BRAIN DRAIN:

TEACHER TRAINING AND STUDENT OUTCOMES

CLIENT:

UNICEF, GUYANA

and

The Ministry of Education,
Republic of Guyana

By:

MARC SHOTLAND

Master in Public Administration in International Development

HARVARD Kennedy School
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

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Advisor: Professor Rohini Pande

Section Advisor: Professor Matt Andrews

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I. EXECUTIVE SUMMARY

Teacher training levels are a key determinant of student outcomes in Guyana. But the educational system has had trouble retaining trained teachers. Many have migrated to richer countries over the past few decades, leaving a school system half populated with untrained teachers. To retain the remaining high-quality teachers, the Ministry of Education must increase the training premium it adds to teachers' base salary. This should both attract more inherently motivated teachers to the profession, and dissuade existing trained teachers from leaving the educational system for jobs in the private sector and abroad. And increasing salaries, rather than penalizing emigration, avoids the pitfall of amputating one of the major appeals attracting new recruits to a career in education – a potentially lucrative career abroad. Furthermore, a training premium, coupled with infrastructure improvements (to improve working conditions), simultaneously addresses the economic and non-economic incentives to which teachers respond and avoids the political risks (with respect to other ministries) of an across-the-board base salary increase.

II. BACKGROUND

Education in Guyana

Education has a long legacy in Guyana. In 1876, Guyana passed an ordinance making elementary education mandatory for all children between 6 and 14 years-old—before similar laws in Great Britain (1880) or most states in the USA (1890). (Fernandez 2004, p. 9; Katz 1976, p. 17) For the next one hundred years, the education system consisted of a combination of public and private schools. In the 1960s, the Guyana had one of the top education systems in the Caribbean. (Gafar 2003, p. 221)

With the dramatic fall in commodity prices (particularly sugar) that shocked much of the developing world in the mid to late 1970s, Guyana saw its economy collapse. (DaCosta 2007, p. 21) In response the Government embarked on its cooperative socialist agenda, nationalizing both foreign and domestic industries. In 1976, the government took control of all educational institutions at all levels as well, making education free from nursery to university. (Gafar 2003, p. 221, Hamilton 2005, p. 3) During this period of economic decline, the government's revenue fell, and debt swelled to nearly 5 times GDP. Despite a modest recovery in commodity prices, by 1980 more than one third of the national budget went to servicing its debt. (DaCosta 2007, p. 22; Samaroo 1991, p. 517) Political turmoil accompanied economic instability and the government responded by transferring resources away from education toward national security—an allocation which reached 17% of total GNP by 1988—the highest in the region after Nicaragua. (Grifith 1991, p. 146; Samaroo 1991, p. 518) By 1991, education expenditure had dropped to only 2 percent of if government expenditures. (Gafar 2003, p. 239) These problems were compounded by a large-scale emigration of the educated population, including many of the most experienced and well-trained teachers. (Gafar 2003, p. 247) The education system saw a rapid deterioration in funding and quality.

In 1989, Guyana embarked on an Economic Recovery Program, the first steps towards a market-based economy. The spigot of IMF and World Bank loans was reopened in 1990. Inflation was tamed, and the economy grew. (PRSP, p. 18) In 1992, Cheddi Jagan was elected president in national elections marking the end of the nearly 30 year reign of the People's Progressive Party. In 1993, President Jagan, conceived a National Development Strategy—a precursor to Guyana's

Poverty Reduction Strategy Paper (PRSP). In it, the government placed emphasis on repairing its broken education system. (PRSP p. 18).

In the past 10 years there have been modest improvements in educational outcomes. But the climb has been uphill, funding is limited, and the Ministry of Education needs to find the most efficient means of accelerating this improvement.

III. EDUCATION-TEACHER QUALIFICATION/TRAINING

In the 1960s, Guyana had one of the best education systems in the Caribbean. (Gafar 2003, p. 221) Today tells a different story. Its educational outcomes are much lower than the regional average. Among the sixteen Caribbean countries that take the Caribbean Examinations Council Secondary Education Certificate (CXCSEC) exam, Guyana consistently ranks in the bottom two (Jennings 2000, p. 98). Many argue that the reason is that the teacher quality has declined. Since the 1970s, trained teachers have left the country or at least the school system in droves.

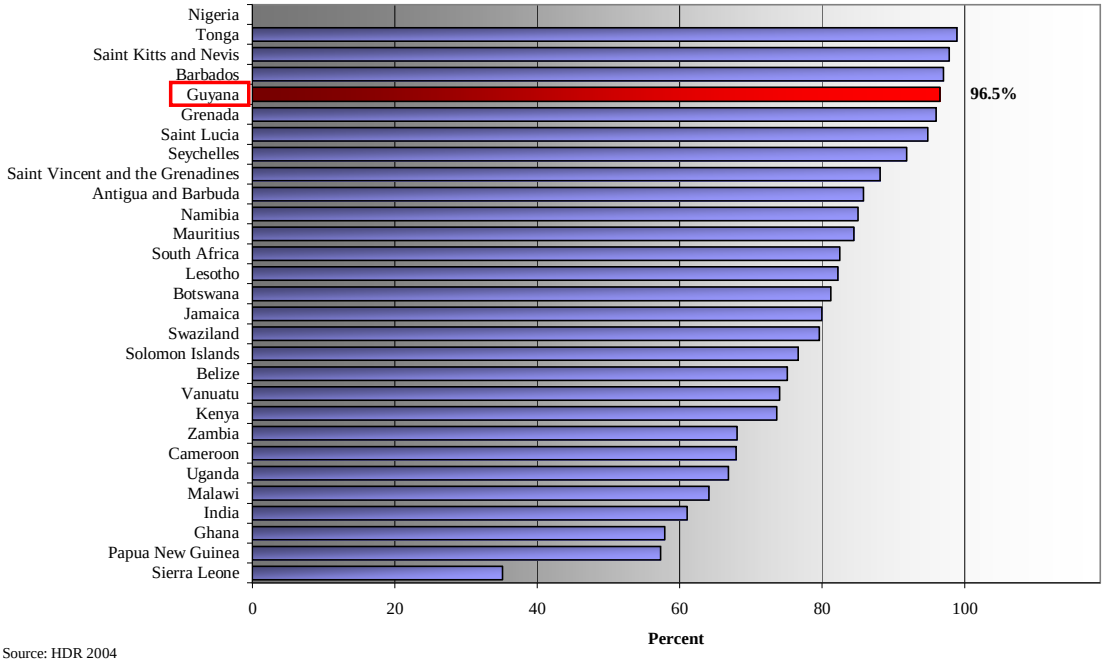
Education Quality

Guyana has a high level of literacy, according to official literacy numbers. There is reason to believe, however, that these numbers hide the poor state of the educational system. Cross-country comparisons of secondary school test scores across the Caribbean place Guyana at the bottom. The Guyanese government, academics and civil society all agree that the educational system suffers from low teacher quality.

Official Literacy Rates are Deceptive

Guyana's official literacy rate, 96.5 percent, is one of the highest in the English-speaking developing world. (See Figure 1)

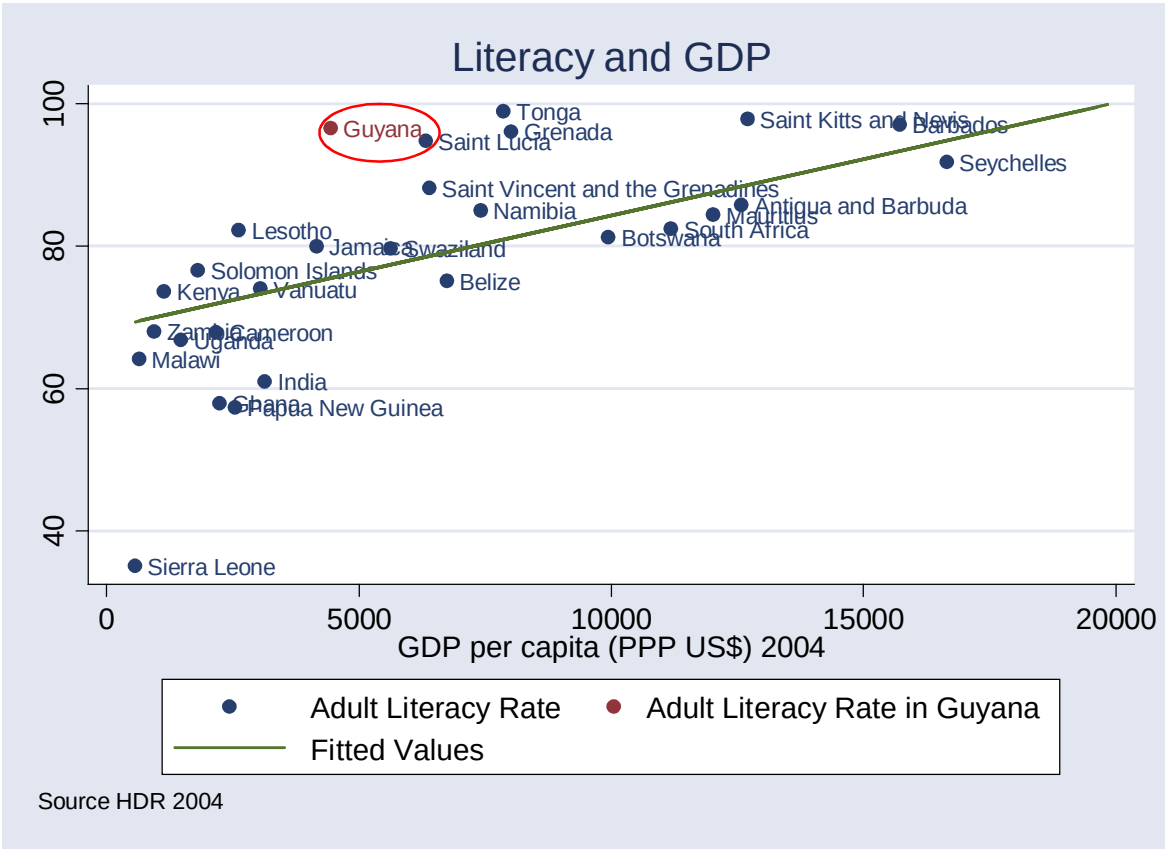
Figure 1
Literacy Rate (2004)
In English Speaking Countries



Source: HDR 2004

This achievement appears even more miraculous when considering its relatively lower per capita income. If we were to predict literacy using income, we would expect Guyana's literacy rate to be closer to 75 percent. (See Figure 2) In fact, the difference between actual and expected literacy (based on income) is higher in Guyana than any other country English speaking world. (see Figure 3) This may reflect Guyana's educational accomplishments in prior generations.

Figure 2

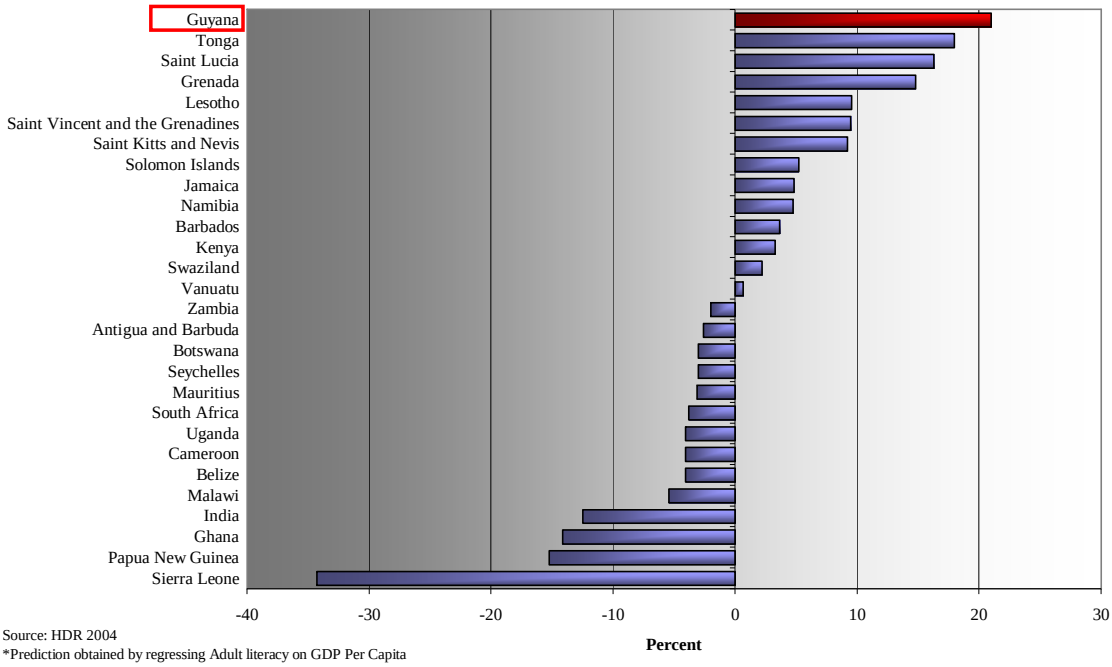


Source HDR 2004

Figure 3

Literacy Residual: Predicted versus Actual Literacy (2000)

In English Speaking Countries



Source: HDR 2004

*Prediction obtained by regressing Adult literacy on GDP Per Capita

Official adult literacy numbers belie Guyana's true educational achievement today. According to Jennings (2001), who designed and administered a national literacy survey in 1995, only 70 percent of its adult population could qualify as literate (under any measure), with a *functional* literacy rate much closer to 50. According to one editorial in the independent Stabroek News (January 13th 2008), *youth* literacy is even more troubling.

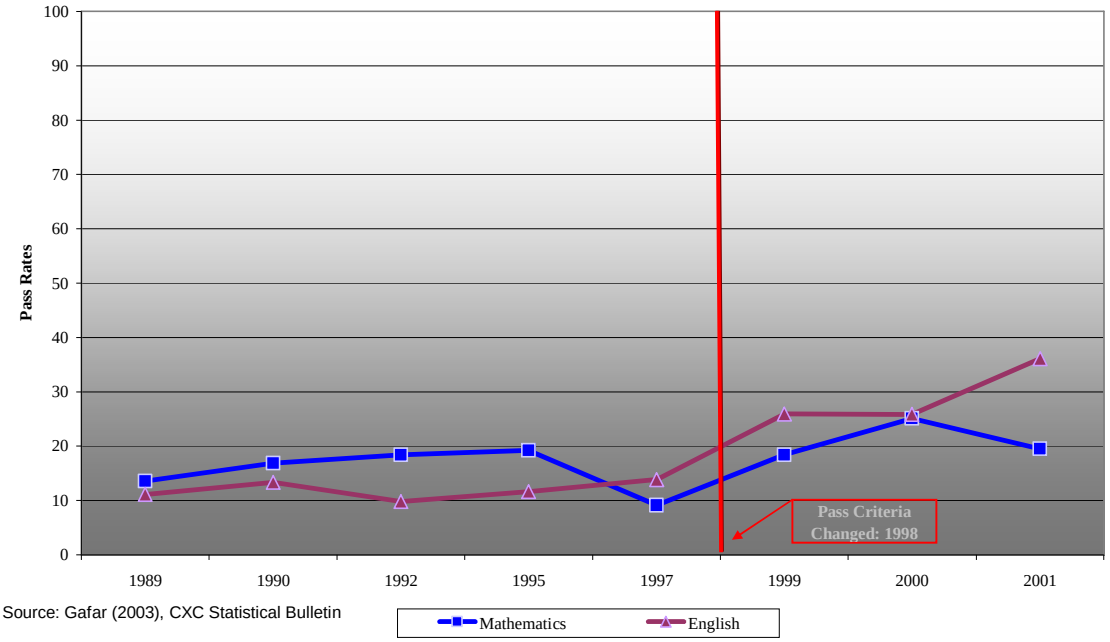
> Minister of Education Shaik Baksh acknowledged that the literacy level is declining across the country. This is not news to anyone who has even perfunctory dealings with the school system…it is nothing short of a national scandal that we are churning out large numbers of teenagers who after spending a decade or more in a formal learning situation, can't fill out a form, can't apply for a job in writing and can't read the voters' register.

Rather than official literacy numbers, the state of Guyana's educational system is more accurately reflected in internationally standardized exams.

CXC Exams

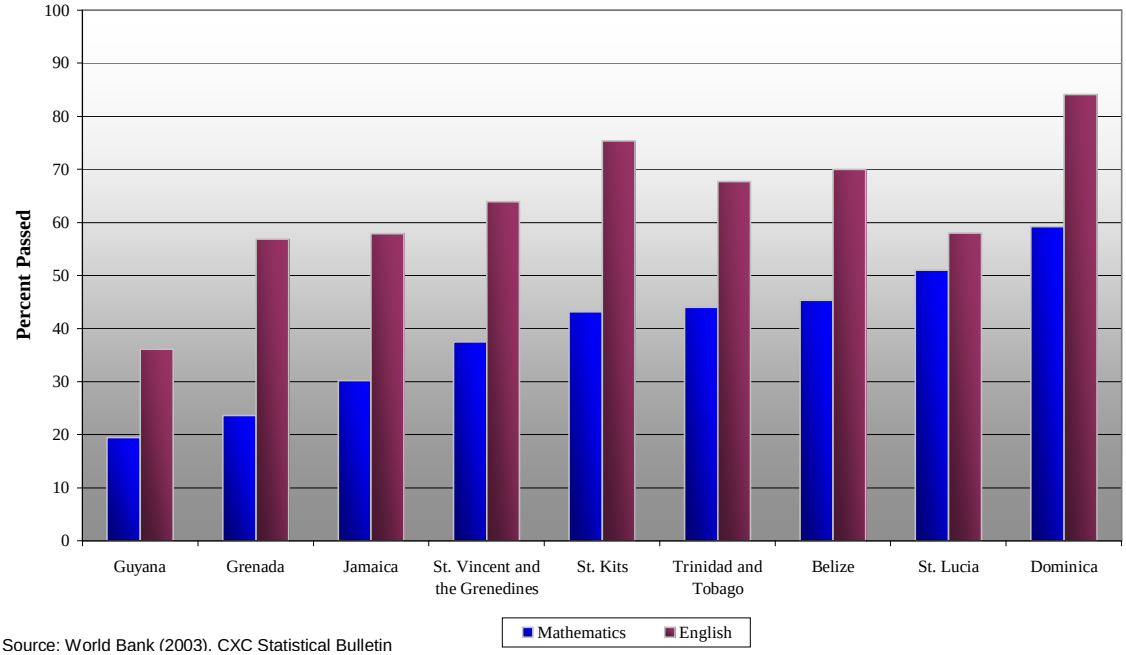
The Caribbean Examination Council (CXC), established in 1972, administers exams to secondary school students in sixteen Caribbean countries and territories. These exams are standardized to aid regional post-secondary institutions and universities in the process of admissions. They also provide a useful tool for cross-country comparisons of student achievement within the Caribbean. In the early years of the CXC, Guyanese students had the third highest pass rates of the sixteen countries. (Jennings 2000, p. 98) By 1983, Guyana's pass rates were at the very bottom, with an average of 35% of students passing all subjects, and only 11% passing the basic mathematics exam. (Samaroo 1991, p. 519) And there has been little progress since 1983. In 1997, Guyana's pass rate dipped down to 9%. (See Figure 4) In 2001 (after the passing criteria were amended in 1998, increasing the pass rates in all countries for all subjects) fewer than 20% of Guyanese students were able to pass Mathematics exam. (See Figure 5) And only 30 to 40 percent of students passed the major science subjects. (Figure 6).

Figure 4
CXC Performance in Guyana over Time:
Math and English



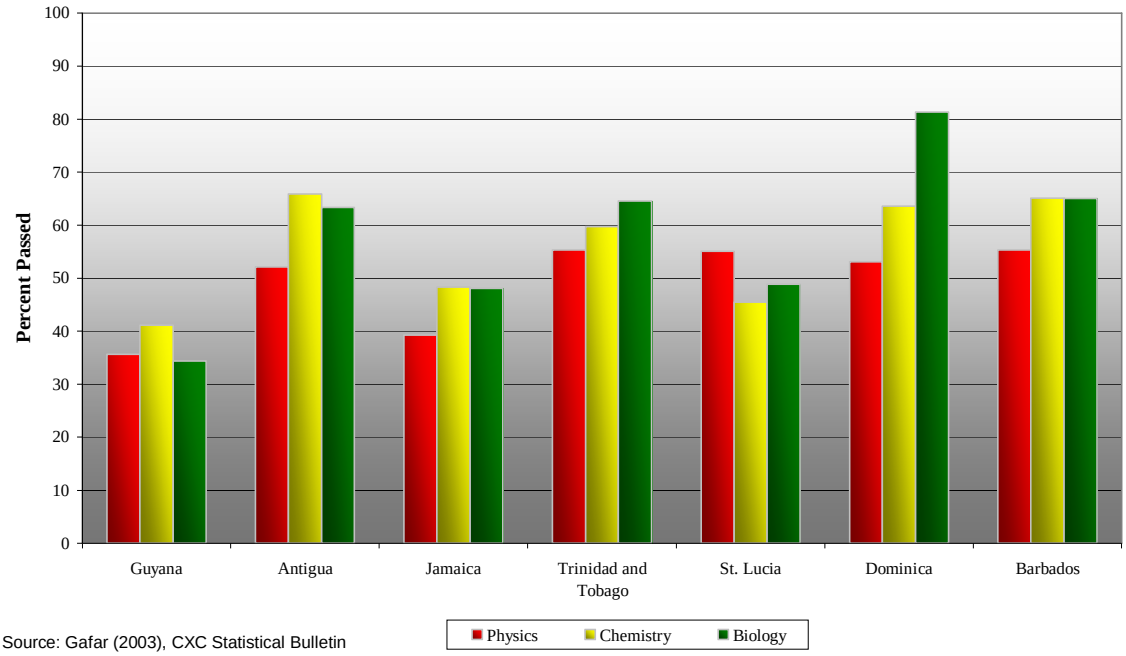
Source: Gafar (2003), CXC Statistical Bulletin

Figure 5
CXC Performance in 9 Countries (2001)
Mathematics and English



Source: World Bank (2003), CXC Statistical Bulletin

Figure 6
CXC Performance in 7 Countries (2000)
Sciences



Source: Gafar (2003), CXC Statistical Bulletin

Unfortunately these results, if anything, *overstate* Guyana's educational achievement. At least as of 1992, for every 100 students who entered primary school, fewer than 20 took the CXC English exam, and only 3 were able to pass it. In comparison, of 100 primary school entrants, 8 passed the exam in Jamaica and 24 in Trinidad and Tobago. (Gafar 2003, p. 237)

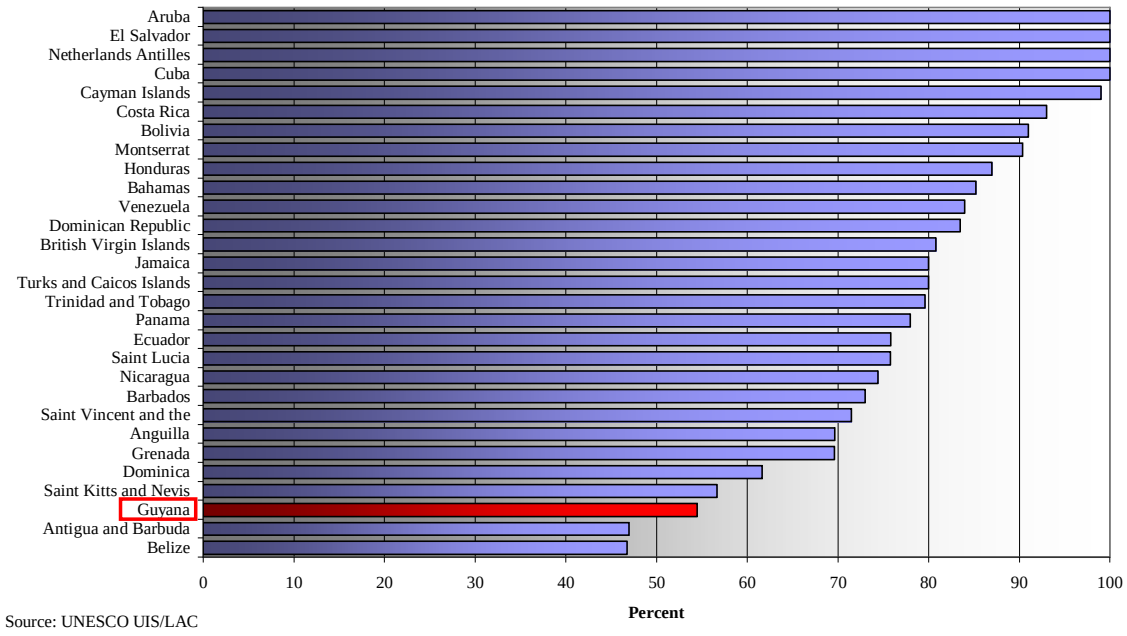
Teacher Quality

Both the government and public recognize that quality is a problem in Guyana's education system. Quality can be linked to many factors, and improvement can be sought though multiple channels. According to the PRSP,

> the Government's strategy centers on (i) reforming the curriculum and expanding the teaching of Information Technology; (ii) increasing access to and attendance at secondary schools; (iii) increasing the number of trained teachers; (iv) complementing teacher's salaries with non-pecuniary incentives; (v) improving physical facilities to reduce overcrowding; (vi) targeting functional illiteracy among out-of-school youth; (vii) providing targeted support to the poor; and (viii) strengthening the Ministry of Education. (PRSP, p 37).

There are many items in this list, and according to the MoE Strategic Plan for 2003-7 (MoESP), theey need to be prioritized. The MoE downplays items ii and v. suggesting that access is "not a great problem." (MoESP, p. 6) This is corroborated by Fernandez (2004), from the International Institute for Higher Education in Latin America (IESALC). "The teacher problem in Guyana is not a problem of numbers, but one of quality. The student/teacher ratios are manageable at al levels." (Fernandez 2004, p. 27) Indeed, class sizes in primary school are moderate, with an average of 26 students per teacher, and the middle two quartiles ranging between 19 and 33. (MoE data 2002-4) While curriculum reform remains a top priority, the ministry treats teacher training with particular urgency. "A large proportion of the teaching force is unqualified and untrained." (MoESP, p. 8) When compared to other countries in the region, Guyana has one the lowest proportion of trained teachers.

Figure 7
Proportion of Primary School Teachers that are Trained
Latin America 2000-2005 average



Source: UNESCO UIS/LAC

IV. TEACHER QUALITY AND EDUCATION RESULTS

The issue of teacher quality and the need for training is highly publicized in Guyana. But is there evidence that training actually produces better student outcomes? Prior research provides some evidence of a connection between teacher training and attendance. But there has been a dearth of rigorous analysis establishing a causal relationship. Using school-level fixed effects regressions on a panel of exams from 2002-5, it appears that teacher training levels indeed have a significant impact on student test scores. Aware of this connection, the Ministry of Education has expanded its teacher training programs over the past decade. Unfortunately, high rates of teacher attrition have negated any increased output of Guyana's training programs.

Correlation Analysis

Using cross-region regressions (within Guyana), looking at inputs including per-capita income, poverty rates, teacher quality, and per-student educational spending, Gafar finds that the strongest predictor of educational outcomes (as measured by attendance rates) is indeed teacher quality. (Gafar 2003, p. 244) However, both the outcome measure (attendance) and method of analysis (cross-region regression) give reason not to infer too much from this result. To be sure, Gafar is careful not use language suggesting causality. Unless the assignment and transfer of teachers across regions is completely random, such cross-regional regressions are suggestive at best. Other variables that impact student attendance could be associated with which region a teacher is from or chooses to be.

A simple correlation analysis provides little information as to whether teacher quality indeed impacts student outcomes. This is point is highlighted by recent research in India and Pakistan suggesting that teacher training is ineffective (Remiers and Warwick 1995) at least when compared to less-trained para-teachers (Banerjee et al. 2004). It does not, however, minimize the

need for analysis in general. The question of whether there is a causal link between teacher quality and student outcomes remains an empirical one. The rigor of analysis, therefore, determines whether we can infer causality from correlation.

Causal Analysis

Using several years of school-level data on test scores and teacher quality, we can run a fixed-effect regression that controls for many of the unobservable factors that make certain schools or communities unique. For the school years of 2002-3, 2003-4, and 2004-5, the MoE recorded the number of teachers at all levels of qualification in each school as well as school-level Secondary School Entrance Examination average results. (Appendix: Table 5) Comparing year-to-year variations in a school's teacher quality (measured as the proportion of teachers that are trained) with year-to-year variations in that school's test scores (normalized average), gives us a more valid estimate of the impact of teacher training on test scores. Table 1 presents the results of this regression.

Results

Table 1
Secondary School Entrance Examination Scores
Years 2003, 2004, 2005

Regression Coefficients on Proportion of Teachers that are Trained at the	Normalized Test Scores			
	Math	**English**	**Science**	**Social Studies**
School Level [2]	**0.320**	**0.353**	**0.519**	**0.289**
	(0.172) *	(0.185) *	(0.191) **	(0.186)
N	1217	1214	1215	1217
R2	0.006	0.012	0.013	0.008
Community Level[3]	**0.580**	**0.625**	**0.657**	**0.555**
	(0.092) **	(0.094) **	(0.098) **	(0.094) **
N	1223	1220	1221	1223
R2	0.089	0.086	0.085	0.082

[1] Regressions use fixed effects at the school and community level and control for student teacher ratio, enrollment, and year

[2] Regressions exclude hinterlands

[3] Fixed effects at the NDC level

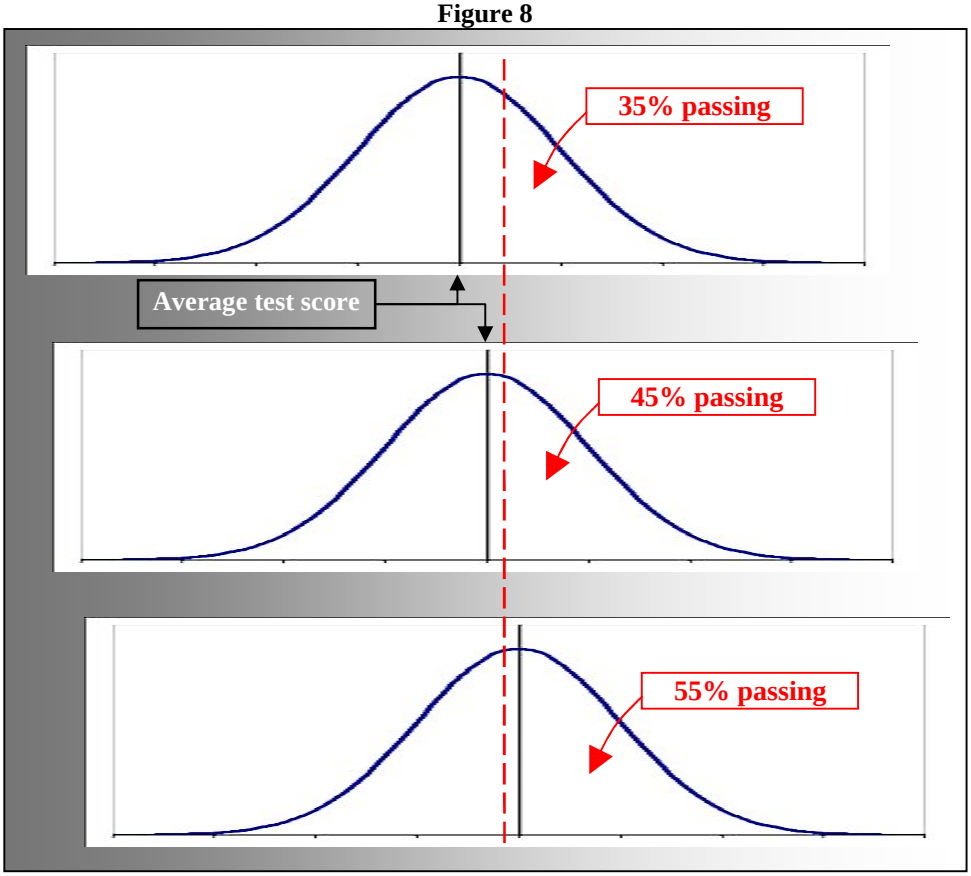
Of particular notice is the teacher quality coefficient for the science exam: a one unit increase in the proportion of teachers trained (going from 0 percent to 100 percent) is associated with a 0.519 standard deviation increase in exam scores.

Interpretation

Put more simply: in a typical school, half of the teachers trained and, on average, 45 percent of the students score better than 30 points out of 60 on the science exam. (MoE data. 2002-4) Assuming 30 points represents a passing grade, the results in Table 1 suggest that as this typical school replaces its untrained teachers with trained teachers, the proportion of those who pass increases from 45 to 55 percent of the class. This is a monumental shift in just one or two years. (See Figure 8) Losing its existing trained teachers, however, could result in less than 35 percent

of the class passing. For a single class, therefore, the difference between having a trained teacher and an untrained teacher determines whether or not 20 percent of the class will pass the exam.

Figure 8



Claim of Causality

Whether or not these results represent a causal relationship is an important question. Perhaps the ministry places trained teachers in schools that look promising. If this were true, however, we would likely see other variables correlated with teacher quality. This does not seem to be the case. The loss of trained teachers within a school appears random across the entire school system. Every year, roughly one third of the schools lose trained teachers, one third gain trained teachers, and one-third remain unchanged. (See Table 2)

Table 2

Gain and Loss of Teachers at Primary Schools

		Schools for which Trained Teachers were					
	Total	Added		Lost		Unchanged	
Year	Schools	Number	%	Number	%	Number	%
2003	444	147	33.1%	129	29.1%	168	37.8%
2004	448	119	26.6%	136	30.4%	193	43.1%

Source: Ministry of Education

The only detectible trend is "mean reversion": if a school has more trained teachers, it is more likely to lose them, and with fewer trained teachers it is more likely to pick them up. (See Regression Table 7 in the appendix)

Other Threats to Inference

The correlation between teacher training and student results is not ubiquitous. It is noteworthy that in the hinterlands (Regions 1, 7, 8, and 9), increases in teacher quality were associated with a *drop* in student test scores. (See Appendix Table 6) There are several possible explanations for this trend, without damaging the validity of the above result. First, if trained (and experienced) teachers were uprooted from the city and sent to the hinterlands, they may have become discouraged, and would teach with less enthusiasm as before. Although perhaps they were the poorly performing teachers to begin with. A second plausible reason is that the teachers from the hinterlands who gained training through in-service and distance learning programs were performing poorly to begin with. But it is unlikely that their performance would worsen after training. The third and most likely explanation is that those assigned to the hinterlands are new recruits from the more remote training centers rather than from the main training campus. Without data that tracks individual teachers, it is difficult to identify the cause.

It is important to note that less than 10 percent of the population lives in the hinterland regions. And indeed, these regions are unique in many ways. Hence the conflicting results discussed here

should not fundamentally undermine the conclusions above. What this mental exercise does highlight, however, is the importance of understanding why so many schools are gaining and losing teachers each year.

Why does teacher quality vary?

The high variance of within-school-teacher quality over time, as seen in Table 2, could be explained by a story in which there is a constant stock of teachers, and the few trained teachers rotate from school to school each year. Equally plausible is one that features a high rate of hiring and attrition of trained teachers. The true story is in the middle.

Teacher Training Programs

Guyana's sole teacher training institution was established in 1928 by the government and still exists today under the new name, Cyril Potter College of Education (CPCE). It currently consists of a main campus and 6 regional centers. The University of Guyana also provides both teacher training and the country's only graduate program in education. (Fernandez, pp. 9-15) Looking only at the stock of trained teachers from year to year would suggest that these two institutions are working at a snail's pace.

Between 1994 and 2005, the Ministry of Education added a net of 418 trained primary school teachers—less than 40 per year. (See Table 3)

Table 3

Primary School Teachers, by Level of Qualification							
	Graduate		Other Qualified				
Year	Trained	Untrained	Trained	Untrained	Unqualified	Total	% Trained
1994	54	0	1821	364	1403	3642	51.5%
1995	76	0	1711	414	1143	3344	53.4%
1996	72	0	1772	507	1110	3461	53.3%
1997	90	2	1759	739	1120	3710	49.8%
1998	106	6	1887	803	1084	3886	51.3%
1999	76	4	1919	833	1119	3951	50.5%
2000	111	7	2062	931	955	4066	53.4%
2003	104	3	2178	913	872	4070	53.5%
2004	120	2	2160	1052	737	4071	53.1%
2005	133	3	2160	1133	590	4019	53.7%

Source: Ministry of Education -- Digest of Education Statistics

At this rate it would take more than 40 years to replace all untrained teachers with trained teachers. This implies a relatively constant stock.

The stock is not stable, however. Between 2003 and 2005 alone, 600 primary school teachers graduated from CPCE and perhaps another 300 from GBET with training certificates (MoE). And UG typically graduates over 100 newly-trained primary school teachers each year. Yet during this period the total number of trained primary school teachers declined (from 2,178 to 2,160). The question then becomes, where are the trained teachers going?

According to the MoE (MoESP, p. 13):

> The demand for trained teachers and other professionals in the Caribbean region and other countries threatens the availability of well-trained staff to Guyana's education system. The present attrition rate for teachers from Guyana is high and appears to be rising with aggressive recruitment by other countries. The growth of private education could also become a source of competition in the recruitment of qualified teachers.

Migration abroad is particularly more troubling than migration to private schools within Guyana. First, according to Gafar, "Private education is a … negligible part of the education system [in

Guyana], since all schools were brought under state control in 1976." (Gafar 2003, p. 226) Second, regardless of whether students are taught in the private or public school system, the positive externalities of education can be internalized as long as these students remain in Guyana. Lastly, as migrant networks expand, the ability to recruit teachers, and the teachers' desire to leave, increases.

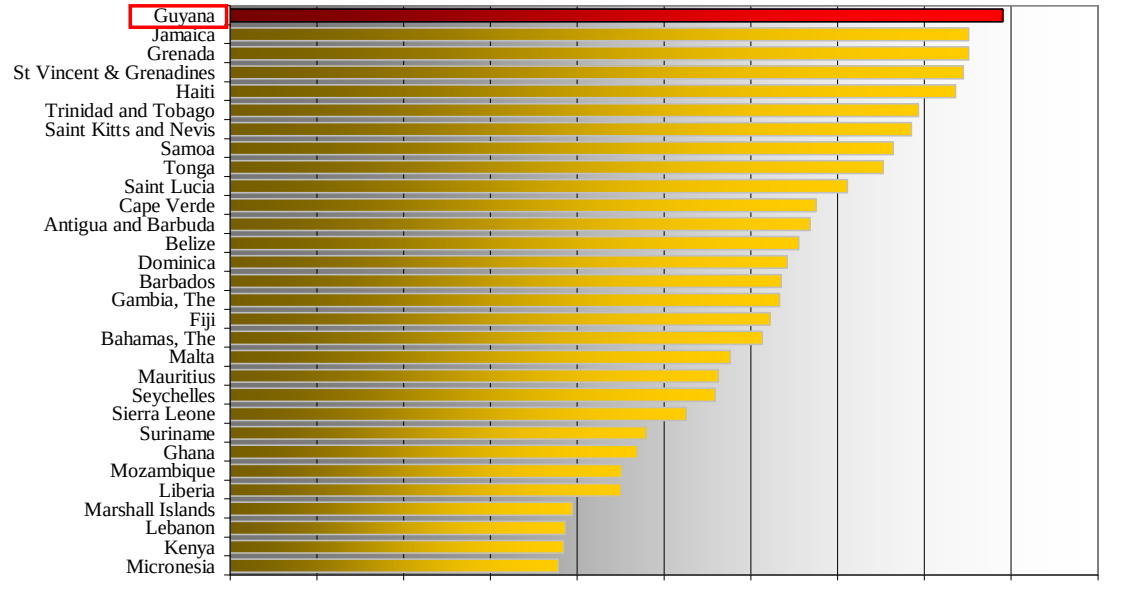
So if there is, as stated in the PRSP, "a conscious effort to reverse the growth in percentage of untrained teachers," (PRSP, p. 37) these efforts must address the issue of emigration and not just teacher training.

V. EMIGRATION AND BRAIN DRAIN

Migration, described as 'embedded in the Caribbean psyche,' is a fact of life in the region. - Stubbs, Reyes (2004)

The Caribbean has lost more than 15 percent of its labor force to other countries through emigration. This compares to that of Central America and Mexico, both around 12 percent. But in terms of their tertiary educated populations, the latter two have lost 17 and 15 percent, respectively, whereas the Caribbean has lost close to 43 percent of its skilled labor force. (Docquier and Marfouk 2005) In fact, "a majority of Caribbean countries have lost more than 50 percent of the labor force in the tertiary education segment." (Mishra 2006, p. 4) And Guyana's skilled labor force has seen the deepest declines, with 89 percent of its tertiary educated workforce emigrating. (See Figure 9)

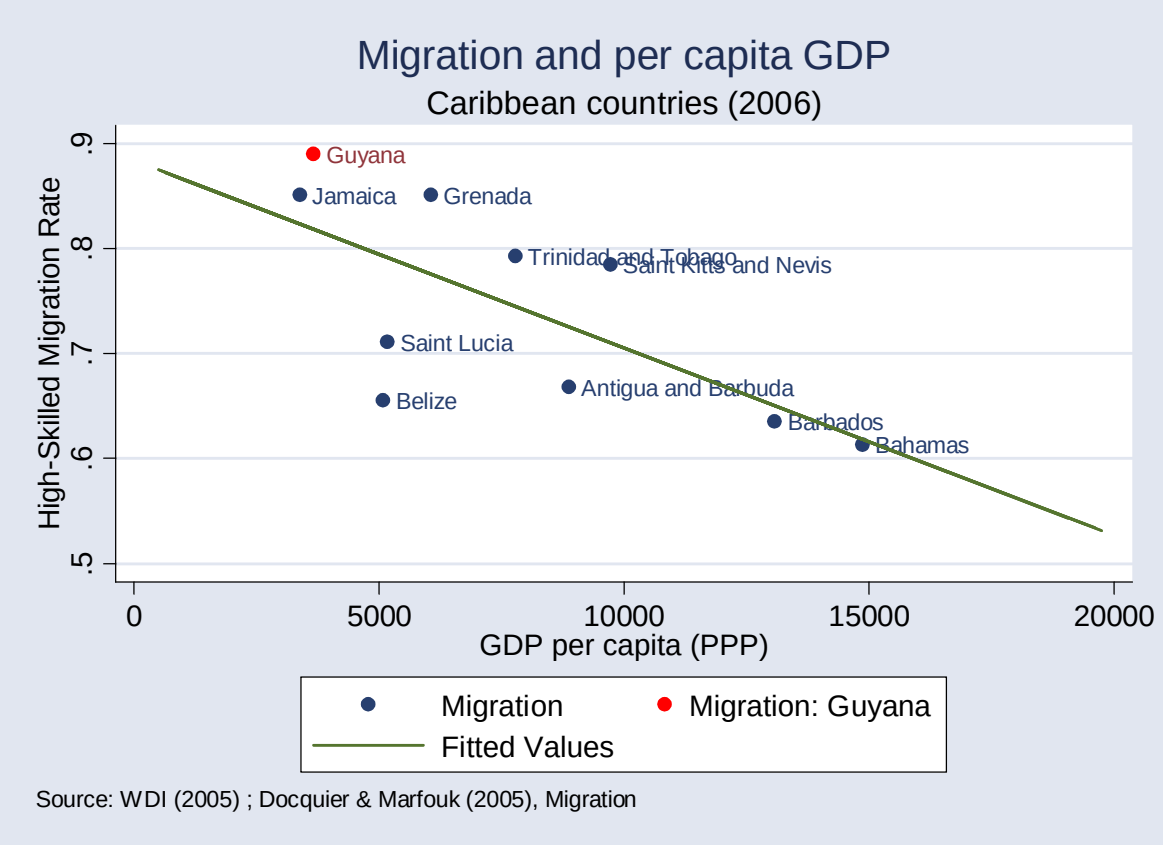
Figure 9
Skilled Migration Rate
Of Top 30 countries (2000)



Source:Docquier and Marfouk (2005)

One commonly given rationale for the exodus of its high-skilled labor-force is the lack of employment opportunities in the Caribbean. According to Mishra, "The high rates of emigration from the region are due not only to the 'pull factor' i.e., higher wages abroad, but also the limited opportunities for highly, but similarly, educated people in the same small geographical areas (i.e., the 'push factor')." (Mishra 2006, p. 28) This is corroborated by the fact that migration is highly correlated with per capita income. (See Figure 10)

Figure 10



But if there were indeed more college graduates than job openings, one would expect them to bid down (high-skilled) wages. This appears not to be the case.

Psacharopoulos (2004 Table A2), comparing Mincer regressions across a range of literature shows that each year of schooling in Jamaica (in 1989) was associated with a 28% increase in earnings—the highest return to education in his sample of 98 countries.[1] Although this particular analysis does not include data for Guyana, notice that Jamaica has the second highest migration

[1] Jamaica was the only Caribbean country in the sample. I am using this return to impute people's expected return to *higher* education. This sample does not have data on the returns to higher education for Jamaica. And there is a significant decline in returns between primary and secondary education. This might not bode well for the returns for higher education. But particularly high-returns to education is a common feature in the Latin-America and Caribbean region in general (as is the case for Jamaica). And returns to higher education in this region as a whole is the highest in the world.

rate of high-skilled individuals. Other sources suggest that for jobs in the public sector alone, the return to higher education in Guyana range from ten percent (for teachers) to seventeen percent for engineers. The return is certainly higher in the private sector. (Hamilton 2005, p. 5) There is indeed a demand for educated workers within Guyana and the Caribbean.

Given the complex relationship between emigration, teacher attrition and student results, what policy options are available to the Government of Guyana?

VI. POLICY RESPONSE AND PROPOSAL

According to Mishra (2006),

> There are two possible approaches countries could take with regard to migration: (i) minimize losses by trying to retain the high skilled; and/or (ii) seek to increase the benefits of emigration by adopting a "Diaspora Approach." The latter uses the diaspora to build networks for trade, tourism, and investment promotion; harness its knowledge, skills, and assets; and attract higher and more efficient forms of remittances." (Mishra 2006 p. 28)

I address each of these approaches in reverse order. But first, I propose an alternate policy option – increase the inflow of certified teachers from the training institutions.

Increase the rate of teacher training

The stock of trained teachers has remained relatively constant at 2,100 since 2000 (through 2005), as shown in Table 3. During this period, roughly 1,000 teachers were trained, and about the same number left. Although emigration is a problem, at least the stock is being replenished. If the government were to put more resources into teacher training, perhaps it could accelerate the inflow until it outpaces the outflow—allowing the stock to increase. This is consistent with the proposal of Jorge Fernandez (IESALC), who suggests "the solution is to provide more and better training for teachers before and in-service." (Fernandez 2004, p. 27)

With growth in its in-service teacher training initiatives, such as the Guyana Basic Education Training Programme (GBET) and the Guyana In-Service Distance Education Project (GUIDE), the Ministry is attempting to do just this.

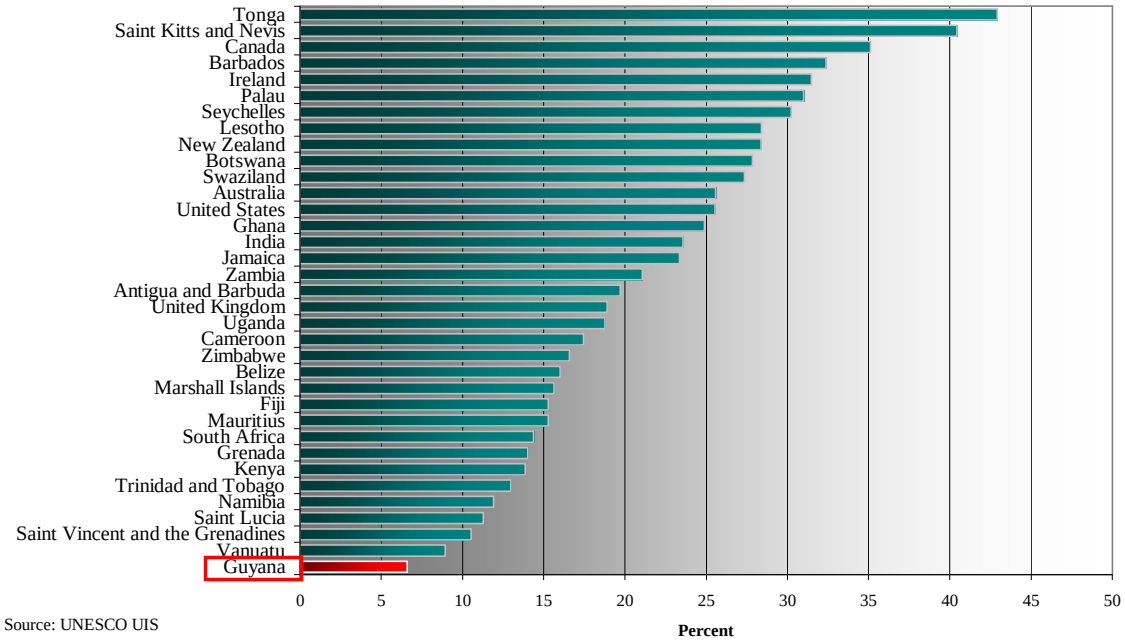
Cost of Additional Training

The first concern is the added cost of increasing resources. The cost of educating teachers is higher than the cost of educating primary school students. Guyana spends twice the amount per college student as per primary student (US$1,571 versus US$760). This difference, however, is not that large. Jamaica spends four times more per college student than primary student, while Trinidad and Tobago spends about 5 times more. (UNESCO UIS) And overall, Guyana allocates less of its education budget to the tertiary sector[2] than any other country in the English-speaking world. (See Figure 11) [3]

[2] In this context, "tertiary" includes both post-secondary (technical and vocational) and university

[3] These numbers are inconsistent with the Ministry of Education's internal numbers, which suggest that closer to 14 percent of the budget is allocated to the tertiary sector. (See Table 4) Within the UNESCO dataset, the proportions allocated to each sector do not add up to 1. This is a problem with all countries. At the very least, this allocation places Guyana in the lower half of the distribution.

Figure 11
Proportion of Education Expenditure on the Tertiary Sectors
Enlgish-Speaking Countries (2000-2005 Average)



Source: UNESCO UIS

Table 4 provides a more detailed breakdown of resources allocated to teacher education. It costs the government $1.5 million each year to provide teacher training and education or roughly 3 percent of its education budget, or 0.4 percent of its national budget.

Table 4

Guyana National Budget Allocation for Education: Teacher Training, Tertiary, and Total (2003)

Budget Allocation To	Value ($US)	Allocation as a Percent of Annual Education Budget: Tertiary	Annual Education Budget: Total	National Budget	GDP
Technical And Vocational Education Training[1]	2,381,544	31.8%	4.53%	0.62%	0.32%
GITC (Industrial Training)	77,148	1.0%	0.15%	0.02%	0.01%
CSHE (Home Economics)	58,663	0.8%	0.11%	0.02%	0.01%
GTI (Technical Institute)	644,554	8.6%	1.23%	0.17%	0.09%
NATI (Technical Institute)	301,215	4.0%	0.57%	0.08%	0.04%
LTI (Technical Institute)	323,109	4.3%	0.61%	0.08%	0.04%
ETI (Technical Institutes)	214,078	2.9%	0.41%	0.06%	0.03%
CPCE (Teacher Education)……	**762,777**	**10.2%**	**1.45%**	**0.20%**	**0.10%**
University of Guyana (UG)	5,114,000	68.2%	9.73%	1.34%	0.69%
Faculty of Education (Teacher Education) [2]……	**748,037**	**10.0%**	**1.42%**	**0.20%**	**0.10%**
Total Tertiary Education Budget	7,495,544	100.0%	14.26%	1.96%	1.01%
Total Budget for Teacher Education…….	**1,510,814**	**20.2%**	**2.88%**	**0.40%**	**0.20%**
Total Education Budget	52,545,000		100.00%	13.75%	7.09%
National Budget	382,045,000			100.00%	51.53%
GDP	741,428,200				100.00%

Source: Hamilton 2005

[1] 2004 Allocation

[2] Faculty of Education represents 14.6% of total UG costs in 2003. Or 841 students enrolled times $940/student

The average attrition rate for trained teachers remains at roughly 20 percent (or 400 per year), which is about the current graduation rate of CPCE plus UG. Hypothetically, if the ministry were to double its capacity of teacher training (costing an additional US$1.5 million per year, assuming no infrastructure costs) it could potentially fill its schools with trained teachers in 5 years after graduating its first expanded cohort, after which it could return to its normal capacity. And if the annual costs are scalable, this "surge" of teacher training could be accomplished for just US$7.5 million. Obviously, this back-of-the-envelope calculation ignores many factors. The need for more classrooms, other capital expenditures, and supplies as well as an infrastructure to train the trainers would add to the cost. By the same token, returns to scale may obviate the need to replicate other redundant costs. But ultimately, budgetary constraints are less likely to be binding than *administrative* constraints.

Demand versus Supply of Teachers

Assume the Ministry of Education could organize the budgetary and administrative resources to promote a "surge" in teacher training. Teacher training is constrained by more than the number of classrooms, teachers, and resources. CPCE must also attract more students who want to be teachers. And it must do so without relaxing the qualifications for admission. Lowering standards would defeat the purpose of increased teacher training. In fact there is already concern of diminishing quality. Earlier this year, the Minister of Education, Mr. Shaik Baksh, "declared he is dissatisfied with the quality of CPCE graduates, especially in Mathematics and English and blamed it for the poor performance in the two critical subject areas." (Guyana Chronicle, January 10, 2008) Even if the budgetary and administrative capacity to train teachers could be scaled up, the most important inputs—prospective teachers—are out of the ministry's control.

Signaling or Value Added

Not all prospective teachers need to come directly from secondary school or outside the education system. There is a large stock of untrained teachers already within the schools waiting to be trained. It is not clear, however, that training these teachers would achieve the quality of even the CPCE graduates that Minister Baksh was complaining about.

Section IV provided evidence that student learning was impacted by the proportion of teachers that were trained within the school. There is, however, a subtle but important distinction between *trained teachers* and *teacher training*. We cannot conclude that it is *training* which makes the difference. Comparing the two groups of teachers—trained versus untrained, we may see more differences than the just the certificate. For example, trained teachers may be more motivated, which is why they pursued training in the first place. More generally, it is possible that "inherently effective" teachers signal their competence by obtaining teaching certificates.

"Ineffective" teachers find the training too difficult or are unqualified, and therefore do not obtain the certificates. The difference between *trained* and *untrained* teachers may not be the training, but rather the distribution of "inherently effective" and "ineffective" teachers within each group, which informed their decision to get training. The training itself may not add much value. If this is the case, increasing its capacity will fail to produce better teachers.

Conclusion: Need for More Data

Unfortunately the distinction between trained teachers and teacher training cannot be revealed with the analysis in Section IV. We may be able to disentangle the effects if we had data on exactly *how* year-to-year variation in teacher quality occurred. Specifically, we would need to know which schools acquired trained teachers from the transfer of existing teachers, which acquired trained teachers through the placement of recent CPCE graduates, and which teachers went through in-service training. Until this is researched further, we cannot conclude that increase training capacity will improve outcomes.

Emigration: Let it Flow?

Emigration has been identified as the chief culprit for reducing teacher quality in Guyana. At the same time, emigration has shown to be economically beneficial to many countries. Worldwide, remittances sent back by migrants each year is valued at more than double the flow of international aid. (WB GEP, p. xi)

The Benefits of Remittances

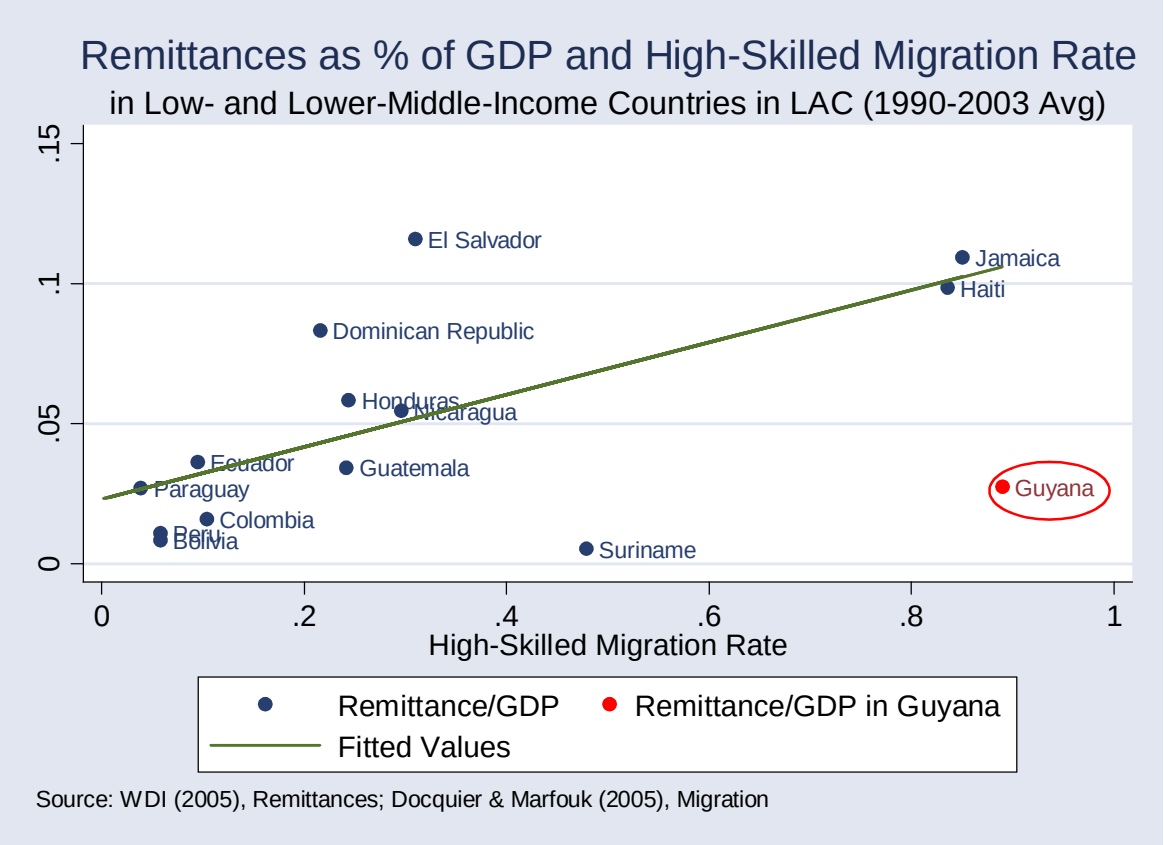
The World Bank concludes that remittances: 1) reduce poverty, 2) smooth household consumption, 3) ease working capital constraints, and 4) lead to increased household expenditures in education, entrepreneurship, and health. (WB GEP, p. 117) According to Mishra, "since the international experience has been that it is difficult to prevent emigration, the real

policy challenge is how Caribbean countries can maximize the benefits from their population living and working overseas. Remittances should be the most immediate focus, as they can affect growth through investment, both physical and human." (Mishra, p. 29)

Relative to its combined GDP, the Caribbean receives more remittances than any other region in the world. (Mishra 2006, p. 19) This is likely correlated with its high migration rates, particularly that of high-skilled workers. (See Figure 12) Guyana, for example, has an education policy for the specific purpose of exporting skilled health workers. "The American International School of Medicine…limits its actions specifically to the training of physicians for foreign countries." (Fernandez 2004, p. 7)

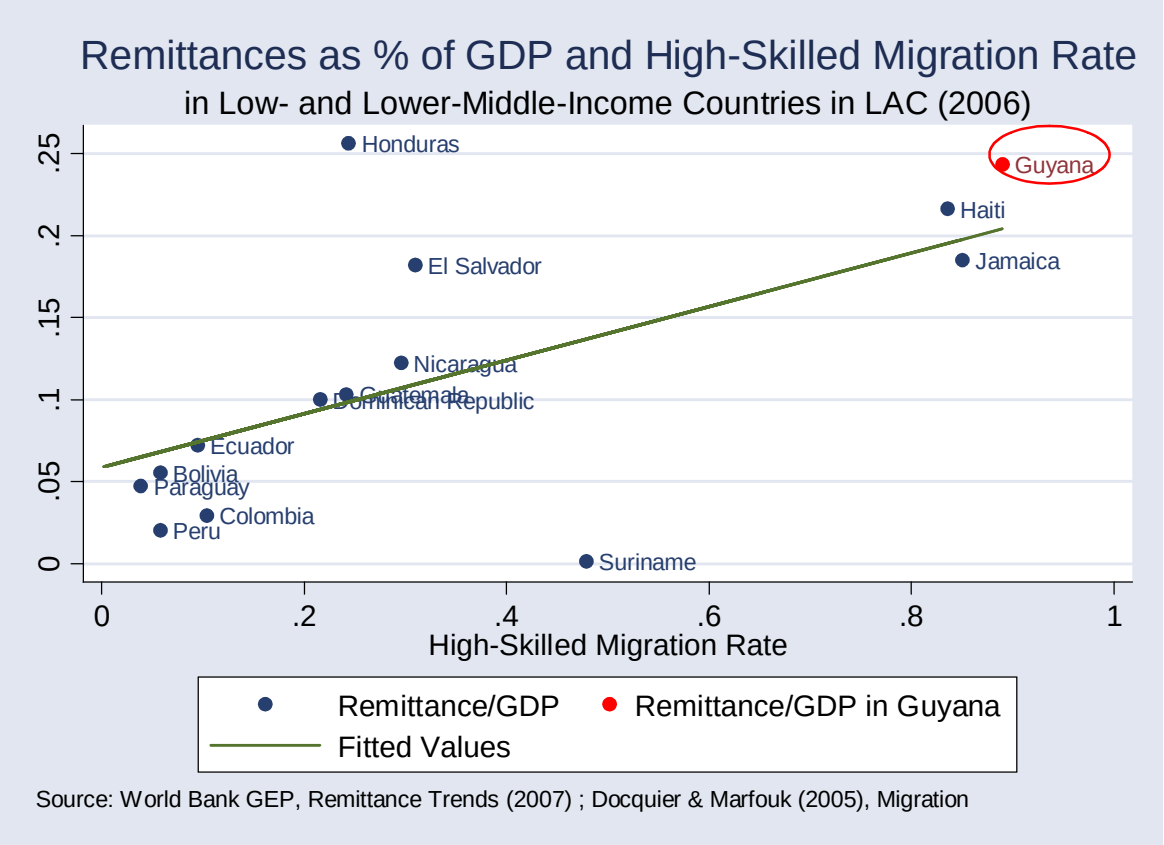
What is unclear is whether Guyana stands to benefit from this process. Between 1990 and 2003, the average flow of remittances back to Guyana was minimal relative to both its neighbors and the proportion of its high-skilled emigrant population. (See Figure 12)

Figure 12



But its level of remittances doubled in both 2002 and 2003, and doubled again between 2003 and 2005. By 2006, remittances represented nearly one quarter of Guyana's GDP—more than its neighbors, even controlling for its high-skilled migration rate. (Figure 13)

Figure 13



The sudden influx of remittances looks promising. Whether they will become a reliable source of income into the future is uncertain. What is known, however, is that there are substantial costs to high-skilled migration.

The Cost of Brain Drain

Brain Drain—the emigration of high-skilled individuals—costs a country more than just the loss of their labor and human capital.

> Highly-skilled workers often confer externalities to [low skilled workers] by affecting their productivity through transfer of knowhow and also through better monitoring and motivation…Qualified doctors, engineers, researchers are not only more productive themselves but are also expected to make other workers in the economy more productive. (Mishra 2006, pp. 5, 8)

The emigration of these high-skilled workers, therefore, means a loss in everyone else's productivity. Clearly teachers, whose job it is to create more productive workers, should be

added to this list. Furthermore, according to the World Bank, "Highly educated citizens may also make contributions to public goods—for example, in improving governance and strengthening the administrative capacity of the state—which may be lost through high-skilled emigration." (WB GEP 2006, p. 67) Teachers also play a role in developing these more engaged citizens.

The social externalities are crucial, because they are the primary justification for why governments subsidize education in the first place. (Taylor 1999) The Government of Guyana likely provides free education with this in mind. But the investments are not paying off. Guyana is losing not only citizens who *could have* benefited the country by staying. It is also investing significant amounts of money into education that emigrants capture and take with them. Keep in mind that nearly 90 percent of the Ministry of Education's tertiary budget (which is 15 percent of the total education budget) is being exported. Not only is there no positive return on these investments by way of externalities, the initial cost is never recovered.

The government has implemented some cost-recovery policies to reduce these losses. In 1994, teacher training programs started charging tuition. But the revenue from this policy is still below the economic cost. (Gafar 2003, p. 226) And while tuition has remained constant since 1994, costs have continued to rise. (Hamilton 2005, p. 4)

A Net Loss

Migration has both costs – from brain drain, and benefits – from remittances. It is unclear whether Guyana's recent spike in remittances is sustainable. There is reason to be skeptical. According to one Guyanese marketing consultant in the US,

> As I study all of the various groups, what I find fascinating across the board, is the predictability of certain statements and actions by each group of actors. 'I would never go

> back to Guyana,' some would say as they go on about crime, corruption and every negative issue under the sun they can think of. (Stabroek News, December 7th 2007)

Unlike in most countries, the decision to emigrate from Guyana is not solely economic. Many Guyanese left home because of the political and social turmoil that has existed over the past few decades. And speaking with many Caribbean immigrants in the US, it appears that the perception of their country of birth is considerably less favorable in the Guyanese community than in other migrant populations.

Remittances aside, there have been unambiguous costs to long term growth from brain drain. With the precipitous loss of social capital, Guyana has seen crime rates spike in the past 6 years. (Hamilton 2005, p. 3) And the rapid deterioration in educational quality in the past 20 years, coupled with the analysis in Section IV is evidence that the loss of trained teachers is having a negative impact on Guyana's development of human capital.

Mishra (2006) calculates the economic loss from externalities using a model derived from Borjas (1995). According to Mishra, "the total losses due to skilled migration (which includes the [direct] 'emigration loss,' externality effects, and government expenditure on educating the migrants) outweigh the recorded remittances for the Caribbean region on average, and for almost all the individual Caribbean countries" (Mishra 2006, pp. 5-6) In his analysis, the costs to Guyana are as great as five times larger than the benefits through remittances. (Mishra 2006, p. 27) It is worth noting, however, that this analysis used remittance data only through only 2002. His 1980-2002 average remittance rate (as a percent of GDP) was only 1.9 percent. Incorporating the past three years of data, the 27 year average remittance rate (1980-2006) is closer to 3.7

percent. This is still less than half of the costs, which he estimates to be between 7.8 and 9.5 percent of GDP.

Conclusion: Emigration should not be promoted

Weighing the costs and benefits, it seems highly unlikely that Guayan's economy is benefiting from emigration. And it is fairly clear the emigration is harming Guyana's education system. Any policy concerned with education should focus on reducing the outflow of teachers.

Retaining High-Skilled: Restrictions

If emigration is, on net, harming Guyana, the next question is how to stop the hemorrhaging of high-skilled workers, or at least slow it down. There are two options. The first is to penalize leaving. The second is to reward staying. In practice, the difference between the two is more psychological than economic.

Restricting Emigration

If the emigration of teachers is harming Guyana, one possible approach may be to limit their ability to leave. Clearly *physical* restraint is not an option. A more realistic policy is to make leaving more costly. Without the ability to tax non-resident Guyanese, the government could impose costs on its citizens that are only realized if those citizens emigrate. The Ministry of Education may not have the authority to administer a direct tax on emigration. But it could tax the emigrants through its education policy. Education is typically considered a free public service paid for by the government. Its cost could be treated instead as a conditional loan. Those who take advantage of government-provided education can cover their obligation by either remaining in Guyana, or paying the government back for its investment if they leave.

The Ministry of Education's current teacher education policy follows a very similar model. "Graduates of CPCE are bonded to serve the Government for three years or to refund the costs expended on them during their period of training." (Hamilton 2005, p. 12) This mandatory service could be extended beyond three years. Or in addition to the government service requirement, the Ministry could append an additional requirement for Guyanese residence.

This policy could have negative side affects, however. First, these graduates are already paying some tuition. A loan, even if conditional, is an added cost relative to before, even if only psychological. When secondary school graduates are considering their career path, they can choose teaching or some other profession.

> Why [would] a teacher want to be in the schools?...If the low salaries are taken into consideration, the conditions of the schools, the lack of teaching resources and the lack of support that the teachers have to face, it is difficult to see education as an attractive career. (Fernandez, p. 23)

As students' costs and restrictions associated with teacher training begin to mount, the teaching profession becomes less and less appealing. And as discussed above, the Ministry's need to attract more qualified recruits is just as challenging as the need to reduce its brain drain.

Conclusion: do not penalize emigration

Paradoxically, brain drain may be responsible for attracting promising students to the teaching profession and keeping the level of trained teachers at least constant. The *prospect* of emigration makes a teaching career more attractive than it would be without that prospect. As reiterated by Fernandez, "teaching is still a path that offers certain opportunities. After completing the training and becoming an experienced teacher, there are many possibilities of having an international career in the United States, Africa or in another Caribbean country." (Fernandez 2004, p. 23)

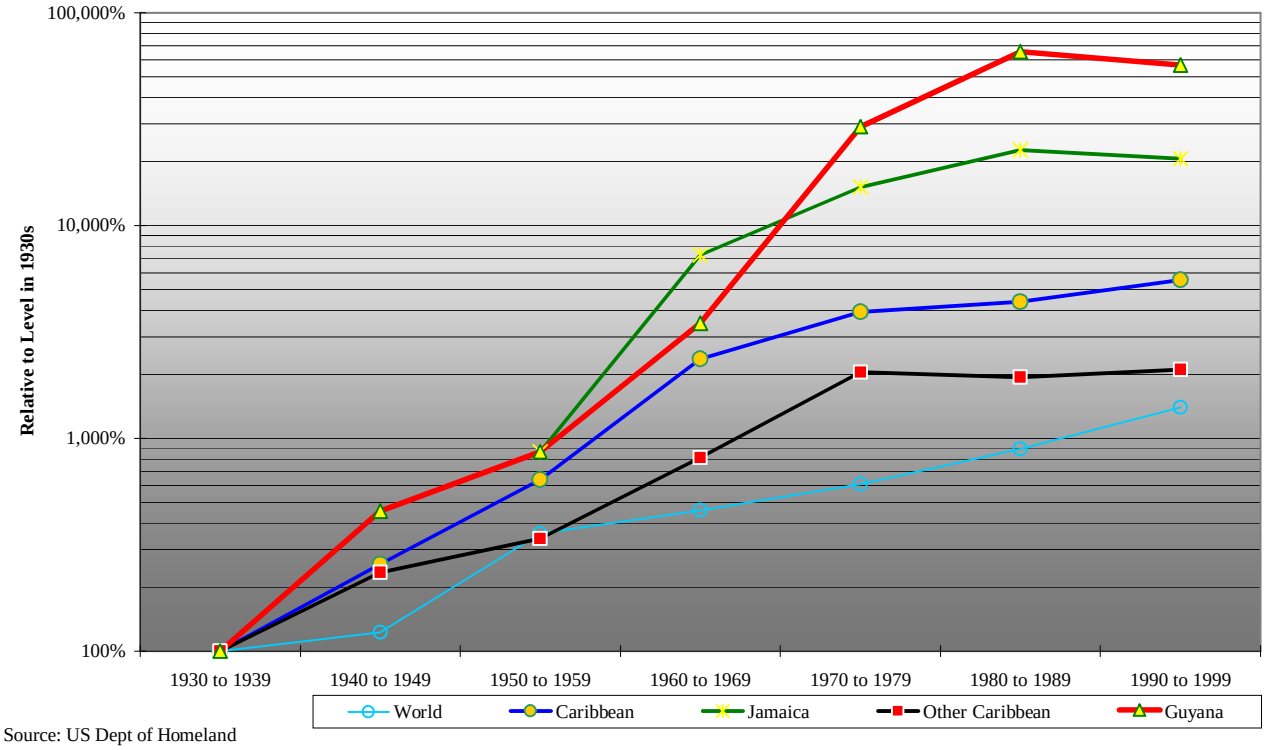
Therefore any policy restricting the emigration of teachers fundamentally reduces the appeal of teaching.

Retaining High-skilled: Teacher Incentives at Home

According to the Ministry of Education, "the Guyana Government cannot compete with the salaries offered by some countries." (MoESP, p. 48) Fortunately, the teacher's decision to migrate is not influenced only by opportunities abroad. Unfortunately, the Guyana's domestic factors appear to be pushing high-skilled workers out of the country.

The large-scale emigration of teachers, which reflected a larger trend of migration out of Guyana, did not begin with a sudden increase in opportunity abroad. If that were the case, we would expect to see an equally significant outflow from other Caribbean countries. In reality, Guyana's emigration was dramatic and unique. The history of Guyanese migration is reflected in US immigration statistics. (See Figure 14)

Figure 14
Permanent US Residence Granted each Decade: Caribbean and the World
as a Percent of 1930s Level



Source: US Dept of Homeland Security/INS Data (2007)

Guyanese were granted permanent legal resident status in the US at a rate nearly 600 times higher in the 1990s than in the 1930s. This compares with the rest of the Caribbean and world, which were only 56 and 14 times higher, respectively, over the same period. And Guyana's rate of increase was 3 times faster than Jamaica's (which has comparable per capita income) since the 1950s. Remarkably, Guyana's migration rate to the US (shown here) *underestimates* its overall rate of migration: the proportion of Guyana's emigrants that went to the US was lower than the same proportion from other Caribbean countries.

The *pull-factor* of better wages in the US exists for most potential migrants. But there must be a unique *push-factor* specific to Guyana as well. And for teachers, it is likely the push factor that is

dominating. Most of Guyana's teachers are in fact going to other non-OECD countries. According to the national secretary of one youth organization,

> It now appears that the governments of Botswana, the Bahamas, Turks and Caicos and others seem to have as part of their yearly education programme the recruitment of Guyanese teachers. This has probably led to the USA authorities being encouraged to do the same. (Stabroek News, January 24, 2002)

The migration of teachers appears to be a function of conditions at home as much as opportunity abroad. Gafar offers some variables that enter that function. There has been an "exodus of teachers because of low pay, shortages of school books, stationary and equipment, dilapidated school buildings and the general deterioration in living standards" (Gafar 2003, p. 222)

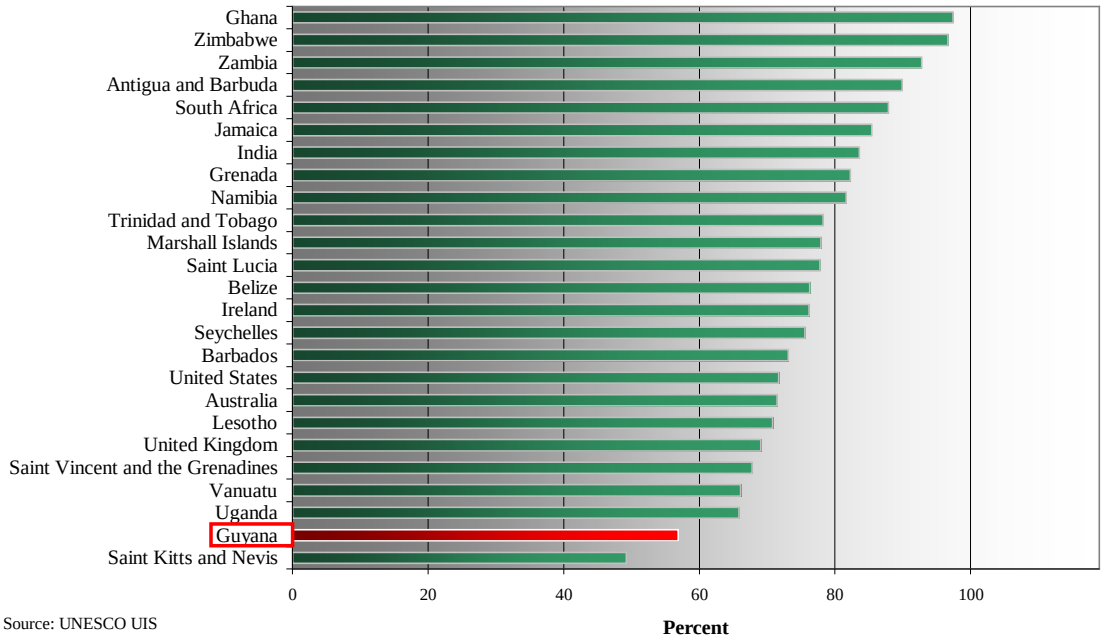
Teacher Salaries

Teacher salaries are particularly poor in Guyana. As a percent of education expenditure and government expenditure, Guyana spends less on teacher salaries than most other English-speaking countries. (See Figure 15 and Figure 16).

Figure 15

Salaries as a Percent of Total Education Expenditure

English-Speaking Countries (2000-2005 average)

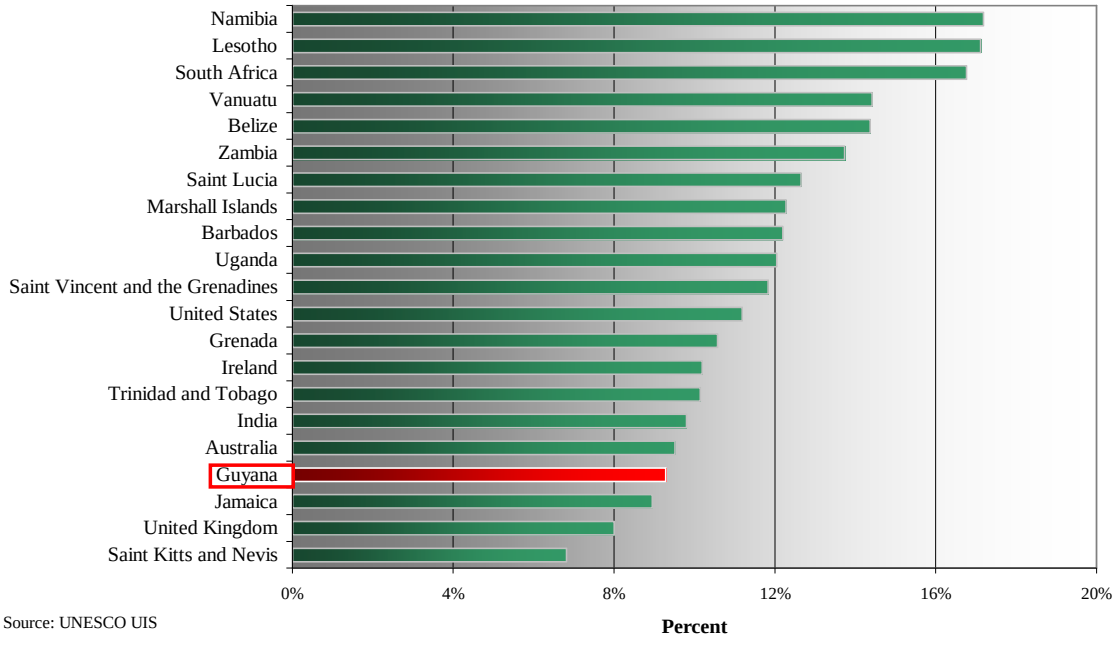


Source: UNESCO UIS

Figure 16

Salaries as a Percent of Total Government Expenditure

English-Speaking Countries (2000-2005 average)



Source: UNESCO UIS

Given that the teachers are consuming such small portions of both education and total government budgets, it seems entirely feasible to increase their salaries, and by a significant margin. The Ministry of Education, while conceding the importance of the salary issue, claimed its ability to do anything was also limited by other factors.

> In spite of substantial increases in recent years, teacher salaries continue to be a disincentive to encouraging people to enter and/or remain in the profession …The issue of teacher compensation…remains a challenge, as the level of teacher salaries cannot be totally divorced from the level of salaries in the rest of the public sector. (MoESP, p. 48)

It is understandable that there may be political economy constraints. And the problem of migration is widespread, extending to high-skilled workers beyond the teaching profession. But to tie the salaries of teachers to other public servants is to deny the fundamental problem of teacher migration. It is unlikely that other countries court Guyana's public servants with the same fervor with which they are recruiting its teachers.

The ministry has tried circumventing its political limitations by offering other non-monetary incentives, such as housing subsidies in the form of free land and loans. (MoESP, p.48) If increasing salaries is not possible, these alternative rewards are certainly worth considering. But the Guyana Teachers' Union (GTU), which is responsible for negotiating the salary on behalf of the teachers, does not consider this sufficient. In its 2005 salary negotiations, "the GTU said that while the union embraced the discussions of non-salary issues, the most critical issue at this time was salaries where all teachers would benefit. The union said non-salary issues would only benefit some of the teachers at different times." (Stabroek News, October 28th 2005)

In 2005, they agreed to a 7 percent salary hike for all teachers. In late 2006, they agreed to a "five-year comprehensive wage package agreement for teachers across the board." It included:

- A 5 percent per annum across-the-board increase for all categories of teachers
- A 1 percent of the wage bill as a performance based increment per annum for eligible teachers
- Increased remuneration for teachers who have improved their qualifications
- An annual clothing allowance for teachers of $6,000 per teacher
- One-off duty free concessions for vehicles for 100 Head Teachers per year
- A housing revolving fund of $40M per year for 2006-2010, that is, $200M by 2010 to facilitate construction of houses for teachers

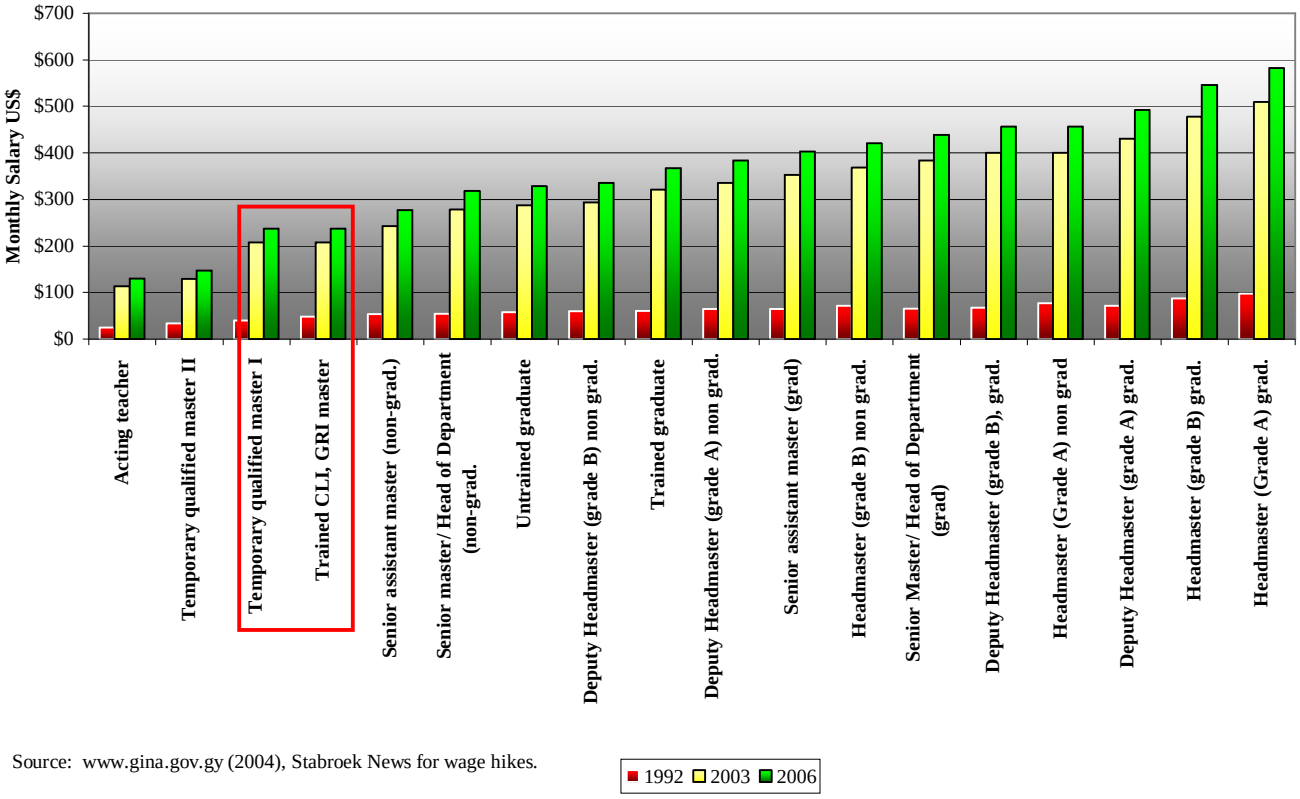
(GINA, October 11, 2006)

According to MoE Minister Baksh, it was a "landmark agreement. We are hoping that this would impact on the reduction of teacher migration." (GINA, October 11, 2006) The salary aspect, however, will likely only exacerbate the problem of retaining teachers. Five percent per year is hardly a raise when inflation has averaged 6 percent per year for the previous decade, and the Central Bank of Guyana was expecting a rate of inflation of 8.2 percent. Teachers were furious with the GTU for agreeing to such a deal. (Stabroek News, November 22nd 2006)

Salary Structure

Beyond the *level* of teachers' salary, the Ministry should consider altering its *structure*. Figure 17 shows the monthly salary for Guyana's teachers at different levels of training, qualification and experience.

Figure 17
Teacher Monthly Salaries in 1992, 2003 and 2006
by Training/Experience Level



Source: www.gina.gov.gy (2004), Stabroek News for wage hikes.

Inside the red box is the salary for two teachers at the same level of experience, one trained and the other untrained. There is no difference between the two. While there are some long-run growth opportunities for certified teachers that are unavailable to untrained teachers, there is very little immediate incentive to get training. If the MoE is limited in its ability to pay all teachers more than their public service counterparts, perhaps it could at least increase the premium to reward trained teachers.

An obvious concern is whether the teachers' union would be amenable to increased inequality within its ranks, particularly since it would "benefit some of the teachers at different times." It turns out this concern is unwarranted. In its 2005 salary negotiations, the GTU was advocating for graduated salary increases – 20% for senior masters/mistresses and head teachers, 15% for

trained teachers and 10% for untrained teachers. (Stabroek News, November 18th 2005) Increasing the "training premium" is therefore a valid option.

Non-Economic Incentives

It is important to recognize that when a teacher leaves the country, she is doing more than trading in a low domestic salary for an expected higher foreign salary. She is making a decision as to her expected happiness. Some of the variables that make her happy, such as climate, location, and culture, are outside the influence of her employer. But others are intricately tied to her career. Umansky and Vegas (2005) provide a wide-ranging list incentives to which she might respond. Included in this list is:

1) Intrinsic Motivation
2) Social Prestige and Recognition
3) Salary differentials and other monetary benefits
4) Job Stability
5) Pensions and other non-salary benefits
6) Professional growth
7) Job characteristics
8) Sense of Mastery at one's job
9) Need to satisfy clients and respond to supervisors

Worth highlighting are the incentives of a) prestige/recognition, b) professional growth, and c) job characteristics. Addressing each of these in turn:

a) It is difficult for the teacher to feel recognized and appreciated if she is paid less than her counterparts in the private sector and abroad.
b) With a salary structure that provides marginal improvements in pay with each added level of qualification and each year of experience, it is hard for her to believe that she is developing professionally.
c) Going to work every day in a dilapidated classroom without the proper resources can be particularly demoralizing.

The first two issues can be addressed by restructuring salaries such that each ascending level of qualification is associated with a higher premium. (Even if the untrained teachers don't see a salary increase, we are concerned here with retaining the *trained* teachers.) Addressing the first

two items may take resources away from the third. In the prior subsection, however, it appeared the constraint was more political than financial. If the Ministry has funds, it could try to boost job satisfaction by allocating resources to infrastructure improvements. Given that working conditions were identified as a major reason why teachers were leaving (MoESP, Fernandez), investments in supplies, infrastructure, and even cosmetic improvements could make the job considerably more appealing.

There is reason to question whether a training premium is enough to slow the flow of migration. It does little to narrow the gap between foreign and domestic teacher salaries. But the entire gap need not be closed. There are economic fixed costs to leaving (establishing residence elsewhere, moving, and higher costs of living.) And when teachers weigh their options, they consider the non-economic costs and benefits as well. The non-economic costs may include anxiety of being alone in a new country, separation from family and friends. The benefits include excitement and added prestige. The salary premium may be enough to close the domestic-foreign gap when combining both economic and non-economic considerations. Furthermore, the premium may strengthen some of the non-economic incentives at home (e.g. prestige and recognition, confidence in professional growth, and a sense of mastery).

VII. CONCLUSION

Alter the salary structure and boost working conditions

The proposal of paying trained teachers more does not rest of the presupposition that training adds value. It reduces the outflow of trained teachers without negatively impacting the inflow of potential trainees. And if it reduces the outflow of “trained” teachers, it will reduce the outflow of “good” teachers. Furthermore, altering the salary structure, rather increasing the base, and improving working conditions (through infrastructure investments) could improve the job

satisfaction of trained teachers without stretching the political constraints of salary-parity within the public sector.

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IX. APPENDIX

Table 5

Indicators and Data Source

Indicator	Source	Measure	Level	Years Available
SSEE Exams				
Math	NCERD	Mean	School	2001,2,3,4,5
English	NCERD	Mean	School	2001,2,3,4,5
Science	NCERD	Mean	School	2001,2,3,4,5
Social Studies	NCERD	Mean	School	2001,2,3,4,5
Teacher Training				
Graduate				
Trained	MoE	Number	School	2003,4,5
Untrained	MoE	Number	School	2003,4,5
Qualified				
Trained	MoE	Number	School	2003,4,5
Untrained	MoE	Number	School	2003,4,5
Unqualified	MoE	Number	School	2003,4,5
Enrollment	MoE	Number	School	2003,4,5
Teachers				
All Teachers	MoE	Number	School	2003,4,5
Trained Teachers	MoE	Number	School	2003,4,5
Attendance	MoE	Average	School	2003,4,5
Repetition Rate	MoE	Number	School	2003,4,5
Poverty Index (EDMI)	Census	Index Score	Community	2000
Racial Composition				
East Indian	Census	Proportion	Community	2000
Black	Census	Proportion	Community	2000
Amerindian	Census	Proportion	Community	2000

Table 6
Secondary School Entrance Examination Scores, 2003, 4 and 5

	Fixed Effects at School Level								Fixed Effects at Community Level			
	All Regions				Coastal Regions (Excluding Deep Interior: Regions 7,8,9)				All Regions			
	Math	**English**	**Science**	**Social Studies**	**Math**	**English**	**Science**	**Social Studies**	**Math**	**English**	**Science**	**Social Studies**
Percent of total teachers												
that are trained	0.166	0.084	0.355	0.193	**0.320**	**0.353**	**0.519**	**0.289**	**0.580**	**0.625**	**0.657**	**0.555**
	(0.129)	(0.138)	(0.142) **	(0.139)	(0.172) *	(0.185) *	(0.191) **	(0.186)	(0.092) **	(0.094) **	(0.098) **	(0.094) **
	1.289	0.607	2.496	1.393	1.854	1.907	2.724	1.555	6.280	6.666	6.714	5.879
% Trained x Hinterlands					**-0.345**	**-0.616**	**-0.372**	**-0.219**				
					(0.260)	(0.280) **	(0.288)	(0.281)				
					-1.327	-2.203	-1.291	-0.778				
Percent of total teachers												
that are graduates	-0.184	0.096	-0.084	-0.637	-0.208	0.041	-0.112	-0.653	**-1.194**	**-0.943**	**-0.715**	**-1.001**
	(0.470)	(0.505)	(0.520)	(0.507)	(0.469)	(0.504)	(0.519)	(0.507)	(0.389) **	(0.393) **	(0.411) *	(0.397) **
Student-teacher ratio	-0.001	-0.003	-0.002	-0.003	-0.001	-0.003	-0.002	-0.002	**-0.003**	**-0.004**	**-0.005**	**-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002) **	(0.002) **	(0.002) **
Student enrollment												
(Total)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.001**	**0.001**	**0.001**	**0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000) **	(0.000) **	(0.000) **	(0.000) **
y2004	-0.005	-0.024	-0.004	0.007	-0.006	-0.021	-0.002	0.007	-0.006	-0.018	-0.008	-0.003
	(0.034)	(0.037)	(0.038)	(0.037)	(0.034)	(0.037)	(0.038)	(0.037)	(0.047)	(0.048)	(0.050)	(0.048)
y2005	-0.028	-0.030	-0.037	-0.029	-0.037	-0.037	-0.046	-0.035	-0.035	-0.046	**-0.047**	-0.047
	(0.034)	(0.036)	(0.038)	(0.037)	(0.034)	(0.037)	(0.038)	(0.037)	(0.047)	(0.048)	(0.050)	(0.048)
_cons	-0.103	0.073	-0.197	-0.141	-0.154	0.020	-0.227	-0.157	-0.444	-0.422	-0.419	-0.385
	(0.177)	(0.190)	(0.196)	(0.191)	(0.187)	(0.201)	(0.207)	(0.201)	(0.071) **	(0.072) **	(0.075) **	(0.072) **
N	1223	1220	1221	1223	1217	1214	1215	1217	1223	1220	1221	1223
R2	0.004	0.005	0.010	0.007	0.006	0.012	0.013	0.008	0.089	0.086	0.085	0.082

Table 7

What determines whether teachers are leaving

	Change in Percent of Teachers that are					
	Trained [1]		**Graduates** [2]		**Qualfied (Not Trained)** [3]	
Marginality Index	-0.0023		-0.0010		0.0041	
	(0.0043)		(0.0021)		(0.0063)	
Total Number of Teachers	-0.0003		0.0002		-0.0001	
	(0.0004)		(0.0003)		(0.0006)	
Total Number of Teachers in NDC	0.0000		0.0000		0.0001	
	(0.0000)		(0.0000)		(0.0000)	*
Student Enrollment	0.0000		0.0000		0.0000	
	(0.0000)		(0.0000)		(0.0000)	
Schools in NDC	-0.0001		-0.0001		0.0002	
	(0.0001)		(0.0000)	*	(0.0001)	
% teachers that are trained/graduates/qualified	-0.1568		-0.3360		-0.3451	
	(0.0197)	**	(0.0718)	**	(0.0331)	**
% teachers that are trained/graduates/qualified in NDC	-0.0249		-0.0908		-0.2918	
	(0.0413)		(0.1495)		(0.0897)	**
% teachers that are trained/graduates/qualified in neighboring schools in NDC	0.0015		0.0555		-0.1521	
	(0.0411)		(0.1363)		(0.0861)	*

[1] Trained teachers are those who have received a teaching certificate from either the main teaching college (CPCE) or the University of Guyana

[2] Graduates are those who have graduated the University of Guyana, regardless of whether it was an education degree