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Globalization and Human Resource Development in the Caribbean

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ABSTRACT: The paper looks specifically at the challenges facing human resource development in the Caribbean as a result of globalisation. The study begins by reviewing the performance of Caribbean education and the training of the labour force vis-à-vis a set of comparator countries – the East Asian NIEs; the new Tigers (Malaysia, Thailand, Indonesia and the Philippines); Japan, UK and US. The conclusion is that the major difference in the performance with comparator countries lies in the inadequacy of tertiary education. This is reflected in the structure of the Caribbean labour force which has large proportions of workers trained only up to primary and secondary levels and a very small proportion up to the tertiary level. In comparator countries, the structure of the labour force is generally more normally distributed. The second section of the paper addresses the need for labour force retraining and particularly the need to develop core competencies (technical and behavioural skills) as a means of increasing international competitiveness.

The third section reviews the issue of technological development in the Caribbean vis-à-vis comparator countries using as indicators the level of manufactured exports, particularly high-technology exports and a number of indicators of ICT development. The conclusion is that relative to comparator countries, the Caribbean has stagnated technologically and needs to develop a vibrant technology development policy, in which tertiary education will have an important role to play in the provision of the necessary mathematical and scientific skills, the development of R and D and closer cooperation with industry in pursuit of technological development. The last two sections review the possible contribution of ICTs in helping to accelerate training in the Caribbean and some related issues. The last section reviews the critical issue of financing the increased level of training that will be required by analyzing the policies of the High Performing Asian Economies.

The presentation will use the findings of this paper to focus on the critical areas of research needed such as – the need to development a much more comprehensive database in the education sector to facilitate policy formulation and evaluation etc.

INTRODUCTION

Since Barro (1991) integrated education variables into his growth model and found them significant, education has become a standard inclusion in empirical models explaining growth performance (Kormendi and Meguire, 1985; Landau, 1986; Easterly and Rebelo, 1993). In the empirical literature, education generally has had a significant impact on growth. In analyses of the outstanding economic achievements of the East Asian Newly Industrialised Economies (NIEs), education receives a prominent place. The theoretical and empirical literature, of course,

goes beyond the growth impact to include certain externalities such as a more stable society, improved family health, associated particularly with the education of women, reduced fertility of women because of the increased opportunity costs of child bearing and hence less population pressure etc. Accordingly, in the growth and the development literature, the question no longer is whether to educate or not but how many to educate, in what areas, within what time and at what cost?

Given the foregoing and the recent economic performance of the Caribbean, the time is opportune for an evaluation of the education sector in an attempt to answer the above questions. The study begins with a review of the performance of the sector *vis-à-vis* other developing and developed countries, given the consensus that education is, in the knowledge-based economy of today, a major determinant of competitiveness. The second part of the study reviews the issue of the skills upgrading of the labour force and the redefinition of core skills, an issue which other countries such as, for example, Australia and Singapore, are currently addressing. The third section of the paper looks at the important issue of technological development and the contribution of education. The fourth section analyses the important role of Information and Communication Technologies (ICTs) in education. The fifth section explores the funding and other related issues with regard to the new thrust in education while the sixth section concludes.

A. The Performance of Caribbean Education *vis-à-vis* Other Countries

The critical question is: Where is the Caribbean in relation to other countries as regards the performance of the education sector? To a significant degree, the answer determines the growth and development performance of the Region *vis-à-vis* other countries. The analysis in this section compares the performance of Caribbean education with that of the East Asian NIEs (Hong Kong, the Republic of Korea, Singapore, Taiwan); the new Asian tigers or emerging East Asian NIEs (Malaysia, Thailand, Indonesia, the Philippines), Japan, the United Kingdom (UK) and the United States of America (US). The Caribbean countries chosen for this analysis are Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago.

The approach in this section is to review the performance of the Caribbean *vis-à-vis* the comparator countries using several indicators of education sector performance. These are:

(i) the ratio of total public sector expenditure on education to GDP;

(ii) total public sector expenditure on education as a proportion of total government expenditure;

(iii) the percentage expenditure of per capita income at the primary, secondary and tertiary levels;

(iv) the average gross enrolment at the secondary and tertiary levels;

(v) the average net enrolment at the secondary and tertiary levels; and

(vi) a review of the composition of the labour force in terms of education attainment at the primary, secondary and tertiary levels. There are clearly gaps in the data

which for reasons of availability focuses mainly on the period 1999 to 2004. Nevertheless, the data is adequate to permit a fairly good picture of where the Caribbean is in relation to the comparator countries.

Table 1 compares total public spending on education as a percentage of GDP. The average for the period 1999 to 2004 for the group of Caribbean countries was 6.5% of GDP. If one excludes St. Vincent and the Grenadines in which expenditure estimates during the period can be considered surprisingly large, the average was 5.6%. This was larger than the estimates of the three East Asian NIEs (4.1%) and of the three developed countries (4.6%) but somewhat smaller than the average for Malaysia and Thailand. In the absence of data on private sector spending, the conclusion can be that, given the public sector expenditure levels of comparator countries, Caribbean public sector spending on the education sector has been adequate, all other things being equal. This issue is discussed in greater depth in the section on education funding and the experience of the high-performing Asian economies

Table 1: Total Public Spending on Education
(% of GDP)

	1991	2001	Average 1999-04
Antigua and Barbuda	..	..	3.5
Bahamas, The	3.7	..	3.7
Barbados	7.8	7.1	6.7
Belize	4.6	5.8	5.3
Dominica	..	..	5.0
Grenada	4.9	..	5.2
Guyana	2.2	8.6	7.8
Haiti	1.4	..	
Jamaica	4.5	6.6	5.9
St. Kitts and Nevis	2.7	8.0	5.3
St. Lucia	..	7.8	6.8
St. Vincent and the Grenadines	13.8	17.0	16.9
Trinidad and Tobago	4.1	4.2	4.0
Average	**5.0**	**8.1**	**6.5**
Hong Kong, China	2.8	4.0	4.3
Korea, Rep.	3.8	4.3	4.1
Singapore	3.1	3.7	3.7
Average	**3.2**	**4.0**	**4.1**
Thailand	3.1	5.0	4.9
Malaysia	5.1	7.9	7.2
Average	**4.1**	**6.5**	**6.1**
Japan	..	3.6	3.6
United Kingdom	4.8	4.7	5.0

US	5.1	5.7	5.6
Average	**4.9**	**4.7**	**4.6**

Source: World Bank, World Development Indicators

Interestingly enough, however, the ratio of public spending on education to total Government expenditure, which can be interpreted as an indicator of the importance Governments attach to education, was lower in the Caribbean than all the comparator countries except the developed countries (Table 2). In the case of the East Asian NIEs, the difference was approximately two percentage points but substantially larger, almost ten percentage points, in the case of the Malaysia and Thailand.

Table 2: Total Public Spending on Education
(% of Government Expenditure)

	1991	2001	Average 1999-2004
Bahamas, The	16.3	..	19.7
Barbados	22.2	18.5	16.5
Belize	18.5	20.9	18.5
Grenada	11.9	..	12.9
Guyana	6.5	18.4	18.4
Haiti	20.0	..	
Jamaica	12.8	11.1	10.9
St. Kitts and Nevis	11.6	20.1	13.7
St. Lucia	..	..	21.3
St. Vincent and the Grenadines	13.8	17.0	16.9
Trinidad and Tobago	12.4	13.4	14.1
Average	**14.6**	**17.0**	**16.3**
Hong Kong, China	17.4	22.9	22.8
Korea, Rep.	25.6	14.7	14.2
Singapore	18.2	..	
Average	**20.4**	**18.8**	**18.5**
Malaysia	18.0	20.0	24.0
Thailand	20.0	28.3	28.9
Average	**19.0**	**24.1**	**26.5**
Japan		10.5	10.1
UK		11.4	11.4
US		17.1	17.1
Average		**13.0**	**12.9**

Source: World Bank, World Development Indicators

Table 3: Expenditure Per Student (% of GDP per capita): Average 1999-2004

	Primary	Secondary	Tertiary
Barbados	20.1	28.4	61.2
Belize	15.2	15.4	337.8
Grenada	14.2	11.6	
Guyana	18.2	21.3	37.1
Jamaica	15.1	24.3	67.1
St. Kitts and Nevis	8.0	18.0	
St. Lucia	21.5	22.1	
St. Vincent and the Grenadines	26.4	24.7	
Trinidad and Tobago	14.0	14.7	114.1
Average	**17.0**	**20.1**	**123.5**
Hong Kong	14.0	19.6	64.7
South Korea	17.5	19.2	7.5
Average	**15.6**	**19.4**	**36.1**
Thailand	15.8	26.2	30.1
Malaysia	17.2	12.2	98.4
Average	**16.5**	**19.2**	**64.3**
Japan	21.7	21.2	17.2
UK	15.7	16.0	25.9
US	20.4	24.2	27.9
Average	**19.2**	**20.5**	**23.7**

Source: World Bank, World Development Indicators

Similarly instructive is comparison of the percentage expenditure of per capita income on students at the primary, secondary and tertiary levels, particularly the latter two. In the case of primary school expenditure, average Caribbean expenditure as a percentage of per capita income at 17% was more than all the other comparator countries except the group of developed countries. The UK average, however, was lower than that for the Caribbean. Caribbean expenditure per student at the secondary level also compared quite favourably. At an average of 20.1%, it was higher than the average for Hong Kong, the Republic of Korea and Malaysia and also close to the MDC average of 20.5%. The average for Malaysia and Thailand was approximately one percentage point below that of the Caribbean. At the tertiary level, where the data is particularly sketchy, the Caribbean average for the five countries for which data is available, was substantially higher than that of the East Asian NIEs, Malaysia and Thailand and also the group of developed countries. Without Belize, which had the highest figures for the Caribbean group, the estimate for the tertiary level falls to 70%, somewhat above the average for Thailand and Malaysia and still significantly above the average of the East Asian NIEs and the MDCs. Once again, the analysis suggests that from the point of view of international comparability, the problem of Caribbean education lies not in the level of public sector expenditure.

Table 4: School Enrollment, Secondary
(% gross)

	1991	2003	2004	Average 1999-04
Bahamas, The	..	86.7	80.1	101.4
Barbados	..	105.8	110.1	104.3
Belize	43.9	77.7	85.3	73.2
Dominica	..	110.3	106.6	100.8
Grenada	..	110.3	100.7	96.6
Guyana	78.7	89.8		89.3
Haiti	20.6			
Jamaica	65.3	83.7	88.1	85.9
St. Kitts and Nevis	85.1	103.2	109.6	111.8
St. Lucia	52.8	82.2	81.3	77.2
St. Vincent and the Grenadines	58.4	70.4	77.6	71.4
Suriname	57.6	73.2		73.0
Trinidad and Tobago	80.4	82.3	83.8	81.7
Average	**60.3**	**89.6**	**92.3**	**88.9**
Hong Kong, China	79.6	82.7	84.9	82.6
Korea, Rep.	89.8	90.1	90.9	94.0
Singapore	67.1			
Average	**78.8**	**86.4**	**87.9**	**88.3**
Malaysia	57.1	75.8		70.8
Thailand	30.7	82.5	77.3	81.5
Average	**43.9**	**79.1**	**77.3**	**76.2**
Japan	97.1	102.0	101.6	102.1
UK	88.0	170.1	104.5	154.1
US	91.9	94.5	94.8	94.3
Average	**92.3**	**122.2**	**100.3**	**116.9**

Source: World Bank, World Development Indicators

It is in the area of enrolment that one begins to witness some divergence between the Caribbean and the comparator countries. The average gross enrolment at the secondary level for thirteen Caribbean countries for the period 1999-2004 was 88.9% (Table 4). This is comparable to the average for the three East Asian NIEs – Hong Kong, South Korea and Singapore. It is significantly above the average for Malaysia and Thailand but far below the average of 116.9% for the three MDCs.

Table 5: School Enrollment, Secondary
(% net)

	1999	2000	2001	2002	2003	2004	Average 1999-04
Bahamas, The	..	..	..	77.1	72.1	73.8	74.3
Barbados	92.3	89.6	84.9	86.8	89.8	95.1	89.8
Belize	55.6	58.8	60.1	64.1	68.7	71.4	63.1
Dominica	68.9	75.6	79.2	88.3	90.5	90.4	82.2
Grenada	49.8	55.9	50.1	100.0	75.1	78.2	68.2
Jamaica	82.4	77.2	76.0	75.6	75.0	79.2	77.6
St. Kitts and Nevis	..	..	..	96.0	92.2	98.3	95.5
St. Lucia	61.3	63.8	62.8	62.0	72.7	71.1	65.6
St. Vincent and the Grenadines	..	57.9	60.0	52.7	59.4	62.3	58.4
Suriname	..	..	63.7	63.4	63.2		63.4
Trinidad and Tobago	72.5	70.0	72.1	70.4	72.0	71.9	71.5
Average	**69.0**	**68.6**	**67.7**	**76.0**	**75.5**	**79.2**	**72.7**
Hong Kong, China	..	..	73.6	74.5	75.7	77.7	75.4
Korea, Rep.	96.6	94.5	91.0	88.8	87.3	88.3	91.1
Average	**96.6**	**94.5**	**82.3**	**81.6**	**81.5**	**83.0**	**86.6**
Malaysia	68.9	69.1	69.4	69.9	75.5		70.3
Thailand	..	..	82.5	..	82.1	77.4	79.0
Average	**68.9**	**69.1**	**75.9**	**69.9**	**78.8**	**77.4**	**72.9**
Japan	99.4	99.5	99.6	99.7	99.8	99.9	99.6
UK	94.7	94.5	94.6	95.7	95.5	94.9	95.0
US	88.5	86.8	87.4	85.6	88.7	89.7	87.8
Average	**94.2**	**93.6**	**93.8**	**93.7**	**94.7**	**94.8**	**94.1**

Source: World Bank, World Development Indicators

As regards net enrolment, the Caribbean performance was relatively weaker. The average of 72.7% was substantially below the average of Hong Kong and South Korea although it should be pointed out that the Caribbean average was close to that of Hong Kong and that it was the high enrolment ratio of South Korea that made a significant difference (Table 6). In the case of the MDCs, the average collectively and individually was substantially above that of the Caribbean. Only the Barbadian, Dominican and St. Kitts net enrolments approximated those of the MDCs, implying that in several Caribbean countries enrolment levels will have to rise substantially in order to reach what are now emerging as the international norms.

It is at the tertiary level that the difference between the Caribbean and the comparator countries looms very large (Table 6). For the period 1999 to 2004, gross tertiary enrolment for seven Caribbean countries averaged 9.3% compared with an average of 30.6% for Hong Kong and 80.8% for South Korea. In Malaysia and Thailand, the averages were 27.4% and 37.5%, nearly

three and four times that for the Caribbean. Japan, UK and the US averaged 49.7%, 60.4% and 76.4% respectively.

Table 6: School Enrollment, Tertiary
(% gross)

	2004	Average 1999-04
Belize	2.6	2.3
Guyana	9.1	7.6
Jamaica		17.9
St. Lucia	14.4	7.9
Suriname		12.4
Trinidad and Tobago	11.9	7.6
Average	**9.5**	**9.5**
Hong Kong, China	32.1	30.6
Korea, Rep.	88.5	79.3
Average	**60.3**	**55.0**
Malaysia		27.4
Thailand	41.0	37.5
Average	**41.0**	**32.5**
Japan	54.0	49.7
UK	60.1	60.4
US	82.4	76.4
Average	**65.5**	**62.2**

Source: World Bank, World Development Indicators

Table 7: Labour Force with Primary, Secondary and Tertiary Education, Average 1991-2001, % of Total

	Primary	Secondary	Tertiary
Bahamas		56.4	17.1
Barbados		64.5	12.5
Belize		15.9	10.4
Dominica		17.2	10.1
St. Lucia	66.9	19.4	8.1
St. Vincent and the Grenadines	59.7	33.0	
Suriname		60.0	4.1
Trinidad and Tobago	41.7	51.5	6.0
Average	**56.1**	**39.7**	**9.8**
Korea,Rep.	16.2	42.6	20.2

Singapore	24.0	28.8	33.0
Average	**20.1**	**35.7**	**26.6**
Japan	20.1	49.1	30.8
UK	20.9	46.5	24.1
Average	**20.5**	**47.8**	**27.5**

Source: World Bank, World Development Indicators

Emerging from the analysis is a twofold challenge for the Caribbean:

(i) the need to achieve higher enrolment (and throughput levels) at the secondary and tertiary levels, and particularly the latter; and

(ii) the need to achieve education sector reform to deliver the increased output without significant increases in expenditure, given fiscal constraints.

The strategies in comparator countries that permitted significantly higher outturns at the secondary and tertiary levels with comparable levels of public sector resource use as in the Caribbean are worthy of consideration.

The output of the education system in the various countries clearly has had an impact on the skills mix of the labour force and on the ability of countries to compete internationally. In this regard, a review of the education levels of the labour force in the Caribbean and in comparator countries is very instructive. For example, in the three Caribbean countries for which data are available (St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago), an average of 53.8% of the labour force had only primary education, ranging from 41.7% for Trinidad and Tobago for the period 1991-99 to 66.9% for St. Lucia (Table 7). On the other hand, the averages for South Korea and Singapore for the period 1991 to 2001 were substantially less, 16.2% and 24.0% respectively. For Japan and the UK, the averages were 20.1% and 20.9% (1994-2001) respectively.

As regards secondary education, the region fared somewhat better with an average of 41% (1991-99) compared with 42.6% and 28.8% for South Korea and Singapore (1991-2001) respectively. For Japan and the UK, the averages were 49.1% and 46.5% (1994-2001). The international norm for secondary level training at this time, at least for the successful countries, seems to hover between 40% and 50%.

At the tertiary level, one sees again a significant divergence between the performance of the Caribbean and the comparator countries. For the Caribbean the average of the labour force with tertiary level training during 1991-1999 was 10.5%. This was approximately half that of the South Korean average of 20.2% and approximately one third of the Singapore average of 33.0% (1991-2001). In the case of the UK and Japan, the averages were 24.1% and 30.8% (1994-2001).

The foregoing comparative estimates help to define the position of the Caribbean in terms of the international competitiveness of the labour force and indicate the need to embark on strategies to close the gaps in labour force skills particularly at the secondary and tertiary levels.

The Caribbean needs to change the structure of the labour force by training a significant portion beyond the primary to the secondary level, an estimated 20.0%, so as to approximate the norms of more successful countries in terms of the proportion of the labour force trained up to the primary level. It also has to make similarly significant attempts to close the gap at the tertiary level. Indications are that the Caribbean will need eventually to treble the level of output at the tertiary level. A sustained effort over the next decade can lead to a substantial change in the skills profile of the labour force, an absolute necessity if the Caribbean is to regain some of the competitiveness that it has lost to others. These are major challenges and will require additional resources and a significant reordering of current spending priorities in the education sector.

While the data above indicate the direction which the Caribbean should take in terms of upgrading the labour force, recent developments in labour force training also indicate movement towards greater focus on specific skills, both technical and behavioural, needed for increased productivity and international competitiveness. In the literature, these are generally referred to as critical enabling skills or core competencies. Technical skills by themselves are no longer considered adequate. The workplace also requires certain behavioural skills deemed necessary for effective and efficient fulfilment of a task. If the Caribbean is to close the performance gap, this implies retraining of the current labour force and new perspectives and strategies of training at the primary, secondary and tertiary levels.

B. Skills Upgrading of the Caribbean Labour Force

A skilled workforce is necessary to enhance innovation activity in the Region together with adoption and adaptation of new technologies, critical to increased regional competitiveness and improved economic performance. It is a prerequisite for regional competitiveness in markets that require products of increasingly higher quality. Increased training of the labour force would make the Caribbean Region more competitive as a place for international investment through reduced start-up costs and improved availability of skills. It would also enhance the flexibility of the workforce, facilitating quicker movement from sunset to sunrise industries, thereby reducing the economic and social costs of adjustment. Additionally, given the small size of regional economies, high transportation and other infrastructure costs, indications are that the Region's comparative advantage lies mainly in the service sector which is generally skills intensive.

In addition to increased productivity, international competitiveness and enhanced economic performance, skills enhancement of the labour force has some other important benefits. These include:

(i) increased job opportunities as a result of more vibrant economic activity leading potentially to a decline in regional poverty; and

(ii) development of a better targeted education system as a result of improved knowledge of the competency requirements of an internationally competitive labour force.

Efforts to improve the skills of the labour force within the Region, however, must include certain vital components. Firstly, the new training initiatives must focus substantially on the issue of relevance if efforts are to be effective and resources not wasted. Increased training must be informed by market demand to ensure employability and minimise resource wastage and

leakage of skilled labour to other economies. This means being constantly aware of the skills requirements of the economy. Policy makers, educators, the private sector and members of the workforce must be able to update themselves constantly on the changing demands of the market place. Initiatives in this regard must be institutionalised with the inclusion of important stakeholders (government, private sector, unions) to ensure that this is so. Collaboration in the establishment of a regional labour market information system, of regional institutions for evaluating and monitoring labour force training must be critical components of the CSME and of the Region's response to globalisation.

Also important will be the need to ensure an environment that is conducive to increased investment by all stakeholders in the upgrading of the labour force. In this regard, government policies (provision of subsidies, tax credit to companies for training etc.) and legislation (for example, minimum mandatory training of members of the labour force) have a very important role to play. This, of course, is in addition to the need for economic policies that lead to increased demand and rewards for the additional training.

Thirdly, the training system must be dynamic, that is, flexible enough to respond to the changing demands of the marketplace since old jobs are being displaced and new job opportunities are being created continuously. This will imply, for example, a change in emphasis within current modes of training towards a more activist approach to human resource development (HRD). For example, greater emphasis on short courses geared towards development of specific sectors, such as the informatics industry or other niches in the outsourcing industry, may become increasingly necessary. In this regard community colleges, polytechnics and other institutes will likely have a much more significant role to play as has been the case in East Asia. In-house training by firms is also generally regarded as one of the most important sources of skills enhancement, given the tight link with market demand.

Additionally, enhanced flexibility requires that the labour force has an education base that enables it to be internationally competitive and also facilitates quick movement into new types of work as opportunities emerge. Towards this end, the Region will have to define key competencies or critical enabling skills that members of the workforce should have as has been done, for example, in Australia and Singapore. Among these would be a high level of competence in the use of ICT, given its centrality in the new economic environment. (Ideally also, ICT itself should as much as possible be used in the training process so as to maximise effectiveness and efficiency. Current efforts to upgrade labour force skills place considerable emphasis on learner-centered training. In this regard, ICTs have a significant role to play). It is also now generally accepted that beneficial participation in the new international economy requires greater knowledge of mathematics, science and technology. These subject areas therefore must be more fully integrated into the education curricula at all levels and greater numbers of students must gain mastery in the relevant disciplines.

The abovementioned core competencies of current and future graduates of the education system apply with added force to those who are already in the labour force. The broader definition of core competencies, of course, goes beyond technical skills to include behavioural characteristics such as interpersonal and leadership skills, innovativeness, sensitivity to customer concerns, self-confidence, the ability to think analytically etc. Core competencies are today considered key to international competitiveness. For example, Australia has included among its core competencies, the ability to use mathematical ideas and techniques and technology to

diagnose and solve problems. Also included are language and communications skills; problem solving; personal and interpersonal skills; the ability to work in teams; the ability to collect, organise and analyse ideas and information.

The Caribbean must ensure that the current labour force has ample opportunity and resources to upgrade its skills. In fact, even the East Asian NIEs (Republic of Korea, Taiwan, Singapore and Hong Kong) and other successful Asian economies (for example, Malaysia, Thailand, Indonesia) are now retooling their workforce in the aftermath of the Asian financial crisis in order to increase the competitiveness of their economies. Very important is the recognition by even these successful economies of the need for continuous training and upgrading of the labour force, a vital lesson for the Caribbean. Of course, in the attempt to upgrade and broaden current skills levels, the Region also needs to institute legal and other initiatives to ensure that all members of the labour force have equitable access to the increased training available so as to minimise the possibility of further marginalisation of vulnerable groups (women, youth, disabled, poor, unemployed etc.) with the deepening of the globalisation process. The resources required for the upgrading of skills will likely be very large and require substantial support of all stakeholders and also external resource inflows. In addition to an expanded availability of resources, increased cost effectiveness will be of extreme importance. In this regard, regional collaboration in various areas can make a significant difference.

C. The Importance of Technology and the Role of Education

Given the importance of technology in the current globalisation process and specifically its contribution to enhanced competitiveness, it is vital that the Caribbean be fully aware of its competitive position technologically *vis-à-vis* other countries. In order to facilitate this analysis, the study uses the approach of Lall (2000, 2001) coupled with various indicators of ICT development, given its importance in the New Economy. In his study of the comparative technological development of countries, Lall (2000) focused on the export sector and specifically, the level of manufactured and high-technology exports. Lall argued, quite correctly, that export structures have implications for growth and development. In his review of the pattern of world trade over the period 1985 to 1998, he found that growth in low-technology, low-skill, labour-intensive products (such as, for example, textiles, clothing, footwear, toys, sports and travel goods) was the lowest and that growth in high-technology products (for example, electronics, pharmaceuticals, semi-conductors, precision instruments) was the highest. The latter, he found, explained to a large extent the dynamic growth of the East Asian NIEs. Lall argued that the dynamism of manufactured exports is an indicator of the strength and transformative power of the industrial sector:

> *"In so far as industrialisation remains an engine of development, structural change and technological growth and modernisation, growing manufactured exports are a sign that this engine is working."*[1]

During 1985 to 1998, East Asia accounted for almost 70% of manufactured exports which grew at almost thrice the rate of primary products. Within manufactures, the high-technology component grew fastest. Of the latter, electronics registered the fastest growth. East Asia in 1998

[1] Lall(2000), p.338.

accounted for nearly 90% of all high technology manufacture exports. High-technology products offer:

> *"more scope for applying new scientific knowledge (and stimulating growth). They have larger spillover effects in terms of creating new specialised skills …..Simple technologies tend to have slower growing markets (because of low income elasticities), more limited learning potential, smaller scope for technological upgrading and less spillover to other activities."*[2]

In the context of this discussion on globalisation, however, one of the most important points is that technology plays a significant role in determining comparative advantage and the pattern of trade, a substantial departure from traditional trade theory in which technology plays no part.

As in Section A, the comparator countries used are the East Asian NIEs, the New Tigers, Japan, UK and the US. As indicated in Table 8, reflecting a general lack of competitiveness and of dynamism, the average of manufacture exports as a percentage of merchandise exports declined for the fourteen Caribbean countries during 1990-2005. On the other hand, the average for the two NIEs for which data is available, showed a gradual upward trend over the period. The NIE average has been generally close to twice or more that of the Caribbean. By comparison, the performance of the New East Asian Tigers was even more distinct. The average in 1990 was close to that for the Caribbean. However, while the average for the Caribbean declined, the average level of manufactured exports for the New Tigers climbed steeply, reaching 71.9% in 2005 from an average of 47.6% in 1990. In the case of the group of developed countries, on the other hand, the average for the period was more than 80% and quite stable.

Table 8: Manufacture Exports (% of Merchandise Exports)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Caribbean	46.1	49.4	50.2	43.1	46.6	44.3	42.4	42.1	36.3	47.2	50.5	42.5	41.3	41.7	43.4	41.8
NIEs	81.8	82.3	84.4	85.8	87.7	88.2	87.9	88.5	89.6	90.5	90.5	90.2	90.5	90.6	90.1	88.5
New Tigers	47.6	59.2	55.0	58.9	60.3	59.9	70.6	69.2	72.1	75.4	76.2	75.5	75.2	73.6	65.8	71.9
MDCs	83.2	84.0	77.3	84.1	84.6	84.9	85.3	86.0	86.9	87.1	86.7	86.4	86.5	85.9	83.8	83.5

Source: World Bank, World Development Indicators

Table 9 shows high-technology exports as a percentage of manufactured exports.[3] In this subsector, the performance of the Caribbean vis-à-vis that of the other countries in the sample is even more stark. The Caribbean average was less than 10% and, for the most part, trended downwards. On the other hand, the average for the NIEs for which data is available (Hong Kong and Singapore) was substantially higher, generally more than six times that of the Caribbean, and trended upward. In the case of the New Tigers also the technology gap with the Caribbean, as defined by the average level of high-technology exports, has been substantial, and has widened with the continuing expansion in the former countries. In the case of the group of developed

[2] Lall (2000), p.340, p.343.

[3] The World Bank defines high-technology exports as products with high R and D intensity such as aerospace products, computers, pharmaceuticals, scientific instruments and electrical machinery.

countries, the percentage of high-technology exports remained fairly constant over the period, hovering between 25% and 30%.

Table 9: High-Technology Exports (% of Manufactured Exports)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2001	2002	2003	2004	2005
Caribbean	13.8	7.1	4.7	4.1	5.4	3.1	2.8	3.0	6.6	4.2	5.2	7.0	6.1	7.4	3.2
NIEs	39.7	40.3	28.3	29.9	32.0	35.1	36.1	37.2	39.0	40.8	43.1	43.7	43.1	44.3	45.2
New Tigers	23.1	22.0	23.2	24.4	27.5	34.0	37.2	40.7	43.5	43.5	44.4	44.7	41.9	42.6	32.5
MDCs	27.0	27	29.0	27.9	28.0	28.8	28.6	28.9	29.7	30.5	30.5	29.2	27.0	26.7	27.4

Source: World Bank, World Development Indicators

Two important conclusions emerge from the foregoing analysis. The first is that, using manufacturing sector exports and specifically the level of high-technology manufacturing exports as an indicator, the technological gap between the Caribbean and other countries in the sample widened during the sample period. There are essentially two reasons for this, the relative stagnation in technology development in the Region and the continuing rapid technological development in the comparator countries. The second important conclusion is that Caribbean manufacture exports will decline further unless the Region is willing to make the technological upgrades (human and material) necessary to remain competitive.

Comparison of ICT indicators from the available data to some extent gives an almost similar evaluation of the technological status of the Caribbean. In 2004 international internet bandwidth (bits per person) among the NIEs (Hong Kong and Singapore) was close to eight times that in the Caribbean. In the case of the group of developed countries, the figure was approximately seven times. On the other hand, the comparison with the New Tigers was much more favourable. The average for the Caribbean in 2005 was estimated close to eleven times that of the New Tigers.

In terms of the number of internet users per 1000 of population, the Caribbean average of 243.6 in 2005 was less than half that of the NIEs (Hong Kong and Singapore) but somewhat above that of the New Tigers who had an average of approximately 200.0 if one assumes an insignificant increase in the Philippines in 2005 (Table 10). The number of users of the internet in the Caribbean was less than half that of the group of developed countries which generally ranked higher than the NIEs. As regards the number of personal computers per 1000 of population, the NIEs in 2004 at an average of 608.4 were approximately four and one half times that in the Caribbean with the ratio for the developed countries somewhat higher (4.7 times). The comparison with the New Tigers was somewhat more favourable for the Caribbean where the number of personal computers was close to twice that of the foregoing countries.

Key Elements of a Technology Development Strategy for the Caribbean

Given the foregoing discussion, there is little doubt about the need for the Caribbean Region to forge ahead with the development of a robust technology policy if it is not to remain on the margins of world economic growth and development. Lall (1993) gives a very clear and

persuasive exposition of the importance of technological development in the context of globalisation.

Table 10: Internet Users (per 1000 people)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Antigua	21.6	28.2	34.5	40.6	53.2	65.4	90.3	127.0	174.9	245.7	350.3
Bahamas	9.7	17.6	13.8	23.6	38.1	43.6	55.3	193.5	267.1	291.8	318.8
Barbados	0.1	3.8	7.6	18.9	22.6	37.6	56.2	112.1	372.9	557.9	593.6
Belize	0.5	9.0	13.0	21.0	41.1	60.0	70.0	94.3	109.6	123.9	130.2
Dominica	5.2	11.1	..	27.9	28.0	84.1	126.6	175.9	224.7	286.8	361.1
Grenada	0.0	3.0	10.1	15.0	24.8	40.6	50.7	144.9	181.6	..	..
Guyana	..	0.7	1.4	2.7	40.5	67.2	134.1	167.2	186.9	193.3	213.0
Haiti	..	0.1	..	0.3	0.8	2.5	3.7	9.8	18.1	59.5	70.4
Jamaica	1.1	5.9	7.9	19.6	23.3	30.9	38.4	229.2	304.1	403.9	..
St. Kitts and Nevis	..	20.8	24.5	37.4	47.3	61.0	78.1	214.1	..	..	..
St. Lucia	3.1	6.8	10.0	13.2	19.5	51.3	82.3	..	211.7	338.6	..
St. Vincent and the Grenadines	1.2	4.6	8.8	17.4	26.0	30.2	47.2	51.2	59.4	67.6	84.0
Suriname	1.2	2.4	10.7	17.8	20.3	27.0	33.2	45.4	51.8	67.2	71.2
Trinidad and Tobago	1.6	3.9	11.8	27.4	58.6	77.8	93.1	106.7	117.9	123.0	
Average	**4.1**	**8.4**	**12.8**	**20.2**	**31.7**	**48.5**	**68.5**	**128.6**	**175.4**	**229.9**	**243.6**
NIEs											
Hong Kong	32.5	46.6	104.0	144.7	211.9	278.3	386.8	430.1	472.3	505.6	507.8
Singapore	28.4	81.7	131.8	191.2	240.4	323.6	411.5	503.4	549.6	571.1	..
Average	**30.4**	**64.2**	**117.9**	**167.9**	**226.1**	**301.0**	**399.2**	**466.7**	**511.1**	**538.4**	**507.8**
Indonesia											
Malaysia	1.5	8.6	23.3	68.3	124.5	216.4	270.2	327.1	353.7	396.8	434.6
Philippines	0.3	0.6	1.4	11.3	14.7	20.3	25.9	44.5	49.9	53.9	..
Thailand	0.9	2.3	6.3	8.3	21.4	37.4	57.0	76.7	95.5	109.5	110.3
Average	**0.9**	**3.8**	**10.3**	**29.3**	**53.5**	**91.4**	**117.7**	**149.4**	**166.4**	**186.7**	**272.4**
Japan	15.9	43.7	91.6	134.0	213.7	299.5	384.6	464.7	482.6	502.2	667.5
UK	18.9	41.1	73.7	136.5	212.8	264.5	332.8	421.6	436.8	469.5	473.5
US	93.9	167.0	220.1	306.6	365.5	439.4	500.6	551.4	555.8	630.0	..
Average	**42.9**	**84.0**	**128.5**	**192.4**	**264.0**	**334.5**	**406.0**	**479.2**	**491.7**	**533.9**	**570.5**

World Bank, World Development Indicators

"Differences between countries are explained by differences in their capabilities to master technology, and their policy regimes (including the granting of infant industry protection) that promote national capabilities."[4]

"Competitive advantage in world markets only to a minor extent is determined by factor endowments (in the neoclassical sense of given stocks of labour and capital.) Other factors, related to technological leads and lags, economies of scale and product differentiation and the location decisions of transnational corporations have a far more powerful impact. Much of the empirical research on trade patterns support the neo-technology version of comparative advantage theory."[5]

These are views shared by others such as, for example, Chang and Tsai (2000) and Mytelka (2000). According to Mytelka (2000), "comparative advantage is based less on the statics of comparative advantage than on the dynamics of innovation."[6] This is a view that dates as far back as the German economist, Frederich List (1841) who placed technology at the center of the strategy for catching up with the then leader of the industrial world, England.

This does not imply immediately embarking on massive R&D expenditures in order to develop cutting edge technologies, but rather becoming aggressively engaged, first of all, in the mundane tasks of incremental innovations in current industries and gradual development of regional innovative capability. Innovation here is defined very broadly to include improvement in product quality and processes (including changes in management) across all sectors (agriculture, manufacture, services) rather than exclusively the generation of new products or processes. This incremental process of technological development together with a considerable amount of adaptation and imitation was very much a contributor to the growth of the NIEs in the early stages of their phenomenal economic growth.[7]

Secondly, the Region at this time needs to pursue effective and cost efficient technology transfer strategies[8] that can enhance indigenous technological capability here defined as "the total of technical, managerial and institutional skills and infrastructure enabling the efficient use, adaptation, enhancement and creation of new technology both at the firm and national levels."[9] This can, in part, be achieved through careful selection of imported technologies and modes of transfer (foreign direct investment, equity participation of MNCs, licensing, joint ventures, management contracts, international subcontracting, technical consultancies etc.). The success of these transfers will depend critically on the Region's absorptive capacity which in turn depends substantially on its skills base and its institutional infrastructure as discussed below. The Region should undertake careful evaluation of each transfer as regards the potential contributions to the

[4] Lall(1993), p.105.
[5] Lall (1993), p.104.
[6] Mytelka(2000), p.16.
[7] Mytelka (2004), p.390.
[8] As Wade(2003) notes, however, because of the TRIPS (Trade-Related Aspects of Intellectual Property Rights) and TRIMS (Trade-Related Investment Measures) Agreements, technology transfer has been made more costly and difficult. Some countries are addressing this issue through the development of R&D partnerships.
[9] Wie(2005), p.215.

development of indigenous technological capability.[10] The preferred method of transfer will depend, among other things, on government's technology policy, the sophistication of the imported technology, the speed of technological change and domestic/regional technological capabilities such as, for example, the local supplier and technical service network.[11]

Thirdly, as indicated in the foregoing discussion, development of indigenous technology capability will require, as part of a system of innovation, a number of key institutions. These include training and industrial institutions, technology extension services, laboratories, research centers, quality control centers, especially for MSEs, given their predominance in the Region and their limited capabilities. For purposes of cost effectiveness, the spreading of risks and the boosting of innovation activity, this may require in some cases the development of regional rather than separate national capabilities. A review of the adequacy of the institutional infrastructure at the regional and domestic levels is clearly warranted.

Fourthly, the Region will require formulation of appropriate policies (macroeconomic, domestic competition regime, labour markets, industrial, trade, and other policies) to provide the appropriate incentive framework for technology development. For example, a stable high-growth economy provides substantial impetus to technological investments. So does a competitive environment.

"*The innovation system approach acknowledges the role of policies, whether tacit or explicit, in setting the parameters within which these actors make decisions about innovation…. It recognises that innovation is not the outcome of a unique policy but a set of policies that collectively shape the behaviour of actors"*[12]

Effective public policy will, very importantly, at times require judicious interventions in cases of market failure (such as a lack of required skills, of venture capital,[13] high uncertainty, risk etc). Also, in the context of resource scarcity, this will likely require targeting the development of specific industries as the East Asian NIEs have done so successfully. To facilitate this, several countries (for example, UK, Singapore) have engaged in foresighting (essentially a brainstorming process) to enable identification of the sectors to be targeted for further development. Generally, this exercise has involved a wide cross section of stakeholders (representatives of industry, government, universities etc.), an important strategy for ensuring consensus and buy-in as regards the implementation process.

Fifthly and very importantly, the targeting of specific industries for development (as for example, the semiconductor industry in Taiwan, the steel, shipping and electronics industries in South Korea or the robotics and computer industries in Japan) implies targeted development of the required skills within the education system to ensure their availability in the implementation process. Two very important facts have emerged from the Japanese and East Asian NIE approach to technological development. First, in the early years of their phenomenal growth,

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[10]For an interesting analysis of the contribution of international technology transfer to Indonesia's industrial technology development, see Wie(2005).

[11]For a more comprehensive discussion of the variables impacting on the mode of technology transfer, see Lall (1993).

[12]Mytelka (2004), p.395.

[13]For interesting examples of successful government intervention supporting technological development through the establishment of venture capital, see Weiss (2006), p.93-94.

they placed much emphasis on secondary education, given the relatively low levels of demand for technical skills. However, increasingly, tertiary education in science and engineering became the focus, given its importance to research and development, the maintenance and further enhancement of their competitive position. Secondly, there has been a substantial emphasis in all of these countries on vocational training. These are paths that clearly the Region will have to follow if it is to even consider closing the technological gap between itself and these high performers in the world economy. This will require quite a significant reorientation in post secondary and tertiary education policy. Without this new science and technology focus, serious efforts at regional technological development will likely be severely constrained. The university-industry link is regarded as one of the major contributors to technological development.[14] Even more important is the general establishment of a close link between national technology policy and industrial and educational policy. According to Mytelka (2000), "education and training are the foundation upon which local competencies are built and R&D provides the basis for continuous innovation."[15] Today analysts have placed learning and "learning to learn" at the very center of the process of successful technological development.

D. Use of Its in HRD in the Region

Advantages of ICT-based Training

In this section, ICTs are defined to include radio, television (old ICTs), fixed and mobile telephone, fax, computers, CD-ROMs satellites and the Internet (new ICTs). This is a definition used by DFID and UNESCO.[16] The question may be asked quite rightly, why the topic of ICTs in HRD? This can be answered simply by the numerous advantages associated with the use of ICTs. These include the possibility of accelerating the pace of training through the ability to reach simultaneously large numbers of students. A very good example of this is Telesecundaria in Mexico which is largely television-based but is migrating towards the use of some of the new ICTs.[17] Telesecundaria is used to instruct simultaneously and cost effectively more than a million secondary school students daily for twelve hours in more than 15,000 schools.[18] It also provides in-service training to teachers.[19] The broad outreach of ICTs is evidently an important consideration for the Caribbean where substantial numbers of the population at the secondary and tertiary level have to be trained if the Region is to close the skills gap with some of the comparator economies. Also, there is the substantial issue of the re-training of the labour force, a major and continuous undertaking. In fact, private sector companies, aware of the need to train large numbers of their work force in a short space of time at minimum cost, have embarked substantially on the use of ICT-based training.[20] However, according to UNESCO (2003), "at this

[14] See Mytelka (2004) and Saad and Zawdee (2005). For example, the National Chiao-Tung University since 1964 made semiconductor technology the main focus of its curriculum. Today, the semiconductor industry is well established in Taiwan and a one of its most competitive exporters (Chang and Tsai,2000).
[15] Mytelka (2000), p.27.
[16] See Sanyal(2001), p.10; DFID(2001), p.13.
[17] Sanyal (2001), p.14; DFID (2001), p.16.
[18] It is estimated that more than 100 million Chinese receive training through special television channels (Ruth and Shi (2001)
[19] For a review of the very advanced use of ICTs in tertiary education in Japan, see (Sakamoto, 2002).
[20] For interesting examples of how private companies have used ICTs cost effectively to train large numbers of their workforce, see Jurich (2001)

point, the adoption of the innovation is shifting from the periphery to mainstream practice."[21] Teachers increasingly are integrating ICTs into their teaching activity. Time savings and cost effectiveness, flexibility in the learning process with respect to time and place, the possibility for group and institutional collaboration across countries and continents, increased access to information, the establishment of school networks for the sharing of information, of teaching best practices, teacher training and facilitation of learning by the disabled are additional and important advantages which use of ICTs offers.[22] ICTs offer the possibility of increased effectiveness in the training process as a result of the potential for increased teacher creativity in the use of multimedia (text, sound, images, video) which provide a more varied and effective learning experience. ICTs are also being used effectively for distance vocational training, for the training of unemployed youth and for adult education (nonformal education; lifelong learning) as, for example, in India. Additionally, the new technology is poised to improve dramatically with time, becoming faster, richer in content and possibilities. Given the foregoing attributes of ICT–based training, and the substantial challenges facing the Region in terms of the training gaps as compared with comparator countries, much greater use of ICT-based training is an option which clearly the Region must explore and pursue where appropriate. This is, of course, in addition to the training in ICTs which has become indispensable for effective participation in the New Economy.

Issues with Respect to the Use of ICTs for HRD

High Infrastructure Costs

While ICT technology has significant advantages, it also has disadvantages of which the Region must be aware. For example, there is the potential problem of high infrastructure and other costs, particularly in the case of the new ICTs (cost of computers, broad band infrastructure, payments to Internet service providers, training, operations, maintenance and service costs). This is an important consideration particularly in the context of the stringent fiscal circumstances facing several Caribbean countries because of high debt. However, the likelihood that in the not too distant future, due to several initiatives such as the Simputer (Simple Inexpensive Multilingual People's Computer) in India, the cost per computer for use in schools will fall perhaps drastically. So also will the cost of broadband technology even as its capability increases. Additionally, Governments worldwide have been able to obtain substantial resources from the donor community (for example, World Bank which has an one of its major objectives the promotion of ICTs in developing countries; EU; US (USAID); Canada; Australia; Japan; UNDP; UK[23]) and also from the international private sector, both those directly involved in the production of ICTs (Microsoft; Intel; Apple; COMPAQ; IBM etc.) and those that are not (for example, Cocoa Cola in Viet Nam etc.) to fund their ICT-based education initiatives. Furthermore, while within the context of the need to train the work force in the use of the new technologies, it would be preferable for the Region to use as early and as much as possible the new ICTs, the fact is that there are other and cheaper alternatives that the Region can use. It is

[21] UNESCO (2003), p.4.

[22] For a discussion of some of the considerable cost savings and other advantages of e-learning, in particular, see Capper (2001) and Moses (2001)

[23] The UK, for example, has a very interesting programme (entitled "Imfundo") through DFID, targeted at the development of ICT-based training in Sub-Saharan Africa. For the Caribbean, this can be a very good source of experience.

generally known, for example, that radio and television are still the cheapest of the ICTs.[24] The Region can make greater use of both of these old generation ICTs, at least initially, and over time migrate to the newer technologies as many countries such as, for example, India and the Republic of Korea, have done. The issue is not one of old versus new technologies but rather one of appropriateness, given the specific circumstances. While there is a choice of technology, there is not much choice with respect to the training responsibilities and to time.

Also, one must weigh the additional costs against the benefits of the new technology such as the wider outreach which would permit cost reductions due to scale economies; the possible expansion of online training services and of user fees; the possibilities for significant increase in non-formal learning (health, agriculture, adult education etc.); the reduced time and costs and also increased accuracy in student evaluations; the possible availability of master teachers to all students; reduced costs from bulk purchasing of equipment (for example, computers, scale economies in the production of teaching software etc); the use of open source as opposed to proprietary software etc. Of course, there is the overarching and substantial benefit of a more skilled and productive labour force.

Resistance of Teachers

Another major issue which the Region will likely have to confront in the attempt to expand use of ICTs is the possible resistance of the teaching profession (professors, head teachers, teachers etc.) who, because of the productivity of the new technology, may be afraid of becoming redundant.[25] The experience so far in countries that have embarked substantially on ICT-based training, is that redundancy has not become an issue. In fact, countries are attempting to train as many teaching staff as possible at all levels, primary to tertiary, in the use of the new technologies, so as to enhance teaching effectiveness. What is emerging is that over time, the role of the teacher is likely to change from one of being responsible for the passing on of knowledge to one of facilitation and mentoring, giving students the tools and helping them to learn. Other concerns of the teaching profession include the loss of autonomy and discretion in the classroom.[26] An additional area of concern is the increased preparation time in some cases with the use of ICTs. These latter concerns, however, have not featured as prominently as the issue of redundancy.

The Digital Divide

An important issue which the Region will have to address in the process of using the new technology, is the possibility of increasing the digital divide (urban-rural; high-income – low-income; male-female; able-disabled). In many countries that have embarked on ICT-based training, there is substantial concern about the possibility of leaving some students behind because of inadequate access to the new technology. This is very much a policy matter and will have to be addressed in the roll out of the new technologies. For some students, access to a computer in school may be their only chance to use the Internet. An additional place of access may be the community resource centre which many countries have used effectively particularly in poor regions. The Republic of Korea, for example, has in part attempted to address the

[24] DFID (2001), p.13. Ruth and Shi (2001), p.36.
[25] Adria and Rose (2004), p.54.
[26] Adria and Rose (2004), p.60

problem through the distribution of computers to low-income families. Countries in the Region will have to explore options specific to their circumstances.

Outdated Laws

Outdated education laws that frustrate innovation are also potentially a barrier to the use of ICTs in education as the US has, in fact, learnt.[27] The Report of the US Congressional Web-based Education Commission has recommended a complete overhaul of education regulations, in particular, the removal of any regulations that would stifle innovation. For example, the Commission has advocated the removal of any restrictions that would prevent public funding of online education. It has also questioned the need for students to be in school a set number of hours when they can use online instruction away from the class room. Additionally, the Commission has advocated the revamping of copyright laws to facilitate easier use of data and information found on the Internet. The Region will need to review and update laws regulating the education sector to ensure that the legal infrastructure does not become an impediment to ICT-based training.

The Importance of the Training of Teachers and Others

The discussion in this section focuses on the use of the new ICTs on the assumption that the Region is familiar enough with the use of radio and television for education purposes. Clearly, of great importance is the availability of the necessary infrastructure (computers, access to broadband, printers, telephones, etc.) which has been discussed above. Increasingly, however, the realisation is emerging that while the physical infrastructure is important, even more important is the training of teachers and of trainers of teachers – faculty in teacher training colleges - in the use of the new technologies. The disappointments that have so far emerged in attempting the use of the new ICTs almost invariably reflect the inabilities of teachers to use the new technologies because of inadequate training. Professional development of teaching staff at all levels is critical to success. Increasingly, Ministries of Education are requiring training in ICTs for teacher certification. (for example in the USA, India, Japan, South Korea, Malaysia, Holland, Singapore, Australia and the Philippines).

There can be regional ICT-based training initiatives (distance learning – pre and in-service) for teachers to accelerate substantially the training of qualified teachers regionally. Distance training (in-service) for teachers has the very important advantage of reaching very large numbers (scale economies) and further reducing the cost of training by leaving the teacher in the class room. DFID has estimated that distance training of teachers can reduce the cost by one-third to one half compared with the conventional approach.[28] China, for example, has been able to train more than three million teachers through distance learning.[29] UNESCO Bangkok also has reported that the Asia Pacific Region has trained large numbers of teachers using distance learning.[30]

[27] The Web-based Education Commission (2001), p.87-97.
[28] DFID (2001), p.11.
[29] Sanyal (2001), p.13.
[30] UNESCO Bangkok, p.2.

Ministries of Education also have realised that the training of administrative staff in the use of ICTs can yield substantial benefits in terms of reduced cost and other efficiencies of administration together with the provision of moral and practical support to teachers.[31] The training of maintenance and service personnel for the new technologies is also recognised as an important requirement. In fact, in some cases, teachers themselves are also being trained in the maintenance and servicing of the equipment.

Production of Software

In addition to the skills requirements of ICT-based training, an area of significant deficiency in the new technology-based approach to teaching is inadequate production of appropriate, high quality teaching software. This will require the necessary training and institutional infrastructure to facilitate the desired results. It is an initiative that the Region for reasons of cost effectiveness, can pursue collectively, since essentially the same curricula are used, for example, at the secondary level. Meanwhile, it is possible, at least initially, to purchase some of the software externally, for example, from private or public sector providers in the US, India or elsewhere.[32] It should also be pointed out that there are now many companies that can provide not only software but also entire ITC-based learning systems.

Increased use of ICTs is critical to accelerating the pace of HRD in the Region. However, to do so successfully, the Region will need to be committed, focused and possessed of a deep sense of direction in order to prevent unnecessary resource waste and policy incoherencies. Regional and national policies can give coherence and focus to initiatives. The Region also needs to refocus its education content to ensure relevance. Teaching irrelevant or marginally relevant content cost effectively to large numbers of students is pointless. Finally, increased use of ICT-based training should not be restricted to the education system, but expanded to include every type of training and retraining where possible. For example, the Region needs to explore the possibilities for using the technology to accelerate the upgrading of the labour force as the private sector elsewhere has done so effectively. India is using distance education to reduce uncertainty in decision making and to enhance profitability in agriculture by increasing the availability of relevant information to farmers (for example, market prices, input costs, weather, scientific agronomic practices etc.).[33] The Region can similarly explore the possibilities for using ICTs for increasing incomes in the agriculture sector where most of the poor reside.

E. The structure of Funding for Education and Other Related Issues – What the Caribbean can learn from High-Performing Asian Economies

Among the most difficult challenges facing Caribbean education is the question of funding. If not properly addressed, regional attempts to confront successfully the challenges of globalisation will be less than adequate, impacting economic growth and development for years to come. In this regard therefore, it would be useful to review the best practices of the more successful economies not in order to copy slavishly, but rather to have available a menu of policy options that can be critically evaluated and applied as need be. The experience of the high-

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[31] Sanyal (2001), p.12.
[32] For a report on the proliferation in e-learning companies and of online learning, see Capper (2001).
[33] Chhibber (2004), p. 191.

performing Asian economies (HPAEs) offers a rich menu of options from which the Caribbean can learn.[34]

One of the important findings in the literature on the HPAEs is the considerable emphasis placed on social expenditure. Rao (1998), for example, in his study of Japan, South Korea, Singapore and Taiwan, noted that the share of social expenditure in public spending in the HPAEs was significantly higher than other Asian countries, and according to Mundle (1998), almost twice that to the OECD countries.[35] Rao (1998) noted that allocations to the social sector during 1970-94 generally varied from one quarter to two thirds of government expenditure with education in some cases receiving more than one half. The emphasis on social expenditure is important because it underscores the priority given not just to the development of skills but also to social welfare (health, housing, community services etc.), a priority which Sen (1998) endorsed wholeheartedly. Social welfare is important as a value in and of itself. It is also an important contributor to the productivity of human capital.

The second important finding has been the emphasis on the funding of basic education, namely education from primary to lower secondary which generally comprises nine years – six years in primary and three years in lower secondary[36]. In all of the HPAEs, governments have been the dominant provider of basic education which they saw as critical to the provision of skills and increased productivity especially in the early years of their rapid economic growth. In fact, in Taiwan, Japan, Hong Kong, China and the majority of East Asian countries, basic education is compulsory.[37] Mundle (1998) notes [38]also that basic education, and particularly primary education, was an important contributor to the enhancement of social welfare. Woo (1991) has argued that this was very efficient use of public expenditure since highest social gains including improved health and other social benefits were reaped from education expenditure at the primary and lower secondary levels.

The third notable feature of education funding among the HPAEs was the significant dilution of government involvement beyond basic education. In many countries, with the exclusion of Singapore, the private sector, including the household sector, became a much larger provider of education funding if not the major provider. In Taiwan, private schools account for the majority of training at the secondary and tertiary levels. For instance, in 1986, close to 60% of students in senior secondary attended private schools and almost 80% attended private junior colleges.[39] In Japan in 1993, private funding accounted for 40% of secondary education and 60% of higher education. The Republic of Korea under its Vocational Training Act of 1976 made it compulsory for companies to finance vocational training programmes. In Japan, trans-national corporations have also provided financing through skills upgrading of their own employees. It is important to note two facts, however. The first is that in several cases, governments provided subsidies to private schools though these were significantly less than the subventions given to public schools. Secondly, in the interest of equity, the entry of the private sector was further buttressed by student scholarships, loans and other measures to ensure access to the poor.

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[34] The HPAEs discussed in this paper are the four East Asian NIEs (Taiwan, Hong Kong, Singapore, South Korea) and Japan.
[35] Mundle (1998), p.662.
[36] de Ferranti et al (2003), p. 17, Mingat (1998), p.698-99.
[37] Tilak (2002), p.23; UNESCO (2007), p.6.
[38] Mundle (1968), p.664.
[39] Woo (1991), p1035.

The movement away from government financing of higher education in recent years has accelerated with the new emphasis on privatisation and corporatisation at the tertiary level. Universities are now increasingly required to manage their financial affairs as corporations while governments reduce their subventions.[40] Universities therefore now have to pursue innovative forms of financing (selling research output to industries; consultancy services; computer services; training and research contracts; running of commercial establishments etc).[41] This is an attempt to imitate the Anglo-US model of university management in which fund raising plays a substantial role. The new approach has been accompanied by an increase in competition among universities for funds and an increased focus on quality in terms of international ranking, a critical indicator of which is the level and quality of research. Moodie (2006) noted that it is "research performance, not access or equity, that determines the ranking of a world class university."[42] In fact, universities now are seen as the new battlegrounds for economic supremacy through scientific research.

With respect to the quality of education, there is little doubt that the HPAEs have done very well, ranking among the top five to ten countries in international competitions of their students with respect to mathematics and the sciences, and outranking many of the developed countries.[43] While some may argue that this is by no means fully representative of the quality of education output in these economies, the fact is that internationally, these economies have been able to compete very effectively over the last three decades as indicated by the steep rise in exports from the region and particularly the rise in high technology exports. There can be little doubt therefore about the quality of skills. There is, however, some conflict in the literature as to how the HPAEs have attained such high levels and quality of educational output.

There are two hypotheses, both of which arguably, have some validity. Generally, low student:teacher ratios are accepted as an indicator, albeit somewhat crude, of the quality of education. UNESCO (2003) reports, for example, that in East Asia, student:teacher ratios in the primary sector at 21:1 are almost half that of South and West Asia.[44] Tilak (2002) also supports the hypothesis that low student:teacher ratios have been an important contributor to the quality of education in the HPAEs. However, he also notes the importance of teacher training, of significant expenditure on good teaching and learning materials (textbooks, audio visual materials etc.). Mundle (1998), on the other hand, while conceding that low student:teacher ratios in recent years have been an important contributor of the quality of education, has argued that student:teacher ratios in the earlier decades averaged more than 40 at the primary level and close to 30 at the secondary level. He argues that at that time quality was maintained by high teacher salaries relative to average incomes, facilitating the attraction of high quality personnel to the teaching profession, the maintenance of quality output despite high student:teacher ratios and the lowering of cost per student.[45]

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[40] Mok (2006), p.E-254.
[41] Tilak,2002, p.33.
[42] Moodie (2006), p.4.
[43] Lall (2001), p.28
[44] UNESCO (2003), p.61-62.
[45] Mundle (1998), p.665-66.

Another important issue in education in the HPAEs and one of substantial relevance to the Caribbean is the emphasis on technical and vocational education. This was clearly one of the priorities of the HPAEs and one of the reasons for their economic success. There has been a proliferation of polytechnic, vocational schools, technical institutes and colleges. Student enrolments in technical and vocational education especially at the senior secondary level, while having declined in recent years, generally varied between 10% and 33% among the HPAEs in the early nineties, substantially higher than in developing and developed countries.[46] In Taiwan, the student allocation to vocational schools, guided by the requirements of the Manpower Development Plans, in some cases reached beyond 50%. This meant, for example, limiting the number of students allowed into universities.[47] In the Caribbean, while there is still a sizeable manufacturing sector and complaints about the lack of skills at all levels and/or about the quality of skills, the Region continues to pay inadequate attention to the development of technical and vocational education which is critical to the survival and advance of industry.

Two additional issues which the HPAEs have had had to confront as part of educational funding policy are equity and efficiency. As regards equity, to a large extent governments have addressed the issue through the use of government funding of basic education (primary and lower secondary). At the higher levels, while there has been a lessening of public expenditure, the issue of equity has been addressed essentially through the use of merit- and means-based scholarships, grants and loans. Suffice to say, the general consensus as regards commentary on the performance of the HPAEs is that high growth has been accompanied by a significant reduction in poverty and a more equitable distribution of income.

In the discussion of the financing of the education sector, there has also been substantial concern about efficiency, an issue to which the Caribbean needs to pay substantial attention especially within the context of fiscal stringency. Generally, there are two indicators of efficiency that have been used:

(i) the social returns to investment in the sector; and
(ii) the cost per unit of output.

The first is used to explain the emphasis of government spending in the HPAEs on primary and lower secondary education where the social returns empirically have been found to be high relative to expenditure on senior secondary and tertiary education. This argument has been used also to explain governments' greater willingness to allow private financing at the higher levels where the private returns are high but where the social returns are generally lower. Estimates of social returns to investment have also been used to explain the emphasis on vocational and technical education as opposed to tertiary education.[48] From the point of view of allocative efficiency, governments of the HPAEs are considered to be quite successful in terms of the structure of expenditure on education.

As regards the second criterion, that of per unit costs, the claim to efficiency is somewhat more muted. It is generally agreed that the private sector in terms of per unit cost has been more

[46] Tilak(2002), p.26; Mundle's estimate of 40% for the HPAEs is substantially higher (p.664)
[47] Woo (1991), p.1033, 1041.

[48] Tilak (2002), 26.

efficient in the delivery of education output. For example, per unit costs of higher education have been in some cases twice as high in public compared to private institutions at upper secondary, post-secondary and tertiary levels.[49] While this statistic has to some extent been countered by concerns about lower quality at private as compared with public institutions, the overall conclusion is that the private sector has generally been more cost efficient. In this regard, there is clearly an important policy conclusion – that the private sector can be used to enhance cost efficiency. However, private sector involvement needs to be accompanied by adequate monitoring to ensure the delivery of quality.

For the Caribbean, another very important lesson to note is the fiscally conservative framework within which the HPAEs were able to achieve high quantities and quality of training. Overall budgetary balances were low, resulting in very low levels of public sector debt. In addition to private sector financing, an important strategy for achieving this outcome was expenditure constraint. HPAE Governments were able to achieve this through considerable pressure on wages, salaries and other forms of public sector consumption. This permitted the generation of substantial current account savings which governments used to finance capital expenditure. For example, current account savings in Japan averaged 9.3% of GDP during 1970-92 and more than 10% of GDP in Singapore during 1980-92.[50] Fiscal stringency was central to the goal of macroeconomic stability which was seen as critical to economic growth. Price stability facilitated growth in savings and investment and kept exports competitive, a strategy central to the economic success of the HPAEs.

F. Conclusion

The foregoing discussion focuses on the requirements of the education sector response to the challenges of globalisation. Of course, the sector does not exist in a vacuum. It impacts and is impacted by what goes on in the macroeconomy. Very importantly, demand for HRD will to a large extent depend on domestic and regional absorptive capacity. Accordingly, it is important that training targets do not take place in a vacuum but rather keep pace with economic demand. The insertion of greater quantity and quality of skills will also impact economic growth and in so doing in turn impact the level of demand for skills. Perhaps one of the great lessons, if not the greatest lesson of the East Asian miracle, is exactly this: that countries through emphasis on upgrading their human resource base, initiated a dynamic virtuous circle from which they have benefited for decades.

[49] Mingat (1998), p.704.
[50] Rao (1998), p.678,p.683

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