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PARTNERSHIP FOR CHANGE: USING COMPUTERS TO IMPROVE INSTRUCTION IN JAMAICA'S SCHOOLS

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FOREWORD

There is a growing consensus across the Latin American and Caribbean nations that the management of their educational systems shift from a centralized, state based and top-down process, to a decentralized, open and participatory operation, and from a rigid, reproductive teaching pattern, to a more inductive, creative and child centered educational model. However, the vast majority of current educational reforms in these countries follow a deductive, top-down approach. The educational reforms of the 1990s, as their predecessors, tend to rely on conventional teacher training programs, curriculum development and management strategies. Few of them are introducing radical changes in the power structure of the educational system by providing resources and opportunities for schools and communities, or promoting innovations in the teaching technologies at the classroom level.

The brief history of educational reform in Jamaica, in which the private sector, the schools and their communities introduced computers in the classrooms, offers an extraordinary scenario for understanding the dynamics of a change resulting from the interaction of forces and interests of different groups in the process of education. As the schools gain more autonomy and families and communities earn a voice in the governance of the schools, more locally promoted innovations are expected to become the rule rather than the exception.

These innovations usually depend on the commitment and negotiation skills of strong leaders and on the joint activities of the actors involved through associations, partnerships and networks. The social structures supporting these innovations that sometimes become national reforms, tend to be flexible, temporary and often fragile. However, they provide the necessary environment for developing new ideas and strengthening the sense of community among the participants.

The study that Dr. Errol Miller, a professor of teacher education at the University of the West Indies, presents in this report is part of a broad analytical exercise on the implementation of the educational reforms of this decade, which includes a series of case studies of national educational reforms, international comparisons and analyses of policy options. The study reflects the vicissitudes, achievements and limitations of a reform process, that moves from the periphery to the centre as perceived by its main actors. Such experiences are difficult to replicate in other contexts, given their close relation with local political dynamics. Nevertheless, they provide invaluable and practical lessons to reformers, and advance our knowledge on the process of change in a time of reform and reassessment.

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PREFACE

The goal of the United States Agency for International Development, through our bilateral assistance programs, is to assist partner nations in the expansion of opportunities for quality education to all of their children. As part of this goal, USAID is supporting studies and research in an effort to better understand the process of education reform in its various manifestations—social, political, and economic.

While education reform is not a new phenomenon in Jamaica, or elsewhere in the hemisphere, this case study is unique in that we can draw some very distinct and important lessons such as; parents and the community play a powerful role in the actualization of education reform; the private sector has a stake in the quality of education provided by schools and an important role to play in developing the national character of the education system; the ministry can and sometimes must take a partnership role as opposed to a centralized role in reform efforts.

Therefore, it is our sincerest wish that the analysis and lessons learned from this case study will in some way assist the government of Jamaica in its reform efforts. We would like to thank Dr. Errol Miller, the principal researcher on this case study, the participant schools and the Jamaican Computer Society.

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LIST OF ACRONYMS

CAI	computer-assisted instruction
CAST	College of Arts, Science and Technology
CEE	Common Entrance Examination
CXC	Caribbean Council Examination
HRD	human resource development
IDB	Inter-American Development Bank
JCS	Jamaica Computer Society
JCSEF	Jamaica Computer Society Educational Foundation
NCE	National Council on Education
NGO	nongovernmental organization
ROSE	Reform of Secondary Education Project
SCOPE	School Community Outreach Programme for Education Project
USAID	U.S. Agency for International Development

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INTRODUCTION

The purpose of this case study (conducted during the summer of 1996) is to probe and examine educational reform in Jamaica. It looks particularly at the introduction of computers to support instruction in primary and secondary schools in the context of the policy of partnership in education. The introduction of computer technology into primary and secondary schools in Jamaica had its genesis in the 1990s and therefore is still in its formative stages, although it constitutes the most dynamic initiative in Jamaican education in the last twenty years. As such, the case focuses on the dynamics of the relationships and processes that initiated the reform rather than on products, achievements, and outcomes, although these will not be overlooked.

Putting computers into primary and secondary schools for the purpose of supporting and improving instruction and learning is a case of bottom-up educational reform. It is not a centrally planned reform directed by the Ministry of Education. Rather, it has resulted and come about from initiatives outside the formal policy mechanism but accepted and supported by the Ministry. Because of its departure from the standard format of reforms, it constitutes and invites not only documentation, but also analysis. It is hoped that the recording of the case will itself contribute to the reform as it further evolves in the Jamaican education system.

As would be expected in any instance of bottom-up reform, the sources from which the reform has sprung are diverse. While the case-study method is most appropriate for studying such a rich phenomenon, severe strain was imposed on this study by virtue of the situation itself, the time available to do it, and the diversity of the sources of the reform. As such, the case contains three mini-cases as critical components, each with its own rationale and dynamics but intimately related to the whole.

METHODOLOGY

The methodology used involved four main elements. They can be summarised as follows:

1. *Interviews of key personnel* of the Ministry of Education, including the Minister of Education; the Jamaica Computer Society; the Jamaica Computer Society Education Foundation; the Jamaica Teachers' Association; members of the private sector; the HEART Trust; members of communities; and principals, teachers, and students in schools. An open-ended interview schedule was used which allowed the informants to tell their stories from their perspectives. Some follow-up questions were fashioned in the course of the interview in keeping with specific answers given and the need for either clarification or elaboration. Included in the interviewing process were unscheduled discussions with some individuals in unplanned circumstances and informal settings.

2. *Focus groups discussions* with teachers and students based on the interview schedule used with individual informants. The main difference between the individual interview and the focus group was the interaction between the participants in the interpretation of questions and the construction of responses.

3. *Visits to educational institutions* and observation of instruction in progress. Also a visit was made to an in-service teacher-training workshop that covered how to implement particular instructional strategies using the computer. On the occasion of this workshop, the researcher was invited to participate in the closing exercises by handing out certificates to the participants.

4. *Examination of documents* related to different aspects of the reform. These included the Ministry of Education's Draft Five Year Development Plan for Education, 1990–1995; Ministry of Education Project documents; documents related to Inter-American Development Bank (IDB) and World Bank projects supporting information technology reform; Jamaica Computer Society Education Foundation Working Documents; Business Partners Minutes of Meetings; and Think Tank and Education Technology 20/20 Minutes of Meetings.

In addition to the above, the researcher has been a member of the Think Tank on Education Technology in Schools since its inception in 1994, and was the Project Director for the In-Service Teacher Education Component of the Reform of Secondary Education (ROSE) Project. In both of these capacities, the researcher gained personal insight and knowledge of the reform introducing computers as learning tools in primary and secondary schools. While such familiarity could constitute some disadvantage, it also provided some distinct advantages in interpreting some of the information solicited as well as constructing the overall design of the case.

The information was collected in Kingston from the Jamaica Computer Society and its Foundation, the Ministry of Education, and the HEART Trust and from three clusters of schools located in different sections of the island. The first cluster is located in a rural community about a 45-minute drive outside the city of Kingston. There the researcher visited St. Mary's College, a high school. The second cluster of schools is located in the southwestern area of Jamaica. The researcher visited the Bethlehem Moravian College and three of the five primary schools within that cluster. Finally, the third cluster is located in the northeastern section of the island. Here the researcher visited the Oracabessa Foundation, the Oracabessa Secondary School, and two of the four primary schools in that cluster.

In all, the researcher visited eight educational institutions: one college, whose principal mission is teacher training; two secondary schools; and five primary schools. The researcher also visited the summer training workshop of the Jamaica Computer Society Education Foundation. At that workshop, he interviewed teachers from primary schools in the St. Mary's College cluster, as well as teachers from schools outside of the three clusters included in the case. The field work, including the interviews, focus groups, and school visits, was conducted over a two-month period and involved approximately fifteen person-days.

Limitations

By definition, case studies provide depth and not necessarily breadth of understanding of a particular situation. The limitation of this case study is it is composed of many elements, and the neglect of any one would lead to diminished understanding of the total reform being studied. However, the time available did not allow any one of the components to be pursued in great depth. Accordingly depth has been sacrificed for breadth in an attempt to capture the essence of the reform in progress. As such, this study could be regarded as a preliminary report of a case that deserves more in-depth as well as longitudinal treatment.

CONCEPTUAL FRAMEWORK

Essentially the case study is about education reform. It is therefore necessary to set out some broad conceptual considerations about the nature of education reform. Cuban[1] made the point that education systems are repeatedly reforming. Hence, reform is neither novel nor rare nor final. Indeed, the decades of the 1980s and the 1990s have witnessed an ocean of education reform in all parts of the world. In general, they have been state-generated reforms as public officials have attempted to reshape school systems to serve various ends.

Educational reform can be approached from several different perspectives. First, reform can be seen as a rational/technical exercise formulated by experts after careful diagnosis using the most advanced diagnostic instruments and rigorous analytic procedures, and after the application of the best available knowledge at the time. Second, reform can be seen as a political trade-off, a set of compromises negotiated in the context of shifting power between competing groups holding to different value systems. Third, reform can be conceived as comparative adjustments in school systems related to major shifts and changes in the culture of homes or in technology at the workplace; to shifts in values in the wider society to which the education system is interconnected; or to changes to keep abreast of other school systems or societies with which they compete. Fourth, reform can be seen as a set of radical departures from tradition and the past and a launching out on entirely new paths.

As a *rational/technical exercise*, education reform seeks permanent solutions to persistent problems. Its nemesis is political considerations which compromise technical purity. As *political trade-offs* between competing groups in society, education reform is the periodic re-negotiation of the values guiding policy and practice in education. Its Achilles heels are technical limitations and logical inconsistencies. As a set of *comparative adjustments*, education reform is a periodic synchronisation of schools with homes, workplaces, and communities or with other school system of societies with which they compete. Its frustration is the elusiveness of diversity that needs to be synchronised among the schools, homes, workplaces and communities. As *radical departure from the past* and from tradition, education reform is revolutionary change in direction or paradigm shifts in the basis of its provision or processes. Its challenge is to deliver on its promise. The tendency of radical reform is to promise much more change than can be or is actually delivered.

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[1] Cuban, Larry "Reforming Again, Again and Again," *Educational Researcher* 19, 1 (1990): 3-13.

Education reform on the whole tends to be top-down. This is particularly the case where it is approached and practised as a rational/technical excise driven by experts, or as a political or radical exercise directed by conventional or radical politicians. Nevertheless, education reform can be bottom-up. Most usually such instances occur where education reform can be explained as comparative adjustment as demands for synchronisation are made by homes, corporations, industries, and communities. However, the direction of reform, be it top-down or bottom-up, is not determined by its explanatory paradigm, but rather by the particular context in which it occurs.

CONTEXT

There are several contextual factors that need to be appreciated in any description and discussion of the introduction of computers into primary and secondary schools in the 1990s in Jamaica. The most pertinent factors appear to be the nature of the governance of the Jamaican education system, developments and reforms in the post-independence period, the developmental imperatives of the 1990s, the current thrust of international assistance to Jamaican education, and policies related to partnership introduced by the Government who took office in 1989. Each of these will be discussed briefly.

The Governance of Jamaican Education

The governance of the Jamaican school system is predicated on what may appear to be two contradictory concepts. The first concept is school-based management which allows schools to run their own affairs. Each school is run by a board which is legally empowered to hire and fire teachers, select and discipline students, manage its own finances, and control the use of its premises. School-based management has existed in Jamaica at the secondary level for more than one hundred years and at the primary level for more than forty years. The Jamaican secondary school system was inaugurated in the latter half of the nineteenth century modelled after the English public school system, in which each school had its own board of governors. In the early 1950s, when the Ministry of Education was created as power passed from the colonial administrator to the elected representatives of the people, the decision was made to extend the form of governance that had been practiced at the secondary level to the primary schools.

The second concept is a centralised Ministry of Education. The Ministry is responsible for educational policy, planning, and development, as well as for the delivery of a number of services to schools related to the conditions of service and payment of teachers, financing of school operations, maintenance of school plants, and provision of nutritional and other support. The division of labour in the governance of schools in Jamaica is between a central Ministry of Education mandated by law to determine policy, initiate developments, and deliver administrative support services and schools run by boards which are empowered to decide on operational matters at the school level.

This configuration of governance means that each of the more than one thousand public schools and colleges in Jamaica relates directly to the Ministry of Education through its board. The defining features of the system of governance of schools in Jamaica can be summarised according to the following categories:

- *School board*
  Each school is managed by a board which is broad-based in its composition. Representation on school boards includes the principal, teachers, other staff of the

schools, parents, past students, community representatives, and representatives of the owners. In the case of secondary and tertiary institutions, students are also represented on the Board. The composition of the board ensures that the school is accountable to community interests, as well as to the Ministry of Education. In turn, this relationship generates substantial community support for schools over and beyond government subvention.

- *Parents*
  Parents exercise choice in the selection of the schools in which they enroll their children, provided they can convince the principal to accept their children. This puts some obligation on the students to justify their place in the school.

- *Teachers*
  Teachers are employed by individual school boards and cannot be transferred to other schools. Boards have the power to hire and fire teachers subject to the Education Regulations which allow for appeal to the Ministry. An offshoot of this is that teachers are free to participate in partisan politics and are indeed important contributors to the political process.

- *Ministry of Education*
  Once they operate with the quotas, ratios, and procedures prescribed by the Ministry of Education, schools enjoy a certain measure of autonomy with respect to the hiring and firing of teachers, selection and discipline of students, utilisation of the school plant and in the expenditure of funds. Once schools and their Boards are operating within the prescribed legal definitions and according to the established administrative procedures, the Ministry is unable to impose upon them. To gain compliance, the Ministry must persuade Boards, principals, and teachers through participatory mechanisms.

- *Principal*
  The principal is both a member of the school board and its chief executive officer and as such exercises considerable influence in the hiring and firing of teachers, selection and discipline of students, financial management of the school, use of the school premises, instructional leadership within the school, and management of all school operations. The quality of the school depends largely on the leadership of the principal.

Decentralisation has been a feature of the Jamaican education system for more than a century in the case of secondary schools and since 1950 in the case of primary schools. This is not to say that every school exercises all the autonomy that it legally has, or that the Ministry is without considerable influence in the schools. Rather, it is to assert that the governance of the Jamaican school system allows considerable autonomy in the

operation of schools and that many school boards and principals choose to utilise the full limit of the latitude permitted by law.

Within the last twenty years, the Ministry has decongested the delivery of administrative and plant maintenance services to schools by the establishment of five regional offices, which reduces the necessity of schools to journey to the Ministry headquarters in Kingston in seeking to deal with such matters. While the creation of the regional offices has been mistakenly referred to as decentralisation, it is really a decongestion of Ministry services, since no further transfer of power has taken place relative to the schools themselves. On the contrary, through the regional offices, the Ministry has proposed the introduction of regional boards, which would in fact result in some re-centralisation in the governance of schools. This is still a proposal and not a policy or law.

The point to note therefore is that decentralisation and school-based decision making are neither new nor novel in the Jamaican education system. Rather they have been structural features of the system for some time. As such, these features are not part of the current wave of reforms that have taken place in other countries of the region and the world, but important descriptors of the context of Jamaican education.

Educational Developments in the Post-Independence Period

Broadly speaking, it seems accurate to say that in the independence period, since the 1950s, education and the school systems have been mobilised to serve the cause of representative democracy. Adult suffrage and representative government placed political power in the hands of those representing the marginal majority in the country. For the first time in its history, the marginal majority, through its elected representatives, held the levers of state power. Elected with a mandate to democratise all the avenues of upward social mobility, to remove discrimination in access to public places, to equalise job opportunities, to create a just society, and to address the needs of the previously disadvantaged, the newly empowered representatives pounced on education and schooling as the most obvious means of demonstrating their commitment to that mandate and possibly for achieving some of its goals.

The strategies for achieving equity and equality of opportunity, while employing the unifying rhetoric of nationalism and nation-building, could be listed as follows:

- Expanding the educational provision at all levels of the education system and changing the rules governing access to the secondary level, particularly to grammar schools.

- Creating new institutions at the tertiary level and ensuring equity in access to these institutions.

- Restructuring the curriculum to promote Jamaican and Caribbean identity and solidarity by the inclusion of Jamaican and Caribbean literature, history, geography, specimens, and examples and the inclusion of positive images of all the peoples that comprise the societies.

- Adopting measures to improve the quality of education through building national and regional capacity, expanding and upgrading teacher training, establishing national and regional mechanisms of assessment of achievement, and building educational research capacity.

Favourable economic circumstances of Jamaica in the post-war years up to the mid-1970s facilitated the implementation of these strategies. In other words, not only was there the political will to implement these strategies but also there was economic means to at least embark upon their implementation. The independence era is therefore marked by the unusual coincidence of social demand, political will, and economic means.

The achievements of this era are truly impressive by any standards. They can be recited briefly as follows:

- More than 80 percent of infants are enrolled in pre-schools, compared to less than 30 percent forty years ago.

- Universal primary education ensuring access to all children exists within the region.

- Mass secondary education has expanded so that more than 60 percent of the 12- to 17-year-old age cohort receives at least five years of secondary schooling. This compares to less than 10 percent access to secondary education up to the end of the 1960s.

- Most children with disabilities are now provided for in the public education system in contrast to forty years ago when there was no such provision in the public system.

- The establishment of colleges of all types at the tertiary level make this level of education more accessible to the middle and lower social strata than ever before.

- Universities have been created that serve needs in the main areas of scholarship and research.

- Curricula that reflect the peoples and culture of the Jamaica and the Caribbean region have been developed.

- Schools are staffed almost entirely by nationals, the majority of whom are professionally qualified teachers, and the existence of indigenous teacher-training capacity can sustain the professional status of teachers.

- Secondary school students are assessed by Caribbean institutions, such as the Caribbean Examinations Council, on curricula appropriate to secondary education in the sub-region.

- Successful nonformal programs in adult literacy and skills training for out-of-school youths have been implemented.

- The more sophisticated management of education through an integrated Ministry of Education has replaced the more fragmented structures of the past, when departments and commissions supervised education.

- Girls have at least achieved gender equity with boys at the early childhood, primary, and secondary levels and may even have surpassed them. At the tertiary level, males only continue to hold the numerical advantage in engineering-related subjects but have lost it in practically all other areas, although in the science-based areas, the gap is still relatively small.

Any objective analysis of the independence period has to note its accomplishments through the mobilisation of considerable financial investments, significant paid and voluntary support, and high levels of client participation in the provisions made. There can be no doubt that the independence period, invoking the themes of nationalism and nation-building, mobilised massive State support and received overwhelming popular participation. Together they took the education system through both a "paradigm shift" and a "quantum leap".

An intriguing question arises from this assessment: given these remarkable achievements, why by the late 1980s, was there so little celebration but instead so much dissatisfaction with the state of education? While the question certainly poses a glaring contradiction, there are a number of factors that readily appear to offer at least a partial explanation. These can be summarized briefly as follows:

- *Notwithstanding the impressive gains, the goals of equity and equality of opportunity remain distant for the majority of Jamaican people*. While the barriers of ethnicity, race, and class have been lowered, they had not been eliminated. Despite the changing of the rules of access, poor children of Black and East Indian origins from rural areas and depressed urban communities still have considerable difficulties gaining access to and maintaining themselves in those sections of the education system that offer the greatest prospects of upward social mobility. The promises of equity and equality, made in the name of nationalism and nation-building, have not materialised for most

of the people who constitute these segments of the population and who have become disappointed by and distrustful of such claims.

- *Even though the independence period only delivered partially upon its promises, the cost was great.* Driven by the imperatives of social demand, the State went beyond its own resources and borrowed heavily anticipating that favourable economic circumstances would continue. By the middle of the 1970s, there were signs that the years of sustained economic growth had ended. Successive governments interpreted these signs as temporary setbacks and borrowed even more, with encouragement from the donor community recycling petro-dollars. Hence, it took another decade for the hopes of economic recovery to be translated into meaningful adjustment policies. Accordingly, the price and the pain of adjustment was much greater.

- *The impact on education of structural adjustment policies has been devastating.* Four reasons account for the magnitude of their effect. First, they have raised serious questions about the cost and affordability of education systems. Second, they have led to retrenchment in the public provision, leading to the impression that the State has reneged or at least retreated from its commitment to equity and equality. Third, the retrenchment in the public provision threatens many of the gains made during the independence period leading to disillusionment on the part of many who helped fashion and achieve these gains and a sense of stagnation on the part of others. Fourth, in the main, the Government has lost considerable control of developments within the education system to the conditionalities of donor agencies. This has led to the perception of sovereignty being compromised, since the State now appears as a supplicant to the agencies.

- *By adopting the strategy of seeking to achieve equity and equality through expanding the education system rather than restructuring its organisation, successive Governments postponed dealing with many irrational and anachronistic elements of the colonial system.* These aspects were simply made bigger by the expansion. While many of these were barely tolerable when the momentum of nationalism was carrying everything with it and promising further change, they have become intolerable when it appears that the system has settled into routines likely to remain permanent.

- *The developments within the independence period have brought with them some new problems for Jamaican education.* For example, universal primary and mass secondary education has brought forward the problem of promoting illiterate children from the primary to the secondary level. The working definition of secondary education for most Caribbean people is the stage of education after mastery of the primary level. Illiterate children in secondary school represent a fundamental contradiction. This problem virtually never arose in an education system which did not enroll all children at the primary level, and which rigorously screened children based on achievement prior to admission to secondary schools. Students who had not

mastered the basics from the primary system were simply excluded from entry to secondary schools. The current inclusion of illiterate children in secondary schools, instead of their exclusion from schooling as previously occurred, has raised new problems concerning the quality and effectiveness of the education being offered. The impression given is that standards have fallen.

- *For the first time, in the second half of the twentieth century, the dominant minorities have the opportunity to not only critique the agenda of the independence period but also to alter it.* The social, political, and economic circumstances of the 1950s and 1960s that favoured the interests of the marginal majorities in the sub-region had muted the influence and even the reservations and criticisms of these dominant minorities. The economic and political circumstances of the last decade are the reverse. The devaluation, underestimation and even denigration of the achievements of the independence period have to some extent been as a result of the highly critical reactions to recent educational development from these social segments.

Developmental Imperatives of the 1990s

The developmental imperatives of the 1990s, however, go far beyond disaffection with the outcomes of the reforms of the independence era. They relate to fundamental global changes that have overtaken Jamaica despite the gains of nation-building reforms. Essentially the school system that was mobilised in the post-independence period to serve the cause of representative democracy has been summoned in the 1990s to serve the cause of economic competitiveness in an increasing global marketplace.

The collapse at the beginning of the 1990s of the ideological polarities that shaped the world for nearly one hundred years has left in its wake a unipolar world dominated by capitalism and market forces. The burden of resolving all social, ethical, and economic problems of the countries of the world have been put on the shoulders of market forces. This includes the growing inequities between and within countries. Faith in the market to resolve these substantial problems persists despite the market's known ethical weakness and its previous failure to resolve these problems in the last century. The emerging ideological polarities are those between North and the South, once it is accepted that within every Northern country there is some South, and within every Southern country there is some North.

At the same time that the ideology of market forces reigns supreme, markets are globalising at a rapid pace. Financial markets are leading the way, with a few markets becoming important and dominant centres in different parts of the world, and with the prospect of emerging markets joining these centres in the not too distant future. While economic growth has been sluggish in many countries, strong growth, where it exists, is export-driven, suggesting that competition through trade is the path to sustained economic well-being. In addition, capital has become transnational through the ease with

which it can cross borders and the speed with which such transactions can take place. In this climate, capital has become sensitive to interest rates and exchange rates differentials between countries and therefore short-term in its focus. The result is that even wealthy industrialised countries are not beyond speculative manipulations in capital markets.

Wealth creation is currently not so much the result of excess capital or cheap labour, but of technology and the quality of the workforce. In the information society that is emerging, where services have replaced the production of durable goods as the main engine of growth and wealth generation, it is science and technology on the one hand and human resource development on the other that are the critical factors of comparative advantage. Countries which have the advantage in both of these areas are not about to be generous to those that are disadvantaged, notwithstanding their rhetoric to the contrary. In such circumstances both technological and human resource development must become endogenous enterprises within countries hoping to compete in the global marketplace.

Like many other populations globally, the Jamaican population is maturing. There are fewer children entering schools each year at age 5 or 6 than leaving the school system at age 15 or 17. This is a result of the falling birth rate and the corresponding decline in the numbers of live births. Life expectancy is also increasing and is comparable to many First World countries. It is currently averaging around age 70 for men and age 75 for women. This demographic shift in the parameters of the population implies that increasing attention must be paid to the education of adults, since they will have to face the dictates of rapidly changing economic circumstances dictated by market forces. People who missed out on educational opportunities during childhood and adolescence have to be given the opportunity to recoup their losses as adults. This is critical since there will be fewer and fewer young people to meet new demands. Put another way, these demographic characteristics do not permit a strategy of "writing off" adults while concentrating education and training on children.

The demographic features of the sub-region includes "a baby boomers' bulge" but this generation is younger than the one in the United States from which the label is derived. This generation is now between age 25 and 30, just about "prime age" in the work force. This bulge in the age structure of the populations has stretched countries beyond their limits in finding gainful employment. The situation has been aggravated by the downsizing of government and the laying off first of public sector workers and more recently workers in the private sector. The net result is a significant increase in "at-risk youth" in the generation just behind the "baby boomers", although the latter has its fair share as well. The destructive, illegal, and violent behaviour among at-risk males and high incidence of pregnancy and prostitution among at-risk females are troubling features of contemporary society that cannot be ignored. While the demographic trends in the population suggest that this could be a temporary hiatus, both the technological trends in requiring less people in the workforce and the growing inequities between segments in the societies, and between countries, suggest the opposite. If not addressed, "at-risk

youth" could become enduring features of modern society threatening any other advances made.

The rapid technological changes have not only had far-reaching economic implications but also dramatic social and ethical consequences by aggravating already worrying features of social organisation and ambiguity in the value structure of society. Many of the effects have been indirect. For example, by permitting major changes in the management structure of corporations, many middle managers have been displaced leading to adverse effects on their families and their roles as parents and spouses. Also by opening up new channels of communications, the process of less personal intercourse is heightened. While trends have long existed indicating the breakdown of traditional family structures and of the increasing contact between people through electronic machines, information technology has accelerated and enlarged these tendencies. These have raised important questions concerning the character and content of society, its related institutions, and of the individuals that comprise them. The recurrent themes have centred around values and attitudes and other ethical issues. Traditional values and attitudes are being re-examined. While there is advocacy to revert to tradition, there is also strong argument for the re-construction of value systems to meet the contemporary situation.

Pedagogy in schools is generally perceived to be outdated in its capacity to address contemporary ethical and behavioural issues and obsolete in the technology employed in instruction. Technology in the classroom appears outmoded compared to many homes, most offices, and modern entertainment and out of step with the learning styles of children comfortable with the information revolution and excursions into cyberspace. There are major questions as to how schools should address the value questions being posed by the "times" and by the children who bring their contemporary questions to school.

The implications of the above changes for teachers have been enormous. In addition, structural adjustment has done much to diminish teachers' stature and status. Yet, apart from students, teachers are the most important part of the education equation. Information technology may force some redefinition of teachers' roles and relationship, the contemporary social milieu is challenging their management capability, and new ethical questions are testing their capacity to accommodate and respond to different world views. At the same time, the quality of the teaching force is a critically important factor in the quality of education delivered. While teachers must be held accountable for their stewardship in the schools, they must also have the assurance, support, and level of remuneration that will enhance their performance and secure their dedication.

There has been strong grassroots demand for educational reform. Factors fuelling this demand include jobless youth and the devastating effects associated with joblessness; the change in the nature of work by information technology in which menial and routine jobs have a more acceptable ambience than manual work; the universal nature of the skills and

competencies developed through international marketing; self employment made possible by virtual reality and other aspects of the information revolution; and the increasing choice of business subjects by students. What this grassroots demand assures is strong participation in the reforms implemented to address the fundamental changes overtaking all societies, including Jamaica.

Reliance on External Assistance

Jamaica benefited from 34 years of strong uninterrupted economic growth from the early 1940s until 1976. Since then, the country has had to cope with the adversity of structural adjustment policies that began in 1977 and continue through the present time. During this period, debt servicing has assumed enormous proportions in the national budget. For example, in the 1996–1997 fiscal year, debt servicing consumed 52 percent of the national budget.

The resulting decline in public expenditure and government's reliance on external funding for development projects have had a negative influence on government planning outside of specific projects. For example, even though the Ministry of Education developed a National Plan of Education 1990–1995, it was never officially ratified by the Cabinet or the Parliament and therefore never went beyond the status of a draft. Unlike several other Caribbean countries, Jamaica has not attempted a comprehensive education reform strategy in addressing the imperatives for change in the 1990s. Rather, it has adopted a project-driven approach to educational development and reform. This has been the case for at least the last fifteen to eighteen years. Capital development in education and educational reform has depended upon external funding.

Currently the Ministry of Education is implementing two major externally funded projects. The first is the Primary Education Improvement Project funded by the Inter-American Development Bank and the second is the Reform of Secondary Education, (ROSE) Project funded by the World Bank. Implementation of both projects commenced in 1993. Of relevance to this case is that neither project addresses the issue of computer-assisted instruction (CAI).

Lockheed and Verspoor[2] appeared to have appropriately expressed the views of the international development banks, in the early 1990s, to reforms in developing countries that involved CAI as a central strategy, when they described such reforms as blind alleys. They reached this conclusion while recognising that the computer has replaced the television as the symbol of modernity and also while acknowledging that empirical studies have established beyond reasonable doubt the efficacy of CAI in improving

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[2] Lockheed, Marlaine E., and Verspoor, Adriaan M. *Improving the Primary Education in Developing Countries.* Oxford University Press, 1991.

achievement in reading, maths, and other subjects. The basis of their caveat is twofold. First, Lockheed and Verspoor[3] insist that developing countries will not be able to both afford and sustain the costs involved in effectively using CAI in classrooms. The costs include not only the hardware and its maintenance, but also software development, teacher training, and building modification. Second, there are other less costly technologies that can be as effective, such as good textbooks and teachers' guides.

Within the Ministry of Education, there is also acknowledgment of the effectiveness of CAI. However, faced with its current restricted fiscal and financial situation, many senior members of the Ministry do not see it feasible to embark on reforms involving CAI. In their view, given the capital needs of the education system, particularly in providing basic facilities, the Ministry could not introduce computers in the classrooms as a first-order priority.

It would appear, therefore, that in the opening years of the 1990s, neither the Ministry of Education nor the external agencies that are funding major educational developments fancied the introduction of CAI, although they acknowledged its efficacy as a tool and its effective use in industrialised and wealthier countries.

Partnership as a Policy

Faced with these fiscal constraints and its experience in government in the 1970s, the new government elected in 1989 decided to promote private-sector partnership in education as a means of mobilising additional resources for both operating and capitalising the education system. Interestingly, the government elected in 1989 had previously held office when the structural adjustment policies were first introduced in 1977. It was voted out of power in 1980 by an overwhelming margin and re-elected in 1989 by a similar margin. Having previously embraced democratic socialism in the 1970s, stressing public ownership and strong government direction in the economy and public affairs, the new government elected in 1989 shifted its ideological orientation dramatically and promoted free market policies and private-sector participation in public policy.

With respect to education, the government promoted partnership as its major policy direction. Some of the main elements can be listed as follows:

- The adopt-a-school programme in which businesses were invited to provide support and assistance to a school or group of schools within its location or based on some criteria related to its mission. Since its inception, business sponsorship has evolved from assistance to a school to supporting programmes within a school, thus allowing several businesses to assist a particular school.

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[3] Lockheed, Marlaine E., and Verspoor, Adriaan M.

- In 1991, the Ministry of Education, with assistance from the U.S. Agency for International Development (USAID), sponsored an investment conference on education in which the Ministry invited the international community, the private sector, and nongovernmental organisations (NGOs) to indicate the areas of Jamaican education in which they would be willing to make an investment, given the imperative of a world undergoing fundamental change in the last decade of the twentieth century and the need for Jamaica to respond to these changes with appropriate reforms of the education system. In preparation for this conference, the Ministry developed project profiles related to the most urgent needs from its perspective. CAI was not listed among the projects.

- In 1992 the Ministry of Education, with assistance from USAID, launched the School Community Outreach Programme for Education (SCOPE) Project, which was designed to enhance and strengthen school-community partnerships. SCOPE had among its objectives reducing the vandalism of school buildings, improving the fund-raising capabilities of schools, strengthening parent-teacher associations, improving the effectiveness of school board members, and expanding community support for schools. The principal instruments employed in seeking to achieve these objectives were training for principals, school board members, PTA executives, past students, and community members; the development and distribution of a training manual to be used by trainers-of-trainers; and the formation of SCOPE committees in communities identified as being in greatest need of the SCOPE intervention. In the 1970s government had enlarged the representation of stakeholders and communities on school boards. SCOPE gave assistance to those communities that had not fully understood or availed themselves of the opportunity to meaningfully influence and support the schools located in their midst.

- In 1992 the Ministry of Education established the National Council on Education, following agreements of the Parliamentary Opposition Party, as a mechanism to promote long-term stability in education policy making by including in its composition representatives from all the stakeholder groups in education in addition to representatives of both government and opposition. The National Council on Education (NCE) was created to promote participation and partnership in education policy making. In addition, the NCE was assigned the responsibility of naming the Government representatives of school boards, thus removing any stigma of political involvement in appointments to school boards.

- In 1991 the Ministry re-established Regional Offices. These had been established in 1975 and closed a decade later. In re-establishing Regional Offices, the Ministry stated that it was decentralising the administration of education not only for the convenience of schools but also to promote greater participation and partnership in the operations of the school systems. A stakeholder committee was established at

each Regional Office to offer advice concerning the progress of education in that region.

- In 1994 the Ministry introduced cost sharing at the secondary level and expanded its scope at the tertiary level as a means of mobilising more resources for the operation of schools at these levels. In this system the Ministry would pay the personal emoluments related to the operation of schools and colleges, which would be allowed to charge user fees to cover their operational expenses. In introducing this aspect of partnership, the Ministry maintained that its provisions to schools could barely cover salaries and that schools had already started to impose user fees unofficially to meet their shortfalls. The cost-sharing programme was actually regularising and making official what had become common practice.

The range of projects, events, and programmes listed above were all linked by the common thread of a Ministry-invited partnership in the financing and support of public education. The underlying concern was the constraints on the State to provide adequately for education. The invitation was for the private sector, communities, and users at the secondary and tertiary levels to pick up the slack in one form or another. The National Council on Education offered limited access, through policy advice, to the decision-making process at the national level. However, expanded financial support was the operative concern in the partnership initiatives that were mounted by the Ministry in the opening years of the 1990s.

THE REFORM

From the previous description and discussion, it can be seen that in 1990 neither the Ministry of Education nor the international donor agencies on which the Ministry relied for capital development placed any priority on introducing computers in primary and secondary schools in Jamaica for the purpose of improving instruction and achievement. While both the Ministry and the international agencies recognised the potential of CAI, for different reasons neither saw it as a feasible option. The issue that must first be addressed are the circumstances that placed the introduction of CAI on the national agenda.

· It is not possible to draw a sharp line of distinction between the objectives and content of the reform and its implementation. Because the reform was not centrally planned and took place within an interactive framework of coalition building, the objectives and content were repeatedly redefined and broadened to accommodate the interests of new partners. Formulation and implementation therefore cannot be separated except for the convenience of presentation, and then with resulting overlap.

First Efforts of Schools

Prior to 1990, about ten of the 143 public secondary schools in Jamaica, acting on their own initiative, had established computer laboratories of some sort to support instruction. In fact, the Montego Bay High School not only constructed a lab through the efforts of its PTA, but also was able, with the support of the Ministry of Education, to secure funding from UNDP to purchase equipment and train teachers. This initiative was supported by the Ministry as a pilot study of the appropriate use of CAI. While the school made full use of the support given, there is no evidence of any follow-up to this initiative or extension to other schools.

Schools possessing computer labs were among the most affluent schools with strong support from their communities. Computer labs had also been established in two of the eight teachers' colleges and in the College of Arts, Science and Technology (CAST). The computer labs in the secondary schools were used mainly to teach Computer Sciences for the Cambridge GCE Ordinary Level examinations. Computers were also used to support the teaching of business subjects that required computers skills.

Approximately thirty other schools had acquired from one to four computers of varied types, mainly as gifts from benefactors. In most instances, the computers in this second group were used mainly for administrative purposes.

The fact that about ten of the 143 public secondary schools had acquired computer labs and another thirty were using computers for varied purposes, although no Ministry

policy or provision existed, has to be understood in relationship to the degree of autonomy that exists in the Jamaican school system, as previously described. These schools were responding to demands for education and training and were supported to varying degrees by the communities they served.

Intervention of the Jamaica Computer Society

The Jamaica Computer Society (JCS) is a private, nonprofit professional society created in 1974 to promote professional competence, ethics, and social responsibility in all areas concerned with the application of computers to commerce, science, and administration in Jamaica. The JCS is modelled on the British Computer Society, of which it is an affiliate. Membership is open to computer professionals and affiliates in the industry. The Society is managed by annually elected officers, who volunteer their services. The daily affairs of the JCS are carried out by a full-time manager and staff of two.

In 1989 the JCS became concerned about the inadequate number of appropriately prepared students being turned out by the Jamaican school system annually, in relation to the growing demand for computer professionals such as programmers, system analysts, and engineers. The shortfall of new recruits was seen as a constraining factor in the desire of Jamaican computer professionals and businesses to keep pace with North America. The JCS came to the conclusion that intervention at the secondary level would be most effective in producing in the medium term the number of appropriately prepared new recruits that were needed by their profession.

Meetings were convened with secondary teachers of Computer Science to identify the existing constraints and to formulate an intervention strategy. The first meetings were held in 1989 at CAST. The consultation between the JCS and teachers identified the following constraints:

- Inadequate pre-service and in-service training for the teachers. Usually Mathematics or Business teachers doubled as teachers of Computer Science. Even though these teachers had some background in computers, they often lacked any pedagogic training in teaching the subject.

- Limited equipment in the teaching of the subject. In many cases, Computer Science was being taught in circumstances in which students had very limited hands-on experience given the number of students compared to the number of computers available.

- Computer Science was being offered in the Cambridge GCE, which was being phased out, and not in the Caribbean Council Examination (CXC), which was replacing it.

In these circumstances, the consultation concluded, it was not possible to substantially increase the numbers of students opting to take Computer Science as an area specialisation without addressing the constraints identified. In addition, improvement in the quality of preparation of Computer Science students emerging from high schools required attention to these constraints.

Following further deliberation within the JCS, the following strategy was agreed upon and adopted:

- To establish the Jamaica Computer Society Education Foundation (JSCEF), which would be a nonprofit organisation with a mission to support secondary schools in the teaching of Computer Science through teacher training and providing adequately equipped computer labs.

- To approach the Caribbean Examination Council with a proposal to establish Computer Science as a subject within the complement and to offer technical assistance in its creation through the voluntary contribution of expertise by members of the JCS.

- To mount in-service training for teachers of Computer Science in secondary schools and to approach the teachers' colleges concerning the establishment of appropriate pre-service training for teachers who want to teach this subject.

- To promote and provide secondary schools with adequately equipped computer labs.

- To invite the public and private sectors to become partners in these endeavours.

Through contributions solicited from JCS members, JCSEF was launched in 1990. Its mission was the execution of the strategy outlined above. As can be seen, this mission was focused on the interest of the JCS to expand the number of new recruits graduating from secondary schools who ultimately become computer professionals in Jamaica. This mission was totally consistent with the mission of JCS to promote the interest of its profession, as would be expected of any professional group. Also the secondary school teachers with whom the JCS had dialogue were interested in obtaining support in serving a need, which they had identified, but which had proven to be beyond their resources if it were to be appropriately and adequately addressed.

JCSEF's first efforts were directed towards mounting in-service training for secondary school teachers of Computer Science. The first workshops were held in the summer of 1991. The Foundation also had almost instant success with CXC, which accepted its proposal for the establishment of Computer Science as part of the curriculum and its offer of technical assistance to help develop it. The Caribbean Examination now offers Computer Studies both at the General Proficiency and Technical Proficiently

levels. Similar success was also experienced with the teachers' colleges. Several of these colleges now offer Computer Studies as an area of specialisation.

The provision of computer labs to secondary schools offering Computer Studies proved a more difficult proposition. In the first place, neither JCS nor JCSEF had the resources to place more than a few computers in schools already possessing some computer capacity. Indeed, the first donations of thirty-six computers to schools were made in 1991 to eleven schools that already had computer labs. Second, without the provision of computers in the secondary schools, the success achieved in creating a Computer Studies curriculum in CXC and the in-service and pre-service training of teachers in Computer Studies would be undermined. Third, there was little support within the private sector at that time for putting computers labs in schools for the purpose of training students specialising in computers. As one informant put it, several of the firms approached did not themselves have computers in their operations and could not justify purchasing computers for schools. Fourth, the Ministry of Education had not established any priority in this area.

Notwithstanding these difficulties, the JCSEF found receptive responses from two sources. First, the HEART Trust responded favourably. The HEART Trust is a statutory corporation reporting to the Ministry of Education. Its mission is to promote and provide vocational training to school leavers and young adults. It is supported by a payroll deduction tax paid by all businesses over a particular size as specified by the law upon which the Trust is established. Having examined the mission of JCSEF, HEART had concluded that it fell within its mandate to promote vocational training for young people.

Second, the JCSEF found support from a very influential CEO of one of the large insurance companies in Jamaica. Through her efforts, the company had just completed a video project to support the teaching of Mathematics in secondary schools. From the experience of that exercise, the CEO was convinced that JCSEF had the potential to make a dramatic impact on secondary education. She volunteered to become the chairman of the Business Partners, which was the group that the JCSEF was inviting to become its ally to help provide funds for computer labs.

The point of departure, however, was that both HEART and the Business Partners, assembled by the CEO, had wider interests than providing computer labs for secondary school students specialising in Computers Studies so that they could become computer professionals. HEART and the Business Partners, in addition to supporting the JCSEF in its professional mission, were interested in the potential of computers to improve learning efficiency in schools and to increase students' familiarity with computers as an indispensable tool of work and production.

HEART was established in 1982. After nearly a decade of providing vocational training to school leavers and young adults, HEART had found that although they were

successful in providing high-quality specific vocational training, the general education of many secondary school leavers left much to be desired. In fact, many employers in their feedback to HEART had noted general weaknesses, particularly in English and Mathematics, which detracted from or limited the overall effectiveness of the trainees notwithstanding their mastery of specific vocational skills. The Business Partners shared these observations and concerns.

Both HEART and the Business Partners therefore indicated to JCSEF that in supporting the provision of computer labs in secondary schools, they wished their use to expand beyond providing for the needs of students specialising in Computer Sciences. The particular expansion they desired was the use of computer labs for the purpose of computer-assisted instruction to strengthen the basics in English and Mathematics.

As a result, JCSEF's mission was revised to include the improvement of the quality of learning in secondary education through the application of computer technology. The Jamaica 2000 project was launched as the means of accomplishing this mission.

The Jamaica 2000 Project

The Jamaica 2000 Project was launched in May 1992 as a partnership of the Government, through the HEART Trust; the private sector, through the Business Partners; and secondary school communities. The overall aim was to improve the quality of secondary education through the use of computer-assisted instruction, particularly in English and Mathematics. Accordingly, the target was to place at least one fully equipped fifteen-station lab in each of the 143 secondary schools, seven community colleges, and ten teachers' colleges by the year 2000. Through the Project, the JCSEF would assist the schools in the installation of the labs and provide in-service training for the teachers using the facilities.

A formula was worked out to share the cost of establishing the labs. The schools would be responsible for providing the computer room. To purchase equipment, the Government, through HEART, would contribute 40 percent; the Business Partners would match this 40 percent; and the school community would contribute 20 percent. Bearing in mind that the school community also had to provide the physical accommodation, their share could exceed the contribution of the other partners depending on the circumstances.

In implementing the Jamaica 2000 Project, JCSEF in 1993 and 1994 stuck closely to the mandate to improve learning efficiency in English and Mathematics. However, several schools and colleges found this limitation highly restrictive and advocated for wider use of the computers. In addition, development of multimedia and Internet capabilities over the period supported the advocacy of those who wished wider application of the technology to learning needs.

In the summer of 1995, JCSEF responded to these entreaties by again expanding the mission with respect to improving learning efficiency. It is no longer limited to English and Mathematics but now encompasses the entire range of the secondary school curriculum. Accordingly, workshops were held with teachers in developing appropriate strategies towards achieving such an objective.

The Extension to Primary Education

In 1994 the Business Partners invited a group of business people, principals of schools and colleges, representatives of the National Council on Education, academics from the University of the West Indies, members of JCSEF, and staff of the Ministry of Education to compose a Think Tank to explore the use of educational technology to re-engineer the education system. The group first came together in May 1994 in a three-day seminar to which invitations were extended to experts from other countries that had successfully employed information technology to fundamentally alter their education systems. CAI specialists from the United States, Israel, and Singapore attended. Following this initial exercise, the Think Tank began meeting on a monthly basis. Based on the seminar and these meetings, the Think Tank drew several preliminary conclusions and recommendations.

The long-term improvement of learning efficiency and effectiveness rested on changes at the primary level. However, the Think Tank concluded that while the Jamaica 2000 Project had made substantial progress in introducing CAI in public secondary and tertiary institutions, progress at the primary level was minimal. Moreover, with the use of current technology, 30 percent of children were functionally illiterate at age 12, even though the country enjoyed universal primary education, low drop-out rates, and high completion rates of six years of primary schooling. Numeracy was also a matter of grave concern at the primary level. The challenge of basic education in Jamaica is that of qualitative improvement in learning efficiency and school attendance, both of which were interrelated.

Education technology, employed to re-engineer primary education, could be the key to improved quality. The primary schools in need of the most urgent attention are small schools located in rural communities, from which parents were removing their children to send them to schools in towns and cities, and primary schools in depressed urban communities. To target these primary schools, the Think Tank made several recommendations: employ mobile units as well as fixed labs to address these needs, mount a programme to re-engineer all 790 primary schools in Jamaica by the year 2020 (the programme was given the title Education Technology 20/20), approach the business community and international donor agencies for assistance in mounting pilot projects in the Education Technology 20/20 programme.

Under the dynamic leadership of the Chairman of the Business Partners and with support from JCSEF, assistance was obtained from the Inter-American Development Bank to introduced computer technology and CAI into twenty primary schools located in four different rural clusters. Implementation of this project began in September 1995. More recently, assistance was also obtained from the World Bank through the InfoDev Project, which was to commence in the school year beginning in September 1996.

Through the instrumentality of the Business Partners, two additional features were added to the reform. First, the use of CAI was extended to primary schools to respond to the concern of the business community to improve literacy and numeracy levels in the products of the school system. Second, international partners were added to JCSEF, HEART, the private sector, and the school community. Again the objectives and content of the reform had been redefined in the process of implementation.

In summary, it seems accurate to say that the objectives and the content of the reform have evolved through four separate phases since 1990. These phases could be summarised as following:

- **Phase 1**. The use of computers to give hands-on exposure and experience to secondary school students specialising in Computer Studies who hoped to pursue a professional career in the information technology field or in certain Business subjects. The emphasis here was producing adequate numbers of appropriately initiated new recruits for the computer-related professions. This objective, and related content, was driven by computer professionals through the JCS. This was the starting point of the reform.

- **Phase 2**. The use of CAI to remediate weaknesses in the mastery of basic skills in Reading and Mathematics and to promote computer literacy among secondary school students. This has now been extended to primary schools on a pilot basis. The priority here was improving learning efficiency in these basic skills on the assumption that such improvement would enhance the quality of general education being offered in the school system. This objective, and related content, was driven by HEART and the Business Partners in response to their perceptions of the needs of the employers and the workplace.

- **Phase 3**. The use of CAI to enhance learning in all subject areas as teachers guide students in the use of appropriate subject-related courseware. This objective, and its related content, has been added by some principals and teachers in schools in which labs have been established. These principals and teachers are not only knowledgeable about CAI but also anxious to maximise the potential of information technology at their disposal.

- **Phase 4**. The use of information technology in knowledge production. This involves the use of the productivity tools by teachers and students to write, publish, solve problems, and create databases for use by others; the use of multimedia for research and enrichment; and the use of network capabilities to research and share information. This objective, and its related content, is emerging among the more proficient users of the computer labs in the schools and is given full expression in the InfoDev Project.

IMPLEMENTATION

In examining the implementation of the reform, it is necessary to distinguish between the work of JCSEF, operating at a national and central level, from activities at the level of schools and colleges. While the two are interrelated, the dynamics and rhythms are different. While JCSEF is coordinating inputs and partners, administering projects from different sources, and controlling the purchase and distribution of equipment, the schools and colleges are focused on fund-raising, providing the labs to house the computers, and all the matters related to instruction.

Progress to Date in Quantitative Terms

Before dealing with each of these elements of implementation of the reform, it is necessary to briefly report, in quantitative terms, on the progress made to date. As of May 1996, JCSEF had placed computer labs into 71 of the 160 public secondary and tertiary institutions in Jamaica. The Ministry of Education conducted a survey in April 1996 to determine the number of schools and colleges with computer labs. The survey found that 84 of the 143 secondary schools had labs and all 17 tertiary institutions possessed labs, although the lab in one college was only partially equipped. In total, therefore, 101 of the 160 secondary and tertiary institutions had computer labs. Hence with four years still to go, there are 59 institutions that still need to be equipped in order to achieve the target of introducing CAI into all secondary and tertiary institutions in Jamaica.

In the opinion of the leadership of the JCSEF, the target will be achieved. Eighteen schools have raised their contributions and are projected to receive their labs in the coming school year, with the remaining 41 schools and colleges receiving their labs in the following three years. Equipping 41 schools with computer labs over three years is below the rate at which schools have acquired and been equipped with labs since 1991. The confidence of the JCSEF leadership in stating that the target will be met does not appear to be either overly optimistic or misplaced.

The Ministry survey's finding that 101 secondary and tertiary institutions possessed computer labs in April 1996 provides evidence that thirty institutions acquired labs without the assistance of the JCSEF and the Jamaica 2000 Project. Bearing in mind that ten institutions acquired labs prior to the creation of the Jamaica 2000 Project, then at least twenty institutions have acquired labs on their own during the period of the Project's existence. Cursory investigation of a few of these instances reveal that some of these institutions could not meet the cash requirements of the Jamaica 2000 Project but tapped sources who could provide in-kind contribution in the form of the computer labs. Some of these sources included Past Student Associations active in North America and England.

The fact that should not be overlooked is that approximately 30 percent of the secondary and tertiary institutions with computer labs that use CAI are outside of the JCSEF initiative. This highlights the reality that JCSEF is providing leadership and coordination in the reform but is not the sole source of its implementation.

As of May 1996, fifteen of the twenty-one labs had been installed in public primary schools included in the IDB project. The remaining six schools are expected to receive their labs in the coming school year. Given the fact that the primary schools with computers are in four clusters linked to neighbouring secondary or tertiary institutions, it was decided to probe the implementation of the reform at the school level in three clusters marked by different set of characteristics. It should be noted that the Ministry survey of April 1996 revealed that seventeen public primary schools had computer labs. This indicates that two public primary schools had acquired labs outside of the framework of the JCSEF/IDB initiative.

JCSEF and the Implementation of the Reform

JCSEF is governed by a seventeen-member Board of Directors comprised of representatives of the Jamaica Computer Society, the private sector, the Ministry of Education, HEART, and the Jamaica Teachers' Association. While the composition of the Board is broad and inclusive of both the private and public sectors, the membership is heavily skewed in favour of the Computer Society and the private sector in that only three of the fourteen members are from the Ministry, HEART, and the teachers' association. The Board meets monthly and operates through four committees: Management, Academic Affairs, Public Relations, and Business Partners.

The day-to-day affairs of the Foundation are carried out by a Secretariat comprised of a full-time Executive Director and Administrative Assistant and a part-time Public Relations Officer. The policy of the Foundation has been to contract for services related to operations, including the installation of computer labs, the initial orientation and in-service training of teachers when labs are installed in schools, and the maintenance of the computer labs.

The activities currently carried out by the Secretariat in implementing the reform can be listed as follows:

- Managing the three projects that are currently on stream: The Jamaica 2000, IDB, and World Bank projects.

- Supporting the marketing and fund-raising efforts of the Business Partners. Breakfast meetings with the CEO and top management of corporations, with subsequent follow-up, have been frequently used in marketing of the reform to the private sector.

- Managing the funds raised from the private sector, contributions from schools, and the annual grants from HEART.

- Periodic reporting to HEART, corporations making donations, IDB, and the World Bank relative to their contributions to the provision of equipment to the schools.

- Reporting to the Board of the Foundation on the progress of the reforms and the operations of the Secretariat.

- Procuring and distributing computer equipment.

- Contracting services related to the installation of labs, in-service training of teachers, and the maintenance of labs.

- Liaising with schools through regular visits.

- Mounting an annual Exposition on CAI. The first Exposition was held in 1993 and they have taken place annually since. The Exposition has attracted wide support and interest from schools offering to exhibit as well as the public in viewing the exhibits. At the 1996 Exposition, visitors lined outside up well ahead of the opening of the doors. The exhibition also attracted widespread media coverage.

- Conducting annual summer workshops for teachers.

Over the five years of the existence of the Foundation, it has attracted an overall investment in support of the reform of over U.S.$5 million. It has placed computer labs into 71 secondary and tertiary institutions and trained more than five hundred teachers in CAI. Through its efforts, Computer Studies at both the General Proficiency and Technical Proficiency levels is offered in CXC to students in secondary schools throughout the Commonwealth Caribbean. Computer Studies is now offered as an area of specialisation in teachers' colleges to trainees preparing to be secondary school teachers. In addition, the numbers of students graduating from secondary schools with the specified prerequisites to be trained as computer professionals have expanded substantially. These are impressive achievements by any standards.

In probing beyond the obvious and impressive accomplishments of the Foundation in the implementation of the reform over the five years of its existence, a number of features and trends were noted. Each of these require some brief elaboration.

First, it has to be acknowledged that these accomplishments have been due more to the charismatic energy of the members of the Secretariat and the Business Partners than as a result of the adequacy of organisational structures and staffing. Indeed, the current responsibilities of the Secretariat are outside what could be reasonably expected of a staff

of one part-time and two full-time employees. The structural constraint creating this situation is that while it has been possible to attract funding support for the purchase of computers and for training, it has been much more difficult to obtain funding for core administrative support. Also in order to maximise support for the work in schools and colleges, the strategy has been to keep overheads as low as possible.

Some attempt has been made by the Board in the last four months to address some of the weaknesses inherent in this situation. In the new arrangement, project implementation will be contracted out, leaving the Secretariat responsible mainly for administrative support, fund-raising, public relations, and reporting responsibilities to the Board and benefactors. In fact, a new Executive Director has been appointed and the former Executive Director has been contracted to undertake the project implementation responsibilities. While this arrangement effectively expands the number of people engaged directly in guiding the reform, it is left to be seen if this modest expansion is sufficient to overcome observed weaknesses of this organisational structure in the core administration of the reform.

The importance of charismatic energy in accounting for some of the early success in the implementation of the reform is underscored by the fact that the Chairman of the Business Partners retired as the CEO of her corporation and left the island in April for an assignment with an international agency. Associated with her departure has been a noticeable decline in the fund-raising activities by the Foundation within the private sector, just as there was a substantial increase when she assumed the Chairmanship. It seems reasonable to conclude that more than the current deterioration in the general economic vitality of business in Jamaica is the root of this decline in private sector returns, and that the charisma of the Chairman was a critical factor.

In observing the implementation of the reform from the perspective of its central administration at the Foundation, it would appear that the reform is still at the stage where it is charismatic leadership of paid staff and volunteers that is assuring its success more than organisational arrangements, systematic programmes, and adequate staffing levels. In other words, the transition to the latter is still to be made.

Second, the scope of the reform has been enlarged way beyond the original vision upon which the Foundation was established, leaving some within the Jamaica Computer Society with the feeling that the reform is now of control, or at least outside their control. From its starting point of seeking to enhance the development of the computer professions, the reform has become a national exercise to transform instruction and learning outcomes in the school system. This transformation over the last five years has been the source of tension and concern within the JCS, where some would prefer the more modest and manageable goals that were first enunciated.

The essence of the unease is that, on the one hand, computer professionals are collaborating with people not in their profession, and in some instances with little technical knowledge, and, on the other hand, as computer professionals, they are operating in pedagogical areas within the school system that are not within their competence. Faced with this existential situation, some would wish to retreat to more familiar territory related to their profession. The majority, however, are enamoured with the prospect of breaking new ground and of making a national contribution in an area that commands significant public and popular attention: improving the quality of learning and modernising the education system. While the majority has prevailed, the minority opinion cannot be dismissed.

Third, in the absence of state authority driving the reform, vested interest is the glue that keeps the partners collaborating. The interest of the JCS is the advancement of the computer profession. HEART is not only pursuing its main mission of promoting vocational training, but is also seeking to ensure that better prepared school leavers enter into its programmes. The Ministry is supportive of activities to advance education that do not demand budget support at the present time. The Business Partners are interested in employees with a higher level of general education. The schools are keen to modernise and acquire resources that will enhance their efficiency and effectiveness and raise their prestige in the communities in which they operate. Teachers are interested in training and resources that will improve their effectiveness in circumstances in which there is considerable public pressure to perform, even with very limited resources. The international development banks that lend to the Jamaican Government are interested in developing their loan portfolio for the future and therefore are engaged in enlightened business development at the pre-feasibility stage of project cycle management.

The point is that while the vested interests of these partners and collaborators are clear and are on the table, so to speak, there are other interests that are not as obvious and are not on the table. These include the interest of hardware and software suppliers in creating markets for their products in the long term and in securing supply contracts in the short and medium term. These interests are embedded in the JCS itself and reflected in the Foundation. While there is nothing dishonourable about these interests, because they are less transparent than the others, they are potential sources of suspicion in deliberations related to the conduct of the business of the Foundation, and therefore in the administration of the reform.

In any enterprise driven by vested interest, at least partial satisfaction of the interests of all collaborators and partners is essential if the enterprise is to be sustained. Further, there is the challenge of balancing interests in the decision-making processes. Either adroit leadership from parties without any known or suspected vested interest, or the willingness of parties to compromise, or some combination of both, is critical if coherent and co-ordinated actions are to be sustained. The work of the Foundation has not been without its challenges and problems in this direction. One informant remarked that

contact with implementation in the schools had always been more inspiring than the deliberations of the Board. While the Foundation has been able to overcome most of these challenges, the work of the Board has not been without tensions and fall-out, including the resignation of at least one Board member.

Fourth, while the private sector has enjoyed high visibility for its participation and financial contribution to the reform, public sector and school community support have been as substantial and both have been more reliable. To date, HEART has contributed approximately Jam$60 million, or just under U.S.$2 million to the reform. When it is considered that school communities bear the total cost of the physical accommodation plus 20 percent of the cost of the equipment, then their contribution is at least the equal of the other partners. While the HEART contribution is included in its annual budget and therefore is programmatic, the contribution of the private sector is ad hoc.

Currently, there are thirteen schools that have constructed their labs and paid in their 20 percent contributions but are still awaiting the delivery of the labs. Five other schools have constructed their labs and raised their contribution to the equipment but have not paid the funds into the Foundation, being aware of the delivery queue that now exists. The HEART contribution for these labs has also been paid. The hiatus in delivery has resulted from the less than timely inflows of the private sector contributions. One explanation offered for this situation is that in circumstances at the outset where private sector contributions were not forthcoming, it was necessary to create some success and momentum. Corporations were willing to give lump-sum contributions as single donations, or spread them over two years, but were reluctant to make ongoing commitments to the year 2000. Faced with this reality, the fund-raising strategy adopted was both ongoing and repetitive. Although the departure of the effective Chairman of the Business Partners appears to be a factor in this hiatus, it would appear that a change in fund-raising strategy is also warranted.

Given the success that has been achieved so far, the time available to achieve the 2000 target, and the manageable number of schools still to be equipped, it does seem possible for the reconstituted Business Partners to devise a marketing strategy to the private sector which includes a programmatic element of pledged contributions to the end of the decade.

Looked at as a whole, it appears that initial steps are being taken at the level of the Foundation to make the transition from the stage where implementation is largely the result of charismatic leadership and almost missionary zeal to a more systematic organisational framework and a more programmatic approach to the various aspects of the reforms.

Implementation at Above Rocks

Above Rocks is a community located in the hills of St. Catherine. It is about forty minutes drive by car, or about one hour by public transportation, from the city of Kingston. Most people in the district are engaged in farming on small tracts of land. A significant minority commute daily into Kingston for work. Like most small farming communities in Jamaica, the people are by no means wealthy, education is prized as a means of escaping the trap of persistent poverty, and the church is a mainstay of community life. There are churches of several denominations in the district, including a Catholic church which runs the only secondary school in the area, St. Mary's College. The Catholic church also runs the primary school and a Vocational Training Centre.

The parish priest is very influential in the community, in addition to being well-liked. He regularly attends functions held by other churches. As chairman of the Board of the secondary school, he was influential in employing a Baptist minister, who had been the pastor of the Baptist church in the district, as the principal of the school.

St. Mary's College belongs to that category of secondary schools in Jamaica to which entry is eagerly sought. Admission to the school is selective, through the Common Entrance Examination run by the Ministry of Education. St. Mary's College is the only secondary school of this type in the district and the surrounding area. Father, as the parish priest is called, has been working assiduously to improve and expand the school. Currently the school has an enrollment of 770 students and a staff of 30 teachers.

Early in 1992, Father was successful in securing a donation of an assortment of twenty used IBM and Apple computers from benefactors living around St. Thomas University in Minneapolis, Minnesota. They were shipped to Jamaica through Food for the Poor, a charitable organisation which includes assistance to schools as part of its mission. Previously, the school had recruited a Mathematics teacher, with a strong background in Computer Science, from the same area of Minnesota. This teacher was assigned the responsibility to establish and configure the lab as well as determine its use. The computers were limited in their functionality because they possessed only floppy drives.

Proud of his acquisition of the donated computers, Father set about constructing a large computer lab through funds raised by the school from past students and other supporters. Unknown to Father, the Maths teacher had set up the computers in a small room while waiting for a larger lab. In November 1992, the JCSEF Executive Director attended a funeral in Above Rocks at which Father presided and was asked to transport him from the church to the cemetery. In the course of conversation, Father mentioned the computer project, and the Executive Director invited himself to see the lab under construction. The visit coincided with the shift in focus of the reform from computer

specialists to CAI in support of English and Mathematics, and also with the inauguration of the Business Partners support.

When he visited, the Executive Director discovered a large, well-appointed computer lab almost completed. In the meantime, the donated computers were not still in the boxes in which they were shipped, but installed in less auspicious accommodation than was under construction. Both realised the common ground that existed for cooperation between the school and JCSEF. The result was that a thirty-station model lab was launched at St. Mary's College in January 1993 in which education software, including Maths and English, was the basis of the programme.

Initially the programme at St. Mary's was set up along four separate lines:

- Students in Fourth and Fifth Forms, Grades 10 and 11, were prepared for Computer Studies in the GCE/CXC examinations. This consumed the equivalent of two school days out of the week.

- Auto-Skills, the software supplied by the Foundation to promote the upgrading of English and Maths, was allocated time for students deemed to need it. The time allotted was two 45-minute periods per class per week in Reading.

- The remaining time was allotted to teachers who could sign up for one class per week in the lab for the teaching of their subject. The school acquired software to support the teaching of different subjects. It also provided a Lab Technician who would set up the lab for the teachers, so that they could concentrate on instruction. Teachers were to preview software programmes, select elements relevant to the topics they were teaching, and then come with their students to the lab for the use of these materials.

- After regular school hours, classes were held for teachers and members of the community. Courses were offered at an introductory, advanced, and CXC level. The introductory and advanced courses were each offered over a six-week period and involved a total of forty-eight hours of instruction. The CXC course was arranged in sequence with the short courses but offered over a school year. These courses were offered on a cost-recovery basis.

This model combined use of the lab for teaching of students specialising in Computer Studies, using CAI to support remedial and other instruction, and offering courses to the community. The model was followed for two years. After review, the following conclusions were reached:

- *The CXC programme had worked.* Students were obtaining reasonably good results in the external examinations, and there was strong demand among the student body for Computer Studies.

- *The evening programme had been successful.* The short courses had enrolled ten to twenty people per session and had been taken by a wide variety of persons from the community. These included teachers from the school itself, teachers from the neighbouring primary schools and the Vocational Training Centre, policemen from the local station, shopkeepers, and school leavers who had left school between one and five years ago who were either in search of jobs or who had obtained employment in jobs in which knowledge and mastery of computer applications was a distinct advantage.

- *The Auto-Skills Reading programme was found to be too teacher-intensive because its structure demanded constant monitoring of the students' work by the teacher.* In attending to the needs of these students, many others were left unattended. Also the programme itself was not teacher-friendly. In addition, after about three weeks, it became increasingly boring to both teacher and students. Auto-Skill Maths was best used as a filler because much of its content could not be related to the real life circumstances of the students. For these reasons, it was decided to discontinue the use of Auto-Skills in the CAI programme.

- *The allotment of computer time to all teachers to use the lab in the instruction of students in their subject area had not worked satisfactorily.* Only about ten of the thirty teachers came regularly with their students to the lab. The rest sent the children sometimes but did not come themselves. This was despite the fact that training sessions had been held with all the teachers at the start of the programme. A major difficulty was that teachers did not come to the lab to review the software packages related to their subject. There also seems to have been some level of resistance to changing lesson plans and materials to fit the package materials. There was also frustration among some teachers with glitches in the technology such as lost files, computers out of operation, and other such malfunctions. Faced with these frustrations, some teachers had simply returned to their manual methods and old ways of doing things. It was decided to discontinue this component of the programme.

It would appear that apart from the logistical problems surrounding the use of the labs by teachers of the various subjects, there was also a problem with the software packages themselves. It was not only that the teachers did not systematically review the software packages for appropriate material, but also that some teachers were not impressed by the materials in the package and therefore did not invest the time in the exercise. One teacher was of the view that software developed for the Caribbean school system, and the CXC curriculum in particular, would have been treated differently. "CXC Maths on the computer would be great, like the video done by Mutual Life," this teacher stated.

For the 1995–1996 school year, the school adopted its own approach to CAI. The essence of the new approach was that computers would be taught to all students of Grades 7 to 9 as a tool for productive, creative research, communication, and problem-

solving purposes. Accordingly, computer lab time of 90 minutes per week was time tabled for all Grades 7 to 9 classes. A single teacher, with the help of two lab assistants, was assigned to teach the classes. The first year's instruction centred around teaching the students word processing, desktop publishing, and research skills related to the use of encyclopaedias and search engines. With these elements, students were required to develop a creative writing portfolio comprised of five projects over the course of the year. All students in Grades 7 to 9 did this course in this first year of the introduction of this new model of CAI.

From all accounts, the response of the students to this new model has been tremendous. There was high attendance, no disciplinary problems, completion of the portfolio of five projects by the vast majority of students, great pride in the finished printed product, and a great desire to take it home and show it off. In addition, over the course of the year, the quantity of students' writing increased and the quality improved as they grew in confidence.

Based on this experience, it was decided that the exposure to CAI as practised in this new model would begin in Grade 8. Hence in the coming school year, Grade 7 students will not be included in the programme. For the Grade 8 and 9 students, the course for this school year will be centred around the computer as a problem-solving tool. Students will learn statistical and charting concepts and techniques to design floor plans of buildings. The portfolio will be centred around using their techniques to develop a product and the print and radio advertising programme to promote it using the multimedia skills capabilities of the labs and the skills learned in the previous year. In subsequent years, the Grade 8 and Grade 9 courses in CAI will follow along the lines of these two introductory years.

In this new model of CAI, 18 of the 25 hours of instruction per week were used in the instruction of Grades 7 to 9 students. The remaining 7 were used for Grades 10 and 11 students specialising in Computer Studies for CXC. The decision to start instruction in Grade 8 appears to be a pragmatic one to give back some of the lab time to the specialists, as well as to reduce lab usage from almost 100 percent of the school day to approximately 90 percent. What is not in question is that for the last school year, the lab was used intensely. What is proposed for the next school year may well be the optimal condition given this configuration and a ratio of 1 computer to 26 students.

The following observations seem warranted concerning the new model that has been adopted by the school:

- The use of the computer lab is now limited to the preparation of specialists in Computer Studies in Grades 10 and 11 and to the teaching of the computer as a tool to all students in Grades 8 and 9. As such, CAI is not possible in relation to the teaching of all the other subjects of the curriculum of the school. Put another way, there is now

no integration between computers and the rest of the curriculum. This is highlighted by the fact that the Creative Writing Portfolio was not developed with participation from the teachers of English in the school, but was solely as an exercise related to teaching the use of computers.

- The one-third of the staff who *had* made use of the computer lab have now been virtually excluded due to the intensity of lab use required by this model. It is also interesting to note that about one-third of the teachers in the school had attended the evening classes to the advanced level. Currently they constitute a developed resource in CAI in the school that is not being utilised by the new model. Given the success of the new model, it may seem that additional computer facilities would be needed to tap this potential.

- Currently the lab size is 30 stations while the class size in the school averages 39, with a few classes being as large as 50. There is need for the lab size and the class size to be more in sync. Probably a lab size of 40 would be more appropriate in this setting.

Notwithstanding these observations, it must be said that through a process of trial and error, St. Mary's College has worked out for itself an eminently rational approach to the use of the computer resources at its disposal. In the early grades of the school, it exposes all students to the computer as a tool for production, research, communication, and problem-solving. At the higher grades, it allows those students with aptitude and interest to specialise in Computer Studies. After school hours, it supports members of the community, including teachers and past students, to continue their professional and personal development through mastery of information technology. There can be no question that the teaching and computer resources of the school in information technology are fully utilised.

In examining the implementation of the reform at Above Rocks, four additional aspects to those previously described need to be noted. First, while the after-school programme has assisted persons in the community employed in or hoping to be employed in non-agricultural occupations, it has not yet make an impact on the main economic activity of the district. This is not to underestimate its immediate impact on the non-agricultural occupations, given that a substantial minority of the community is employed in jobs in the city for which information technology skills is a distinct asset. Rather, it is to highlight a deeply rooted structural factor in the relationship between schooling and peasant farming in Jamaica. Peasant farming is what is left, when schooling has failed. Schooling is the escape hatch from persistent poverty. Information technology applied to schooling enhances its capacity to play this escape role, and therefore its potential to improve the marketability of community members in non-agricultural occupations is immediately grasped. Its potential to enhance agricultural pursuits in peasant farming is a matter that requires more careful cultivation. The development of this potential, in all

probability, requires deliberate intervention which may be beyond the capability of the normal secondary school.

Second, some teachers of the two primary schools and the Vocational Training Centre in the Above Rock area, out of a desire to improve themselves, made use of the opportunities of the evening classes and did both the introductory and advanced courses in computers and their applications. This was done at their own expense. Now that the IDB Project is being implemented in the Above Rocks cluster, immediate use is being made of this training. Further, graduates of the St. Mary's College Computer Studies CXC course are now the lab assistants in the primary schools and at the Vocational Training Centre. Also, it was the teacher in charge of the computer lab at St. Mary's, assisted by some other teachers of the school, who installed the labs in the primary schools in the cluster. Following the setting up of the labs, teachers of St. Mary's offered training to the primary school teachers who had not had previous exposure to computers. Put another way, as a result of its four years of operation, St. Mary's College has offered technical assistance and training to the educational institutions in the area.

The relationship between St. Mary's and the primary schools, however, should not be seen as one way. Now that the primary schools are in possession of labs and will be offering CAI to their students, students entering St. Mary's in another two to three years from these primary schools will have already been exposed to some of the instruction now being given at the secondary school. This fact of itself will require St. Mary's to rethink its current model. For example, if students are entering the school with previous knowledge and exposure to CAI, it is doubtful whether the current policy of excluding Grade 7 students would be appropriate. In other words, a dynamic and interactive relationship is being established between the educational institutions in the Above Rocks area which will require constant adjustment and change as it works itself out over time.

Third, a productive income-earning capacity has been established, the potential of which is only just begun to be realised. The researcher stumbled upon this on a visit to the school, since none of the informants had mentioned this development. On this visit to the school, the researcher met the Ministry's senior research officer delivering material for data entry for one of the Ministry's projects. He said that the Ministry had entered into a contract with the school to do the data entry for this project. The school had organised some of its Grade 11 students, under the supervision of the lab assistant and teacher, to actually do the job. The Ministry was pleased with the accuracy of the work, the timely delivery of the results, and the price that it was able to negotiate compared to other sources. He was, in fact, delivering another batch of data to be processed having received results from previous batches.

While the price being charged by the school pleased the Ministry, for the school it represented substantial earnings. Summer jobs had been created for several students of the school who would otherwise have been unemployed. Income was earned by the

school itself which could be further invested into the facilities. The income-generating capacity of the lab both for evening classes and data processing explains how St. Mary's has been able to finance memory and multimedia upgrades to its facilities as well as ensure effective maintenance. It would appear that the school is doing more than teaching Grade 7 to 9 students about the computer as a productive tool, it has begun to use it as such in income-generating activities.

Fourth, just as the implementation of the reform at the level of the JCSEF was fueled by charismatic leadership, the same is true at Above Rocks. It is the instrumentality of a well-beloved parish priest, supported by a competent, confident, and committed teacher, upon which the introduction of information technology in the district and its surrounding area is founded. The JCSEF national effort came upon the local efforts of the parish priest and his able lieutenant, and the synergy of the combination has exceeded what either on its own would have or could have accomplished.

The local effort at Above Rocks has not slavishly followed the prescription of JCSEF in using Auto-Skills as the basis of CAI and as the means of improving English and Mathematics competence. Having tried Auto-Skills and found it wanting, they have devised their own programme for achieving the broad objectives of CAI and English and Mathematics competence. Further, the evening classes have extended the reform beyond the school and included the community, especially those living and working in the area who desire to advance professionally and personally. Mainly due to the efforts of the priest and the teacher, in the space of four years a firm start has been made in changing the quality of education in the school and the impact of the school on the community. In the process, the reputation of the institution has also been advanced.

Implementation at St. Elizabeth

In the parish of St. Elizabeth, the reform is being implemented in five primary schools, six secondary schools, and the teachers' college. The implementation of the project in the secondary schools follows the basic outline described for St. Mary's College. Computer labs are being used to assist in the preparation of students who hope to pursue careers in information technology or related areas. CAI is being used for remedial work in English and Maths and enrichment in other areas. The exact mix of modes varies with the particular schools and their circumstances. Given the constraint of time and resources, no attempt was made to probe the implementation at the secondary level in St. Elizabeth.

The Teachers' College and Its Relationship to the Reform

The implementation of the reform in St. Elizabeth is led locally by Bethlehem Moravian College, a teachers' college in transition to a college with broader offerings. The college is located in Malvern, St. Elizabeth, in the southwestern section of the island about one hundred miles from Kingston. This college was established in 1861 and has a long and

rich history. It was the first college in Jamaica to train female teachers, but is currently coeducational. The college has had an educational technology lab since 1973 and a computer lab since 1985, established with assistance from Lehigh University in Bethlehem, Pennsylvania. However, by the early 1990s, the equipment was obsolete. At the same time that Bethlehem was seeking ways to replace its obsolete computers, JCSEF had developed its partnership programme. The college already had the lab and had no difficulty in raising its 20 percent contribution toward purchase of the equipment. Bethlehem became part of the Jamaica 2000 Project in 1993.

The understanding was that the college was being supported in its programme of training secondary school teachers in Computer Studies and that JCSEF would have access to the lab for the in-service training of teachers particularly in the summer. There was no requirement for the college to undertake any outreach activities in support of the Jamaica 2000 Project.

Part of the reason for Bethlehem's strong involvement with information technology resides in the fact that its current principal, who had previously been a lecturer on the staff, is one of the few people in Jamaica with a doctorate in educational technology. Given his competence in information technology, his commitment to southwestern Jamaica, and his contacts in the school system in that region, it was not surprising that the Executive Director of the Foundation asked him to provide support to the Jamaica 2000 project in that section of the island, which he volunteered to do. It is also against this background that he was invited to become a member of the Think Tank established by the Business Partners in 1994. His work in the area was also an influential factor in the selection of primary schools in St. Elizabeth as one of the clusters in the IDB Project.

Bethlehem has a multifaceted relationship to the implementation of the reform. For ease of presentation, it is necessary to make the distinction between those that are directly related to the college site and those carried out elsewhere. At the College the computer lab and information technology are used with four groups of students:

- Teachers of Computer Studies for secondary schools are trained at the college. Students admitted to this programme would have had to have passed the CXC General Proficiency examinations in Computer Studies. The loop into the reform that this represents is interesting. The Jamaica Computer Society collaborated with CXC in both the creation of the Computer Studies Curriculum and the examination. It also collaborated with the Joint Board of Teacher Education in the creation of the curriculum to train secondary school teachers to teach CXC Computer Studies. Now college students with CXC qualifications are being trained to become teachers of the subject, facilitated by a lab that had been upgraded through the Jamaica 2000 Project.

- The computer lab is also used in instruction in computer literacy skills to the approximately one hundred first-year students who are not Computer Studies specialists.

- It is also used in the Evening College programme to offer computer skills to members of the community. This is a similar outreach activity to that noted at St. Mary's College.

- The lab is used in the summer by JCSEF to offer in-service training to teachers in the Jamaica 2000 Project. The boarding facilities of the college enables teachers to come together from different sections of the island. The first summer course was offered in 1993.

In addition to these activities on campus, the College is engaged in the reform in three significant ways. First, through a member of the staff of the College who is a Peace Corps volunteer, the college provides in-service training to the staffs of the six secondary schools in St. Elizabeth in which computer labs have been installed. This is done through a ten-hour course on the use of computers held once per week, for two hours a session over a five-week period. This course is offered at a school, with two separate two-hour sessions offered each time. Half the staff attend a morning session and the other half attend an evening session. By means of this on-site training, it is hoped that all the staff members in these schools will become proficient in the use of computers.

As an aside, the staff member reports that on several occasions in visiting schools, he has had to offer assistance with malfunctions in the operation of the lab. In his experience, there have been only a few hardware problems. In the majority of instances where labs were down or computers were not working, he has found the problems to be software-related malfunctions. Although this support for the implementation of the reform was not planned, the College has been offering maintenance support as an offshoot of its involvement in training.

Second, the College is offering both leadership and training in the implementation of the IDB project. A lot of the work done to develop criteria and select the schools to be included in the cluster in St. Elizabeth was done by the principal of the college. In addition, he has been making visits to the schools and assisting the principals and teachers with various matters related to project implementation. Further, through one-day and vacation courses at the college, training has been offered to the primary school teachers in the cluster schools.

Third, the principal of the college has provided an important link between the development of national strategy and realities in the field. He has been a member of the Think Tank of the Business Partners from its inception. His involvement in field implementation and his membership on a body that is national in scope has provided an

important link and perspective in formulating strategy and addressing issues. Further, as an educator of teachers, the principal represents a dimension that is different from the school perspective but one that is critical to the long-term viability and sustainability of the reform.

Implementation at Red Bank

Red Bank is a small district located in the hills of St. Elizabeth. The vast majority of its residents are engaged in peasant farming. They grow vegetables, mainly tomatoes and carrots, which they market themselves. The district is relatively poor, but in the tradition of peasant farming communities in Jamaica, education is highly prized.

The Red Bank All Age School has an enrollment of 240 students: 114 boys and 126 girls. It has a staff of 7 teachers, including the principal. The general organisational pattern of the school is one class per grade. However, Grades 4 and 5, and Grades 7 to 9 are combined into two classes respectively. By this means, the 6 teachers are each assigned a class.

The principal is a past student of the Red Bank school. He started his teaching career at the Basic School (a pre-school) and then moved to the All Age school. After going to the teachers' college for training, he returned to the school as a teacher. Ten years ago he was promoted to the position of principal. He is highly respected and regarded in the district. Under his leadership the school has made strides especially in the performance of students in the Common Entrance Examination (CEE). For example, in 1995 the school sent twelve children to the CEE, half of whom gained places to high schools. The national average for all schools is 20 percent, based on the number sitting for the CEE and the number of high school places available.

In the past, the school had experienced some vandalism and therefore was included by the Ministry in the SCOPE Project. A very active SCOPE committee was established and vandalism disappeared. The SCOPE committee remained active even after the project came to an end. Based on criteria related to the size of the school, multi-grade teaching in school classes, the known efforts of the principal to raise standards in the school, and the existence of an active SCOPE committee, the Red Bank school was recommended by the principal of Bethlehem and later selected by the Foundation to be one of the schools to be included in the IDB Project.

On the very evening in March 1995 that the principal learned of the selection of the school, he set in motion activities to gain the support of the School Board and the SCOPE committee to mobilise the school and the community. The school did not have a room to house the computer lab. One had to be built. That was the responsibility of the school. The school also had to raise its 20 percent contribution to the cost of the equipment. After alerting the SCOPE committee, the principal wrote letters to every household in the

district informing them of the development and soliciting their support. The following fund-raising activities were organised by the school with assistance from the Board, SCOPE committee, and PTA:

- A competition between the classes in the school in raising funds by various means and events.
- A paid concert, mounted with the help of the PTA.
- A raffle organised by the PTA and SCOPE committee.
- Letters soliciting contributions from past students living outside of Jamaica.
- Letters soliciting contributions from firms doing business with the school and community.
- Appeals to the churches in the community to contribute.
- Pledges of free labour by members of the community and the school. For example, the male teacher on the staff has some competence in electrical installation. He volunteered to wire the lab under the supervision of a licensed electrician, who was also a member of the community who donated his services.

Over a seven-month period the school raised Jam$248,000 or U.S.$7447. The school started the building while the funds were being raised. The building under construction became a strong motivational force in the fund-raising. Assisted by a substantial amount of free labour the lab was completed. However, the school owed Jam$70,000 or U.S.$2102 for materials, labour, and professional fees that it had to purchase. The SCOPE committee accepted the liability of this debt and paid it off through its own fund-raising efforts. While in absolute terms, these may appear to be modest sums, in a small peasant farming district in rural Jamaica that is cash poor and where barter is still an accepted from of economic exchange, they represent considerable amounts.

A six-station lab was installed at the school and became functional in early November 1995. Because each of the six teachers in the school has a class assignment, the principal assumed operational responsibility for the lab. The following are the CAI activities that have been mounted at the school:

- Remedial Reading and Maths for students of each grade diagnosed as being in need of such assistance. Six students are sent at a time from each grade for approximately thirty minutes of instruction daily using the Auto-Skills Reading and Maths programme.

- Students from Grade 6 to 9 are being instructed in Basic Windows techniques, word processing, the graphics programme Paint Brush, research skills using multimedia, and desktop publishing.

- In the afternoon, fourteen secondary school teachers and college students are allowed access to the lab for the purpose of doing school assignments and independent study.

- About ten boys from the school are allowed to return to school for independent study, especially playing games and using the multimedia features.

- Eight young adults, past students of the school, have been enrolled in a class run by the principal at nights. These young adults are unemployed, are poor readers, play soccer in the afternoons, and hang out on the street corner at nights. Most receive remedial reading instruction but tell their friends and guardians that they are going to computer classes.

The principal and teachers at the school have all benefited from training courses in the use of computers and CAI run by the Foundation and Bethlehem. On their own time and at their own expense, all six teachers enrolled in the CXC Technical Proficiency course in Computer Studies being offered in evening classes at the Junction Comprehensive High School located six miles away. It should be noted that the Junction School is part of the Jamaica 2000 project. Having attended these classes for the 1995–1996 school year, the teachers at Red Bank used the lab to produce annual school examinations, rather than display the questions on the chalkboard. They also use the lab to produce annual reports to parents. Parents have been impressed by the improved quality of the 1996 reports they have received. In addition, all the school and class records have been computerised, including the admission records going back to 1950.

The point to note is that the use of computers for school administration is not officially part of the reform. No one at the Foundation or Bethlehem encouraged this application. The principal and teachers at Red Bank, on their own initiative, acquired the necessary skills and used them to address several of the administrative needs of the school, having complied with the instructional requirements mandated in the understanding upon which computers were placed there.

The school has also begun to market services in desktop publishing to the community. Posters for churches and other community groups and programmes for weddings, funerals, and other special occasions have been done by the school for a fee. The income raised has been used to purchase supplies for the lab and to assist with maintenance. In other words, the school has realised the productive potential of the computer capacity they possess and have begun to use that potential in income generation.

In the focus group discussions with the teachers and with the students, the enthusiasm was undisguised. When asked how they felt about the reform the terms and phrases used included the following: "Feel proud", "feel great", "excited", "elevated", "on top of the world", "motivated", "can't wait to go home and tell auntie what we did on the computer", "the games are fun", and "it has turned the community around, in their view of the school". The fact is that neither Red Bank nor its school are likely to be known or heard of outside of the immediate vicinity or among people not of that area. From their perspective, to be located on the very cutting edge of modernisation was nothing short of fantastic. The researcher could feel the excitement in the school.

Implementation at Seaview

The Seaview district and school are located about nine to ten miles from Red Bank towards the coastline. As its name implies, the district has a clear view of the sea from its perch in the hills. Like Red Bank, farming is the main economic activity in Seaview. The crops grown are carrots, thyme, and scallions. However, in Seaview the farmers have large acreage and are wealthier than those in Red Bank. The school in Seaview was selected on the same criteria as Red Bank and at the same time.

The Seaview School has an enrollment of 300 students: 164 boys and 136 girls. It has a staff of 9 teachers including the principal. The school is organised into 8 classes: one class each in Grades 1 to 7 and a single class for Grades 8 and 9. There is a functioning Board, PTA, and SCOPE committee at the school. Like the Red Bank school, there was no existing accommodation into which the computer lab could be put. Unlike Red Bank, there was no need to construct a whole new building. Instead, it was decided to extend an existing building.

Seaview set about its fund-raising drive at about the same time as Red Bank and used the same basic strategies of assistance from its Board, PTA, and SCOPE committee. Although the cost of the construction was less (Jam$150,000) and Seaview is the wealthier community, the lab at Seaview was just in the final stages of completion on the occasion of the researcher's visit to the school in June 1996. The implementation of the reform at the school is set for the commencement of the new school year in September. There had been no construction delays, and like Red Bank the school had benefited from a substantial amount of free labour donated by community members.

The delay in the commencement of the project had been a cause of concern to teachers and some benefactors. Some teachers at the school had been trained in the use of the computers by the Foundation and Bethlehem in the summer of 1995. They now feel that they are in need of a refresher course, since they have not used these newly learned skills over the year. In fact, Bethlehem has planned such a course for them for this summer. Several of the early benefactors have been concerned about the delay in

completion of the lab and therefore in the commencement of the implementation of the use of CAI.

In probing the fact that it took Seaview more time than Red Bank to raise less money in a wealthier community, several of the informants observed that the Board, SCOPE committee, PTA, and school had to work very hard to raise the funds. They had received a donation from the local Member of Parliament and also a substantial donation from a past student living in England. However, funds were hard to come by from the community itself. It was also noted that the project was started by the principal of the school who retired in November 1995. The project has been taken to completion by the acting principal. The opinion of the informants was that this change in leadership at the school had no material bearing on the fund-raising activities.

One informant noted that the parents of children attending the school from neighbouring districts were more supportive of the project that those in Seaview. Two informants were of the view that many of the members of the district were doing well in farming and therefore did not have to rely on schooling and education for their well-being and advancement in society. Accordingly, they did not value education and the school as much as their less well-off peers and were not as willing to contribute to developments at the school.

Notwithstanding the delay in implementation, there is great anticipation and some excitement surrounding the commencement of the project in September. The plans for use of the lab are much the same as in other schools. It will be used for remedial Reading and Maths, for teaching basic computer skills to the older students, and for evening classes for community members and past students of the district, on a cost-recovery basis.

Implementation at Bethlehem All Age School

Bethlehem All Age school is located in Malvern a few hundred meters from the College. It has an enrollment of 500 students: 254 boys and 246 girls. It has a staff of 14 teachers plus the principal The school decided to convert the library into a resource centre by modifying the layout to accommodate the computer lab. The availability of this accommodation and its capacity to be modified significantly reduced the costs the school had to bear in providing the computer lab. Like the other schools, Bethlehem also benefited from free labour donated by parents and members of the Malvern community.

Bethlehem All Age used very much the same strategy as Seaview and Red Bank in raising funds for their 20 percent contribution and for the modification of the lab. The Board established a Fund-Raising Committee and with the help of the PTA, the past students and the school mounted a number of fund-raising events and ventures. These included a paid concert, selling ice cream in the school, canvassing contributions from businesses in the area, securing a contribution from the local Member of Parliament, and

soliciting individual contributions from community members. The school raised Jam$170,000 in cash, which was sufficient to meet its costs.

The conversion of the library into a resource centre was completed in the summer of 1995 and a ten-station lab was installed in September 1995. Two teachers at the school had been trained at Bethlehem and were assigned responsibility for the lab and CAI. Teaching, however, did not start until late November because it took some time before the computers were configured and programmed by the technical assistance that was contracted to perform these tasks.

The programme of CAI implemented at the school followed closely on the recommended use for improving Reading and Maths competence among students in need of remedial work. At first, the school focused attention on slow readers in Grades 3, 6, and 8. Plans to address the needs of students in other grades were hampered by the fact that the lab was down for almost the entire Easter term. While this problem was reported to the Foundation, a teacher from a school in Eastern Jamaica, who was visiting out of personal interest, solved the problem. In the last term of the year, in addition to the use for remedial Reading and Maths, the lab was used for research by the higher grades using the multimedia features. Projects included Underwater Exploration, Famous Scientists, and Disney Programmes for Infants. In all therefore the lab has only been effectively used for one half of the school year.

Plans for next school year include the following:

- Exposing all slow readers in the school to the Auto-Skills programme.
- Teaching students in the higher grades basic computing skills.
- Using the computer as a research tool.
- Offering evening classes to members of the community.
- Upgrading the competence of teachers in computer applications.

With respect to the latter, six of the fourteen teachers attended last summer's training at the College. Thirteen of the fourteen have enrolled in and attended the evening classes in Computer Studies offered at the College. In addition, during the last term of the school year, the college tutor visited the school on alternate Fridays and offered on-site training to the staff of the school. For the end-of-year examinations, all teachers produced printed papers for the students in their classes. Reports to parents have also been prepared with the computers. The school now has its letterhead prepared at the lab and circulars issued in the school as part of its internal management are also prepared using the facilities. The

automation of the school records is one of the tasks being planned for the immediate future.

Some Points of Tension

In discussing the implementation of the reform at one school, one informant mentioned some points of tension existed between the approach adopted by the College and that of the Foundation. The school found itself on occasion in some cross fire and had taken the position of the Foundation, since they had given the critical assistance in securing the lab. On probing the matter further, two points of tension were identified. Each requires some brief elaboration.

First, the Foundation, seeking to be faithful to the remedial education purpose on which both the Business Partners and HEART contributions were predicated, insisted on schools using the Auto-Skills software supplied with the labs. It also sought to promote some uniformity in the implementation of the reform across the schools. Very early, after assessing the Auto-Skills software, the College came to the conclusion that while the software package may give dramatic results in the short term, it was boring and even stultifying if used over the long term. To ensure motivation and excitement in the use of the computers, the College advocated that schools go beyond the Auto-Skills remedial application and develop their own instructional programmes using the multimedia features.

The constructive side to the tension is that after maintaining its position for a time, the Foundation heeded the observations of the College and other schools, like St. Mary's College and was not as prescriptive in requiring schools to restrict their efforts mainly to remedial work with Auto-Skills. Indeed, in the summer of 1995, the Foundation mounted a workshop on the use of the computer to promote learning across the subject areas. Sixty-one teachers participated in this workshop which was held in Montego Bay.

The starting point of the workshop was not on computers but rather on how children learn and the importance of interaction between reading and writing, seeing and hearing in the learning process. Bloom's taxonomy was applied to different subject areas. In addition Gardener's theory of multiple intelligence was introduced and teachers were asked to assess their teaching styles and strategies in this context. The conclusion reached was that most teachers taught their strengths and ignored other areas. Against this background, teachers were introduced to approaches that could be adopted in using computers to enrich both learning and teaching.

This one-week summer workshop was followed up by monthly one-day workshops in each cluster. These follow-up workshops were held at a school in the cluster, making use of the lab at that school. The experience was that a core of teachers attended in the summer and also at the monthly sessions, but new teachers kept being added at each

session while others did not continue. An important point to note is that while there are more than one thousand teachers now participating in the reform, only about 150 teachers were exposed to this approach. This is counting those participating in the workshop last summer, this summer, and the monthly workshops in the clusters over the last school year.

In effect, implementation of the reform had been widened considerably from its original position. The tension between the position of the College and the original remedial emphasis had been resolved. At the same time, some participants were not aware of this resolution and movement. Their views remained frozen in a previous stage. What is highlighted is that the pace of the implementation, the limited scope of some activities, and the intermittent participation of some actors demands constant communication to minimise misconceptions.

Some tension arose between the College and the Foundation with respect to the placement of secondary school teacher trainees specialising in Computer Studies into schools with computer labs in St. Elizabeth. The six secondary schools in St. Elizabeth with computer labs and offering Computer Studies in their curriculum were not sufficient to accommodate all the secondary school teacher trainees being placed in teaching practice by the College. To minimise the problem, the College put forward the idea that some of the students could be placed in the four All Age schools with functioning computer labs, and assigned to teach students in Grades 7 to 9.

The Foundation was not in favour of the proposal on the grounds that the College trainees were not trained in using the Auto-Skills package and that interruption in the instruction of the pupils in the schools could have a negative impact on their achievement of the learning targets. The College's response was that school experience was critical to the preparation of teachers to teach Computer Studies and CAI. Auto-Skills was simply one instructional package and any disruption in its use had to be weighed against the long-term objective to produce competent teachers. Further, the College made the point that the jurisdiction to determine the acceptance of the students in the schools for teaching practice rested with the school and not the Foundation. Three of the four schools accepted the students; one followed the advice of the Foundation.

What is highlighted, on the one hand, are some of the problems encountered by the Foundation in seeking to implement a reform without State authority and according to plans funded upon certain assumptions and conditions dictated by sectoral interests. In seeking to be systematic and uniform in project implementation, the Foundation at times is called upon to trespass on territory it does not and cannot control. On the other hand, in the absence of State control, schools and colleges can interpret and determine broader interests from their perspective, express them, and implement actions consistent with them.

Another point to be noted is that in the early stages of the implementation of the reforms, all elements cannot be assumed to be in sync. Appropriately trained teachers are critical to the long-term sustainability of the reforms. The location of the schools with appropriate facilities may not coincide with colleges with the capacity to train the teachers required by the reform. Flexible and less than optimal arrangements will need to be tolerated from time to time, which may indeed conflict with systematic project management and implementation. What is interesting in this situation is that the informal and voluntary arrangements of this reform made it possible for the system to develop its own self-correcting mechanism which was fast and decisive.

Implementation at Oracabessa

Oracabessa was once a famous seaport town. Its fame was celebrated in the well-known Banana Boat song that became the signature tune of Harry Belafonte. Earlier in the century, it was one of the leading ports to export bananas and was a thriving, bustling town. When the size of ships changed, the harbour was not deep enough and the port was abandoned in the 1960s. The town became a shadow of its former self. In the 1970s, the Urban Development Corporation built an artificial harbour and reclaimed about seventy acres of land, but the project failed because of a host of technical difficulties. The town's hope of revival was deferred.

In the early 1990s, the Island Trading Company acquired an option from the Government on the seventy acres of reclaimed harbour front. Its intention is to build a tourist resort around the concept of community tourism. A strong trend in Jamaican tourism since the late 1970s has been the all-inclusive hotel. Inherent in this concept is the separation of the guests from the community and vice versa. In many instances, the all-inclusive resort is a walled enclave. The concept at Oracabessa is to make the town the resort, with no separation between guests and the community. In this particular instance, it would involve the integration of the reclaimed harbour front with the town of Oracabessa. The idea is to allow for broad ownership in the planned development and wide participation of the community at all levels of the enterprise.

In moving to implement this concept, human resource development (HRD) and public education are seen to be even more important than the planned physical development. Island Trading Company therefore launched the Oracabessa Foundation as the major vehicle of the implementation of its HRD and community education strategy. Island Trading had come to the conclusion that the level of education in Oracabessa and its surroundings is quite low. If local people are to participate in all levels of the planned development, it is critical to effect dramatic improvements in the educational standards of the people. The Oracabessa Foundation has therefore placed emphasis on both formal and informal education.

The Oracabessa Foundation obtained the services of an Executive Director who had been highly successful in mounting HRD and community education programmes in a section of the inner city of Kingston. The offices of the Oracabessa Foundation are located on the main street of the town and are readily accessible to the town's people. Among the projects implemented by the Oracabessa Foundation are the following:

- Scholarships to members of the community to pursue further studies at tertiary institutions on the island, including West Indies College, the University of Technology, and the University of the West Indies.

- Scholarships to teachers to enroll in degree programmes at the University of the West Indies and in an off-shore programme being run by the University of Western Carolina.

- A back-to-school assistance programme for parents experiencing difficulties in fitting out their children to attend primary and secondary schools for the new school year. Assistance is given to purchase school uniforms, books, and other school supplies and in the payment of school fees.

- Assistance to basic schools (pre-schools).

- Sponsorship of a music development project in the primary schools in Oracabessa and the surrounding districts. With the assistance of Music Educators from the University and two teachers' colleges, music teachers are employed by the Foundation to run seminars and workshops with primary school teachers and students in the promotion of music education. In addition, a summer school in music has been held each year for primary school students. Two schools have so far been assisted with the purchase of musical instruments and support is given for the formation of musical groups in the schools, including an ensemble which has already gained some reputation.

In addition to these projects of the Oracabessa Foundation, Island Trading Company has recently financed the construction of a new wing of the Oracabessa Primary School, which has accommodation for five hundred students. This will allow the school in September 1996 to discontinue the double-shift system in operation at the school for the last twenty years. The new wing was constructed at a cost of Jam$12 million or U.S.$338,028.

The link between JCSEF and the Oracabessa Foundation was made as a result of the Executive Director of the Oracabessa Foundation attending a function at which the JCSEF Executive Director spoke on the subject of partnership and the use of computers to improve educational standards. Following the function, contact was made and a partnership was established with the Oracabessa Foundation. The first venture in the partnership was the installation of a computer lab at the Oracabessa Secondary School.

The second venture was the Oracabessa Foundation's support of the installation of computer labs in the five primary schools in Oracabessa and its surrounding districts: that is, the cluster of primary schools now part of the JCSEF/IDB Project.

Implementation at the Oracabessa Secondary School

The Oracabessa Secondary School does not belong to the prestigious category of secondary schools in Jamaica. Its students are not selected through the Common Entrance Examination. Rather, it receives its students on a non-selective basis from the five primary schools in Oracabessa and its surrounding districts. Also after five years of secondary schooling, its students do not sit for the coveted CXC examinations but rather a combination of exams set by the Ministry of Education and HEART. Oracabessa Secondary, and the other sixty-six schools that were called New Secondary, were former Junior Secondary schools that were converted into five-year institutions. The non-selective nature of their entry, the vocational bias in their programme, and the assessment by Jamaican and not Caribbean examinations give them the aura of second-class institutions. Students, teachers, and the public in general perceive these schools along these lines.

Oracabessa Secondary School has an enrollment of 1171 students and operates a double-shift system each school day since its accommodation is only for 540 students. The school is organised on a three-stream basis on each shift. There are 47 teachers on the staff in addition to the principal. Each shift is managed by a Vice Principal. The average class size in each of the five grades is approximately 40.

Oracabessa Secondary received a fifteen-station lab in September 1993. The Oracabessa Foundation had borne the cost of modifying a classroom into a computer lab and of paying the 20 percent contribution on behalf of the school. Two teachers were trained by the JCSEF in the use of computers and in Auto-Skills.

One of the purposes the lab immediately was used for was that of helping to prepare students opting for Business Studies in Grades 10 and 11 to meet the National Training Agency standards set by HEART. This is a comparable use to that of supporting the education of students in the high schools specialising in Computer Studies.

For reasons that the researcher was not able to ascertain in the time available, no remedial programme in Reading and Maths was immediately implemented. This is despite the fact that the school admits a large number of non-readers each year as a result of the non-selective policy governing entry to these schools. A start was made on the remedial programme in September 1995 with the appointment of a new principal to the school.

The particular strategy adopted was that attention would be focused on the non-readers entering the school in Grade 7. A Remedial class taught by a teacher of English using Auto-Skills was organised for each shift. Bearing in mind that the lab can only accommodate fifteen students, with the implication that the others would be left unattended, an arrangement was made to have a teacher's aide support the trained teacher. One teacher's aid was obtained by the National Youth Service and another from the Oracabessa Foundation. Both aides were trained in the use of Auto-Skills. Either the teacher or the aide would accompany the fifteen students to the lab while the other taught the remaining students. The forty students of each remedial class were rotated through the lab over the period of two terms.

In assessing the outcomes at the end of the school year, it was found that on one shift almost all of the non-readers in Grade 7 has learned to read. On the other shift, most of the non-reading students had still not learned to read. It would appear that one factor which contributed to the difference in outcome was different responses by the teachers when faced with a logistical problem. The Oracabessa Foundation employed a lab assistant to help with the operations. However, because the lab is used on two shifts, it is not possible for the assistant to be present on all occasions or to set up the lab for each class. In the case of the shift in which the outcome was satisfactory, the teacher was able and willing to set out the lab in the absence of the lab assistant. In the case of the other shift, the teacher did not feel competent to carry out this task and therefore did not use the lab whenever the assistant was not available to set it up.

The Oracabessa experience seems to highlight four factors that can materially affect the implementation of the reform:

- The critical importance of the principal in providing leadership in the implementation of the reform.
- The difference in ethos in different types of secondary schools and the implication of this for reform in the particular context.
- The logistical problems involved in implementing the reforms in schools operating on the double-shift system.
- The organisational problems imposed on schools where the lab size is much smaller than the class size.

Implementation at Jack's River Primary School

The Jack's River Primary school is located two miles outside the town of Oracabessa. It is a small school with an enrollment of just over 150 students. In the words of an

informant, it was one of the forgotten and neglected rural schools in Jamaica. Apathy and disillusionment were common to the experiences of teachers and students at the school.

Two years ago the Oracabessa implemented its music project at the school. The principal, teachers and students began to show more interest and enthusiasm . One year later, the school was included in the JCSEF/IDB project. The transformation has been unbelievable. The psychological impact on the school and community of these two project cannot be overestimated.

The principal and other teachers of the school attended the JCSEF workshop in Montego Bay in the summer of 1995. The principal assumed leadership of the reform at the school. She reorganised the time table and integrated CAI in the instructional programme of the school. Dramatic changes have been noted in student performance. In previous years, about half the students transferred to the Oracabessa Secondary School were non-readers. For September 1996 the proportion was reduced to 20 percent. In other words, in the course of one year the number of functionally literate students leaving the school had risen from about 50 percent to 80 percent.

The principal of the school won the Teacher of the Year Award, for the JCSEF programmes and projects. This was not only for the dramatic improvement in student achievement recorded by the school, but for her outstanding leadership in integrating learning across the curriculum using the techniques that were taught in the Summer workshop of 1995. The thrust of that workshop was directed at secondary schools. The principal of the Jack's River school on her own initiative and with little external assistance applied these principles to instruction at the primary level with outstanding result. Her work is recorded on a video shot by JCSEF.

The Ministry of Education and the Implementation of the Reform

The posture of the Ministry of Education with respect to the reform has been one of benign support. Policy makers and officials of the Ministry have publicly endorsed the reform and the work of the JCSEF, the Business Partners, and the schools. Indirectly the Ministry has supported the reform through HEART, which could not have been such a substantial partner had the Ministry not consented. However, officially the Ministry is not a partner, although it is regarded as such through representation on the JCSEF Board and participation of Education Officers in workshops and other field activities sponsored by JCSEF. In other words, the reform is not rooted in Ministry policy, projects, or programmes, although the Ministry maintains good fraternal relations with the partners implementing the reforms and is mindful and informed of the objectives, content, and progress. In fact, the Ministry recently appointed an officer whose responsibilities are defined with respect to information technology applications in the school system.

While Ministry personnel are generally in favour of the reform and see it as a good thing, there are concerns at some levels and in some quarters. Some of the concerns can be listed briefly as follows:

- Several schools have constructed or added to buildings without informing the Ministry, whose responsibilities include the maintenance of school plants. In this regard, the Ministry's responsibilities are being added to without its knowledge or consent.

- The national curriculum, at both the primary and secondary levels, could be undermined by some of the software packages currently being employed in CAI. From this perspective the national curriculum is threatened by both the content of some packages as well as the lack of uniformity engendered by the plurality of software packages used by schools.

- Policy making is taking place outside the policy-making machinery: market-driven educational policy making, so to speak. While such an approach may be feasible with respect to one or two areas, the prospect of this approach becoming the norm is viewed with considerable unease by some officers.

- The absence of any regulatory role played by the Ministry of Education to at least ensure minimum standards is a concern by some.

In large measure, these are muted concerns expressed by a few members of the Ministry. These concerns are muted for two main reasons. First, the Ministry's stated policy is to promote and support partnership in education. To the policy makers within the Ministry, therefore, it is totally unacceptable to invite partners and then deny them authentic action. Second, the fiscal and financial circumstances of the State, and the Ministry, constrains capital development from the public purse. To decline developmental assistance while the Ministry is unable help in an area that is growing internationally would totally destroy the Ministry's credibility.

It is against this background that the Ministry has taken the safer role of supporting the initiatives led by a professional body and supported by the private sector and school communities. The centre of policy making has accepted a marginal role in this reform as it follows the leadership of the people.

INTERPRETING THE CASE: THEORETICAL PERSPECTIVES

As was previously pointed out, educational reform can be interpreted from at least four different theoretical perspectives: as a rational/technical process, as political trade-off, as comparative adjustment, and as a radical break with the past. Indeed, there are aspects of the case that relate to each theoretical perspective. The question becomes: which of these theoretical perspectives best accounts for and explains this case?

The Radical Explanation

While there can be no doubt that the use of computers in schools and the use of CAI represent a radical departure from the past, and as such has the making of revolutionary change, it would be difficult to situate the explanation of the Jamaica case in the radical paradigm. Certainly those implementing the change are not part of a wider all-inclusive movement with the stated intention of fundamentally transforming Jamaican society or the education system. If this were the end result, it would be an unintended outcome. The goals and objectives of the reform are more modest, seeking to work within the existing social parameters.

Put another way, the development of the partnership concept in Jamaica and, within that framework, the introduction of computers and CAI in schools is not part of either sweeping radical political or social changes or part of radical approaches to education such as de-schooling, alternative schools, or rescue homes as proposed by Heyting.[4] On the contrary, computers and CAI are being employed to make conventional schooling better. Educational reform as a radical break with the past has very limited explanatory power in this case.

The Rational/Technical Explanation

It could be argued that one of the main driving forces for the formation of the partnership through which computers were put into schools, and one of the main ends to which CAI was directed, was the improvement in learning efficiency and in particular the remedying of learning deficits in literacy and numeracy. In fact, the teacher-training activities were simply to assist the teachers to acquire the knowledge and skills needed to use this new technology appropriately. These are essentially all technical matters which lay at the root of any explanation of the reform.

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[4]Heyting, Ellen. *An International Fraud: How the Schools Cheat Your Children.* New York: Vantage Press, 1987.

The essence of this argument is that the level of learning efficiency possible in any mass system of education in part depends upon the state of knowledge about learning and the technology employed to affect it. Any breakthrough in technology brings with it new levels of efficiency by the capacity of the new technology to effectively deal with problems inherent in the technology that it supersedes. Essentially, computers and CAI employed by teachers to support classroom teaching allows for structured individual attention to the multilevel needs of children in the class which teachers could never appropriately address with the previous technology at their disposal. Further, by increasing time on task by individual students and giving immediate feedback, thus enhancing reinforcement, computers and CAI represent a substantial technical advance in promoting learning.

From this perspective the main challenges and operations of the reform are rational logistical determinations related to the following:

- Selecting or developing the most appropriate software packages to address the learning needs of children in the various subject areas.

- Synchronising lab size and class size, and establishing the number of labs that are appropriate in relationship to the varying enrollments of schools.

- Training the teachers to make maximal use of the learning packages and computer facilities.

- Time tabling the use of the facilities so that students across the different grades and subject areas receive optimal benefit from the technology.

- Providing effective maintenance of hardware and software to keep the labs functioning on an ongoing and reliable basis.

Explained within this rational/technical framework, the Jamaica case of employing CAI in primary and secondary schools is nothing but the replication of similar cases of reform implemented in other countries and settings. Accordingly, the strengths and weaknesses in reform are to be judged in relationship to the resolution of the various technical and logistical matters listed above.

In this regard, it would need to be noted that the reform has not developed in a rational manner with due attention to logistical contingencies and technical details. Certainly the reform has spread beyond the capacity of the technical experts to either manage or synchronise all the logistical requirements. Demand for the reform has outstripped the supply of technical and logistical answers. Following strictly technical

requirements, as outlined in Lockheed and Verspoor[5] in setting out the World Bank's policy position, the Jamaican case should not have taken place. But it has. Therefore other than rational/technical explanations must be found, notwithstanding the technical issues inherent in implementing the reforms.

The Comparative Adjustment Explanation

The comparative adjustment perspective begins to offer some satisfying explanation of the implementation of reforms in the Jamaican school system involving the combination of partnership and computer technology. From this perspective, the computer, above all technological devices, has become the symbol of modernity and therefore of progress. Homes, offices, factories, entertainment, schools, professionals, and other people employing computers in their daily activities are perceived as being progressive or as making progress. They are seen as modern and with it. While the cellular telephone may rival the computer as a status symbol, the computer goes beyond status and defines the substance of modernity itself.

In the emerging global marketplace, comparative advantage is seen to rest with information technology. To be left without information technology capability is to be left behind, that is, to be consigned to perpetual subsistence without hope of escape. In this scenario, small countries like Jamaica, with open economies that are perennially vulnerable to external influences, have no choice but to modernise and to keep pace with the developments in information technology.

There are two additional factors that are critical to understanding the Jamaica case from a comparative perspective. First, the Jamaican school system at the primary and secondary levels has never been related solely to the Jamaican economy. It has always accepted the imperative to prepare its products to compete in the international marketplace of job opportunities, particularly through migration. Without modernising the Jamaican school system, Jamaican society would lose or seriously jeopardise this channel of mobility.

The second factor is related to the first but with a difference. Jamaican students have always had to access tertiary education opportunities in the metropolitan countries. This is because the primary and secondary school systems are broad-based. Jamaica has had universal primary education for the last forty years, and currently gives 60 percent of the secondary age cohort five years of secondary schooling. However, only 6 percent of the 18- to 24-year-old age cohort can be accommodated by the indigenous tertiary education capacity. As many students access tertiary education opportunities in North America as remain to do so in Jamaica. Without information technology exposure and skills, it is

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[5] Lockheed, Marlaine E., and Verspoor, Adriaan M.

perceived that Jamaican students would be undermining their competitiveness in gaining access to tertiary education opportunities in North America.

Faced with these comparisons, particular groups within Jamaican society came to the conclusion that the modernisation of Jamaican education, by incorporating computer technology and information processing strategies, was mandatory in securing the future of the society. The alternative was further descent into poverty and obscurity.

In the context of these comparisons, the various technical requirements for ensuring the feasibility of the introduction of computer technology in the Jamaican school system were not seen as disqualifying prerequisites, but rather as practical obstacles that need to be overcome along the way. In other words, in disregarding the advice discouraging the introduction of computers into the school systems of Third World countries, the Jamaican reformers were not ignoring the practical realities being warned against. However, they were treating them as obstacles rather than as barriers. This major difference in perception between those outside of the Third World context and those inside can be attributed to differences in the outsiders' perceptions of Third World people and the people's perceptions of themselves.

While the comparative explanation adequately addresses the modernising imperative that is so obvious in the communities and schools in which the reform has been implemented, as well as the continuing strong demand even in the light of known technical and logistical weaknesses, it does not give an equally satisfying explanation to the development of the partnerships. In other words, the comparative explanation can readily account for the fact that the reform has been driven more by charismatic energy and missionary zeal than by sound organisational and logistical arrangements, but it cannot as readily account for the partnerships that have made the reform possible.

The Political Trade-Off Explanation

Limited by its fiscal constraints and debt service obligations, the Jamaica state traded policy space for development assistance initially to international lending and donor agencies, and more recently to NGOs, the private sector, and communities inside the country. By trading policy options for developments within the system, the State is seen to be "progressing" without having to finance these ventures directly. The yielding of policy space to others has been encoded as partnership in policy language. Those moving into the yielded policy space are those seeking to advance vested interests of different kinds. In the absence of State authority, the various groups, holding to different interests, have had to form alliances and coalitions which invariably negotiate and re-negotiate compromises and accommodation between the various interests. The alliances and coalitions in their negotiations and accommodations are constructing the values, creating the social demand, and shaping the political will by which they will seek to mobilise the State in support of their interests in the future.

It is within this framework that one must seek to understand the collective and cooperative actions of the Jamaica Computer Society seeking to advance the interests of the profession that it represents; the private sector and HEART seeking to secure a workforce with higher general education standards; the Government seeking additional sources to share development and operational costs; schools seeking capital to modernise their operations; communities seeking recognition; suppliers of computer hardware and software seeking to develop markets for their products; and international banks seeking to develop future loan portfolios. As groups with their different interests joined the alliance and coalition, the scope of the reform has broadened and its content redefined. This interactive element has been the dynamic of the reform process which has constructed the reform beyond the intention of any single group. It is the interaction of these various interests that have given the reform its bottom-up character and also its attractiveness.

From this perspective the extent to which the reform succeeds depends upon the continued satisfaction of the various interests to a degree that engages the continued support of the different groups. At the same time the open and voluntary nature of the process is creating widespread ownership at different levels and, with that sense of ownership, commitment for continued involvement.

The strength of the political trade-off explanation is in its account of the formation and operation of the partnership phenomenon. It does not as readily account for the modernisation element, which is manifest in the schools and communities.

Combination of Explanations

No single theoretical explanation fully accounts for the reform in progress in the Jamaica case. The most comprehensive explanation is derived by combining the Comparative and the Political Trade-Off explanations.

STRENGTHS, WEAKNESSES, AND LESSONS LEARNED

The strengths and weaknesses of the reform and some of the lessons that can be learned from the experience are briefly summarised here.

Strengths

The major strengths of the reform introducing information technology into schools for instructional purposes through partnership between the Government, private sector, school community, and professional society can be listed briefly as follows:

- *Leadership at the various stages of formulation and implementation of the reform.* This is evident in conceptualising the initiative; in renegotiating its objectives and content as new groups bought into the venture; in mobilising public-sector funds, private-sector resources, and community support; in mobilising school communities; and in devising innovative and creative solutions to challenges faced at different levels of implementation. In the process, a leadership network is emerging stretching from the national to the school level.

- *Broad-based ownership of the reform at the different levels of both the structure and implementation.* There is a very real sense in which the Jamaica Computer Society, HEART, the Business Partners, and the school communities themselves can each stake strong claims and feel a deep sense of ownership of the reform.

- *The pride, excitement, and energy that is associated with the reform at all levels of implementation, but particularly in the primary schools.*

- *The strong demand for inclusion on the part of almost all schools.* There can be no doubt that this reform has captured the imagination of schools, communities, teachers, and students. Public support is also strong as knowledge and information about the reform spreads.

- *The speed with which issues are resolved and decisions made with respect to the interests and concerns of the partners.* To date the implementation process has been very responsive to issues raised by the different partners. The loosely organised partnership relationship, unencumbered by a large bureaucratic machinery, has fostered both flexibility and responsiveness, predicated on the pragmatic criterion of what works in the schools.

Weaknesses

The main weaknesses are organisational and logistical. They can be listed briefly as follows:

- *The schools that have independently embarked upon the reform are not integrated into the activities and exercises sponsored by JCSEF.* However, they constitute a significant part of the reform, 30 percent of the schools with computer facilities.

- *JCSEF's project implementation capacity is grossly inadequate compared to the demands and imperatives of the situation.* The rapid pace of the reform, its redefinition as partners join the partnership, the intention to channel almost all the resources garnered to the schools, the difficulties in raising core administrative support, and the accountability requirements of donors all contribute to this weakness.

- *The delivery of technical support to the schools is yet to be systematised on a timely and reliable basis.* While the problem has been recognised and is being worked on, it represents a constraint in the operations at many schools. One effect of the weakness is that some teachers attempting to use this new tool are tempted either not to invest in the new learning required or to lapse into the old ways if reliable use of the facilities is not assured.

- *The provisions are still grossly inadequate to the goals that have been set.* In some cases this has resulted in disappointment on the part of some teachers in larger schools. There is almost total mobilisation in the school fund-raising. This has the effect of raising the expectations of the entire school. Fifteen-station labs in large schools do not have the capacity to allow access to all students or teachers. Those excluded are disappointed particularly in relation to the efforts made in securing the facilities.

- *While the use of pre-packaged software developed elsewhere is understandable, development of software from the wealth of teaching and learning experiences generated in the Jamaican and Caribbean settings is still a far way off.* The danger is that the cost in terms of human resources, finance, and time may postpone the efforts required and in so doing risk the loss of a considerable amount of knowledge currently resident in the existing system.

- *Although teachers are given some orientation and training in the use of the technology and some teachers are receiving more comprehensive training, the current provisions are very inadequate compared to the needs.* The resources that are contributed go mainly to the provision of hardware and software. While a great deal is being done with the resources available for training, the needs far outstrip the available provisions.

Lessons Learned

The Jamaica case study is rich in its details and experiences. Numerous lessons are there to be learned. Lessons learned are largely dependent on the learner. No attempt will be made here to be either exhaustive or comprehensive. However, some of the lessons that ought to be learned fall into the following categories:

- *Leadership is the sine qua non of educational reform.* Imaginative, bold, and committed leadership at all levels is underscored in this case as the most critical ingredient of fundamental change in the education system. This lesson is underscored with reference to the leadership of the Jamaica Computer Society in initiating the reform and in creating JCSEF as the instrument of implementation. It is again demonstrated by the leadership of the Executive Director of the Foundation in the implementation of the reform. It is further illustrated in the leadership of the Chairman of the Business Partners and in the leadership of HEART in the mobilisation of public- and private-sector support for the reform. It is repeatedly demonstrated and emphasised at the level of the school, as principals play dynamic roles in the mobilisation of school and community support and in shaping the implementation of the reform in their schools.

- *In the paradigm of partnership, the private sector, professional bodies, communities, and schools all have different priorities and agendas than those set out in the policy prescriptions and priorities of Governments and international donors.* Governments and the international donors invite partnership with these groups with the expectation that they will help bear the cost of educational development and operations. However, the interests of these groups lie elsewhere. Hence, in becoming partners these groups pursue their own interests and agendas. From the perspective of the international donor, it must be noted that conditionalities will be much harder to apply to these groups than to governments. In this case it is the international community that yielded to the agenda of the private sector, professional bodies, communities, and schools, not the other way around. In a decentralised system were autonomy is practised and partnership is the policy, there is greater opportunity for the expression and implementation of the people's vision of themselves than in a centrally controlled system where external imposition is easier.

- *The organisational, logistical, and technical problems faced by Third World countries in using information technology in their school systems to expand access and improve quality are probably better worked out in impulsive application than by long-term central planning.* For example, in the light of school experience in the Jamaican context, steps are being taken to address the need to develop appropriate software packages and also a more appropriate and reliable technical support system.

If these were treated as pre-qualifying prerequisites in a central planned scenario, then the reform may not yet have been implemented. At the same time, it would take enormous perspicacity and foresight to anticipate and configure the systems that are most appropriate prior to implementation. Hence school experience would be needed in any case. Indeed, the impulsive character of the reform in the context of limited resources has phased the early stages of the implementation process into a *de facto* pilot testing phase.

- *In the absence of State authority and Government policy direction, the vested interests of the partners to reform are brought to the fore in a more transparent and forthright manner than otherwise may have been the case*. At the same time, without the backing of State authority or the shield of Government policy, the partners are constrained to negotiate the mutual satisfaction of interests. Ownership of the process is broadened due to the high level of participation and deep involvement in decision making of the various actors and stakeholders.

- *Where professional bodies, the private sector, and communities take the lead in reform, the State is not only made almost invisible but its role and substantial contribution is grossly underestimated.* While an enlightened State agency may take such a position, it may be untenable in the long term, especially if the benign posture of the State is projected in a negative light by the newly empowered partners. In terms of the overall investment in the reform to date, HEART has contributed at least one third of the total. Such a substantial contribution is only possible because the Ministry of Education, under whose portfolio HEART falls, has permitted it. If the benign posture of the Ministry of Education is projected in a negative light by JCSEF, the private sector, the schools, or the communities, then the Ministry may not be able to maintain its enlightened restraint in the reform process.

- *High value placed on education by communities is more advantageous to schooling than the possession of greater resources.* While high value on education combined with wealth can be expected to interact with great advantage to schooling, and conversely low value and poverty could be expected to produce the lowest support, high value on education combined with poor circumstances could produce greater support for schooling than greater wealth and lower value of education. Emphasis on community possession of resources is misplaced if it is not backed by high value on education.

RECOMMENDATIONS

No attempt is being made here to address issues that have been recognised and for which plans and strategies are already being developed. For example, through the InfoDev project sponsored by the World Bank, attempts will be made to experiment with other configurations for using computers in schools other than in labs. Also, provisions have been made for elements of evaluation and research to be added to the enterprise. Further, steps are being taken to develop a more reliable and effective technical support delivery system.

Rather, suggestions are being offered concerning areas that may need to be addressed in the near future. The following is a list of suggestions:

- *The reform being implemented by the partners must at some time be integrated into the general policy matrix of the Ministry of Education.* For example, the Jamaica 2000 project is firmly on track to place computer labs in all secondary schools and tertiary colleges in Jamaica by the year 2000. At the same time, the ROSE Project does not include any reference to computer-assisted instruction although its goals of promoting cooperative learning, multilevel teaching, integration across subject areas, and self-direction by students are entirely consistent with those promoted by CAI. The same can be said of the IDB project to improve primary education. Any extension of these projects, which are due to close before the year 2000, cannot ignore the reform taking place in applying information technology to expanding access and improving quality in primary and secondary education. The suggestion here is that the National Council of Education appears to be the channel through which this integration can begin. Some means should be found whereby this reform in CAI becomes an item on the Agenda of the National Council and the JCSEF be invited to participate in the deliberations of the Council on this matter.

- *JCSEF needs to establish operational linkages with those schools and colleges that did not obtain their computer capacity through the Foundation.* Steps should be taken, by mutual agreement, to include these schools in programmes of training, technical support, and all other operational matters related to the implementation of the reform.

- *JCSEF needs to strengthen the representation of educators, particularly school and college principals, on the Foundation's Board and operational committees.* Currently the Board of the Foundation is heavily weighted in favour of computer professionals and does not give due weight to the school system in which the Foundation is executing its mission. In addition, JCSEF needs to establish ongoing relationships and links with the various associations of principals of schools at different levels of the education system.

- *JCSEF needs to seek and be given support for its core administrative functions, perhaps for the next five years, in order to expand and strengthen its capacity to support the implementation of the reform in the field.* Its current lean organisational structure and capacity is inadequate in relation to the national role it is performing.

- *JCSEF should consider altering its marketing strategy to one that is more programmatic, systematic, and consistent with its projected targets, rather than the ad hoc, single contribution strategy that has characterised its early mobilisation of the private sector.* The success of its early efforts should greatly enhance the prospects of shifting to this marketing strategy.

- *JCSEF should establish a consultative group mandated to advise it on the technical issues related to the reforms: for example, the relationship between lab size and class size, teacher training strategies, software development approaches, and like matters.* This group should have representation from computer professionals, the principals of schools and colleges, faculty from the Universities, staff of the Ministry of Education, and teachers.

- *JCSEF should consider publishing a newsletter each term featuring schools, communities, and donors, reporting on developments, and informing about future events and actions.*

- *The Ministry of Education needs to become an active partner in the reform, playing a substantive role in a particular area.* The suggestion here is that the Ministry take responsibility for teacher training, both in-service and pre-service. The sustainability of the reform will be highly dependent on the scope and the comprehensiveness of the teacher training that is put in place. Ministry responsibility for this component of the reform will be meaningful and substantial without committing the State to the provision of the hardware and software which would remain the province of the other partners.

- *For a need to be created, outside of the training function, to allow principals and teachers to share information on their experiences and innovations, across schools and clusters.*

CONCLUDING COMMENTS

In concluding there are two observations that appear appropriate. First, one of the remarkable features of this case is the emergence of an NGO, the Jamaica Computer Society Education Foundation, as an actor in education policy at the national level in the short space of six years of existence. As remarkable is the fact that it has done this with a staff of three people. While it is recognised that it contracted several services, the volume of work done and its impact belies the means used to achieve it.

Apart from the charisma of the persons involved and the vision of the Computer Society in establishing the Foundation, it would appear that timing was of the essence. A new Government in 1989 had enunciated a policy of partnership. The technology itself had become more affordable and more easily adapted to the learning processes in schools. Secondary schools under public pressure, as a result of poor performance in external examinations, were actively seeking new modalities to improve their effectiveness and efficiency. A statutory body was concerned about the quality of general education of school leavers entering its vocational programmes and mindful that criticism by employers of this deficit had a negative impact on its core mission. An influential CEO in the private sector had recently completed a successful project in secondary education using modern media and was available for recruitment in this new venture.

The question is how readily can the Jamaican experience be replicated without these attendant circumstances? The answer may will be that they do not need to be replicated because each case will arise from its own imperatives and happenstance, even if the outcomes are similar.

Second, when one sees the excitement, pride, enterprise, and energy that surrounds the introduction of CAI in small, rural primary schools, and the transformation that has taken place in some schools in the short space of one year, then the potential of this reform to substantially reduce the drift from small rural schools to large urban schools cannot be ignored. Overcrowded, urban schools and rural schools with ample space and small enrollments are a current feature of Jamaican education. Indeed, as more and more resources are put into relieving and solving the problems of urban schools and communities, they increasingly become magnets for students from rural schools. This further aggravates the urban problems, and often nullifies the most recent measures to alleviate the conditions.

Modernising small rural schools has the potential of contributing to the resolution of some of the problems of large urban schools, as rural youths perceive the prospect of making progress while remaining in their communities. While this prospect is still at the level of speculation, it is a latent potential of the reform, as it is currently being implemented, which merits the closest monitoring in the future and speedy generalisation of its application should its feasibility be established, after assessment.