial technology, agricultural technology, and fishing technology.

In Columbia, Honduras, and Guatemala, the *Sistema de Aprendizaje tutorial* (SAT) has also targeted rural communities to provide students with an alternative, non-formal route to secondary education. The model emphasizes capacity development verses content memorization. The

learning modules are designed to find practical applications that are implemented through community and productive projects. The program emphasizes capacity development over the creation of new curriculum. Unlike the traditional models, which consider secondary school as one educative phase, the post-primary TLS program is divided in three correlated functional phases that have practical results whether the students complete the three phases or not. This model is adapted to rural students' time frames because it allows them to leave school during harvest seasons or home duties, after which time they can continue their education. Learning schedules are arranged by students and their tutor.

In Africa, the Malawi College of Distance Education (MCDE) targets out-of-school youth and adults who have completed primary education. The purpose of the program is to expand secondary schooling to students who would be unable to continue their post-primary studies. Students in the program register at their local study center, where they gather daily to work independently on their printed correspondence material. MCDE provides supervisors for each center, as well as the materials used by the students. Most supervisors are certified primary school teachers with two years of teacher training. Graduates of the program receive a secondary equivalency certificate.

Reaching large numbers of secondary students may depend on the development of similar alternative approaches to the organization of secondary schooling and therefore the potential sources of teachers since the current education system experiences huge losses in candidates over time. As illustrated by the Zambia example, the pools of secondary school graduates that could be tapped to be teachers are 10 to 20 times greater than what the pools of TTI graduates are projected to be. The policy implications of any of these approaches are significant. First, pre-service teacher training needs to accelerate its programs, getting teachers into schools more quickly, and the institutions need to incorporate the use of distance education to provide training to less qualified teachers (who can then begin to teach sooner in their qualification process). Distance learning would be particularly suited for situations where teachers are needed to provide subject specific coursework and are located in more remote regions.

Second, policies on who becomes a teacher should allow the education system to tap students at earlier points in the system. As the case of Zambia illustrates, the number of students in upper secondary is much larger when compared to the number of students entering TTIs. Countries can develop policies that encourage and reward the system for drawing on this younger population and then utilize alternative training mechanisms to ensure that over time, these candidates gain both content and pedagogical expertise. In addition, as lower secondary becomes more general in nature, ministries of education need to consider policies that allow for communities to use local capacity to teach lower secondary. Programs such as *Educatodos*, *Telesecundaria*, *SAT*, and the Malawi Distance College can serve as models for developing effective distance education programs, in-service training, and support systems that allow communities to deliver quality secondary education. The community-based complementary programs also provide examples of how to develop learning communities for teachers that support them in improving and sharing effective practices.

Finally, financial resources are a challenge. As Lewin (2003) notes, in most developing countries, secondary education is publicly financed and as donor support has favored primary education, secondary education has gotten squeezed. International evidence increasingly shows that differences in investments in secondary education impact economic growth making secondary education an area of needed investment. Complementary models have shown that they can deliver education to students in a less costly and more cost-effective manner. Drawing on the



lessons of these complementary models, which include hiring teachers locally, investing in support services, and drawing on community resources can allow secondary education to expand within the existing tight resources faced by many of these countries.

The Brazilian Fund for the Maintenance and Development of Primary Education and Teacher Enhancement (FUNDEF) also serves as a model for redistributing funding to equalize opportunities and funding across regions. The main objective of this fund was to equalize educational opportunities across states and municipalities by guaranteeing a minimum expenditure per pupil in primary schools throughout the country. Embedded in the reform was a requirement that at least 60 percent of the additional funds provided by FUNDEF to local governments must be spent on teachers' salaries. The program helped to improve teacher quality and student outcomes by increasing the salaries of existing teachers in regions, making teaching more attractive. Additionally, local governments use the increase in resources for teacher salaries to hire additional teachers.

An assessment of the reform in 2002 revealed that regional disparities in teacher pay had been reduced and that the number of teachers who had at least graduated from secondary school had increased. The study also showed that the increase in teachers' compensation and in the number of teachers with at least a secondary education were positively associated with better student outcomes such as lower dropout rates and higher pass rates (World Bank, 2002). While this example targeted primary education, the model could easily be adapted for secondary education as well.

While these recommendations for meeting the demands of an expanding secondary education sector provide some initial thinking about options, there are several areas of research that will better inform policymakers as they begin to face the challenges of a growing secondary sector:

1. First, conduct an in-depth analysis that examines the regions within countries as well as subject areas that require more teachers. This analysis would provide additional information about what regions within countries need teachers and whether existing populations can be tapped as teaching candidates.
2. Second, examine the existing patterns of secondary teacher deployment, utilizing teacher work loads (i.e. hours taught per week) as the key variable. Better understanding how teaching resources are currently deployed can highlight areas for policy and operational reforms that could lead to more efficient use of existing teachers (e.g. requiring minimum work loads or assigning teachers more than one subject area).
3. Third, research can more purposefully draw on the complementary and community-based approaches to begin to pilot alternative approaches to training secondary education teachers so that we learn and understand the conditions that would allow these approaches to best support the growing demand for teachers.
4. Finally, we also recommend that additional quantitative research be carried out to look at teacher attrition rates in different regions, to understand how and why teachers move out of assignments in different parts of a country.

As this study has shown, countries in many regions of the world will face large shortages of qualified teachers as policies begin to move towards universal secondary education. New approaches to the recruitment, training, and utilization of teachers are needed if these countries—particularly those in SSA – are to effectively expand the reach of secondary education. The findings and recommendations presented in this paper are intended to provide policymakers and donors with ideas for creative policy development and for the development of strategies that can

increase the reach, quality, and effectiveness of secondary education. Below is a summary of the ten policy recommendations that can assist governments to take action and fill the teacher gap.

1. Accelerate the pre-service teacher education programs.
2. Permit the recruitment of unemployed graduates of other subjects and provide them with training and support.
3. Use contract teachers.
4. In countries where there is a surplus of basic education teachers, recruit teachers for secondary education from the existing pool.
5. Target upper secondary students and recruit them directly into the TTIs.
6. Consider movement towards a more general lower secondary curriculum that facilitates movement of teachers from basic education into lower secondary education. This approach is particularly useful in SSA.
7. Use existing teachers more effectively, including having them teach multiple subjects, increase teaching load, use part-time teachers to teach non-core subjects, slightly increase student-teacher ratios, consider expanding existing schools into parallel shifts, and share teachers across schools.
8. Review existing structure of TTIs and consider restructuring of the programs to include periods of teaching with study, increase in-service support, refocus on content area expertise, and develop mentoring and peer teaching clusters.
9. Apply lessons from complementary education programs—distance education, increased direct instructional support, and increased supervision of less qualified teachers can enable less qualified teachers to effectively support learning in the classroom.
10. Increase investments in secondary education.

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For more information about EQUIP2, please contact:

USAID

Patrick Collins

CTO EGAT/ED
USAID Washington
1300 Pennsylvania Ave., NW
Washington, DC 20532
Tel: 202-712-4151
Email: pcollins@usaid.gov

FHI 360

John Gillies

EQUIP2 Project Director
1825 Connecticut Ave., NW
Washington, DC 20009
Tel: 202-884-8256
Email: equip2@fhi360.org
Web: www.equip123.net

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