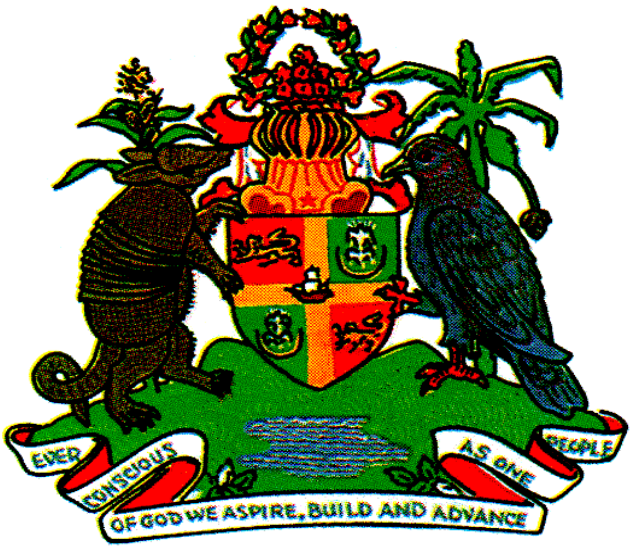

FINAL REPORT

EXTENDED EMIS FOR GRENADA

Study Funded By:

The World Bank

Prepared by:
Arnott West
Independent IS Consultant
May 23, 2003

EXTENDED EMIS FOR GRENADA

FINAL REQUIREMENTS REPORT

TABLE OF CONTENTS

1. Executive Summary

1.1 Introduction

Educators in Grenada and around the globe, face a similar set of complex challenges (the transformation of their Education programs):

- Steady and sometimes escalating pressures to improve Student achievement and School accountability;
- To assure equal access and the same quality of Education, for every child;
- To strengthen the institutional capacity and increase the efficiency of publicly financed Education;
- To utilize budgetary resources more effectively.

To facilitate the transformation of its Education Systems the Government of Grenada has approached the World Bank, seeking financial assistance to support the implementation of educational development priorities in Grenada.

1.2 Consultancy Objectives

There are several issues that currently affect the efficient management of the education sector in Grenada. Firstly, there is a dearth of valid, reliable, timely and accurate education information to guide informed decision making, both at the policy and operational levels. Secondly, there is a need for the provision of a mechanism for the Ministry of Education (MOE) and Schools to report test results and other data (enrollment figures, attendance, repetition and transition rates, etc.) in a systematized way. An Education Management Information System (EMIS) would replace the manual system of recording (through questionnaires and other MOE reporting documents) and deliver more effective processing of education information. It would also provide better management of education data, facilitate the storage of files for extended periods; improve the retrieval of data for decision-making purposes; plus enhance the tracking of achievement and other sector outcomes over time etc.

The overall objectives of this Consultancy are to:

- Develop a clearer definition of the EMIS required by Grenada relative to: System requirements, maintainability, reliability, compatibility, and performance; associated toolsets; as well as the necessary support services and related training, required for implementation;
- Define the steps for an effective implementation of this extended EMIS;
- Determine the costs, financial benefits, and risks associated with the potential and effective implementation of the EMIS.

1.3 Educational Services and Products

As the MOE in Grenada continues its transformation from a classic administration organization to one characterised by strategic participatory planning, and trusting internal and external relationships, the key Services and Products it must provide as a modern-day MOEs are:

- Policy formulation;
- Quality monitoring within the framework of policies, programs, and Educational reform;
- Strategic Education Administrative Support Services (particularly Planning, Accounting, MIS, and HRD);
- Well managed and administered Educational Facilities;
- Relevant Educational development Programs;

- Skilled Instructors, Administrators, Professionals and Support Staff;
- Pedagogy (particularly curricula);
- Education materials and supplies;
- Planned activities for Students and Learners;
- Accredited Examinations;
- Education delivery and administrative facilities.

The key School Administration Services and Products it must also provide include:

- School Admissions;
- Set-up and maintaining of Student and Parent records;
- Recording and monitoring of Student and Staff attendance;
- Managing coursework;
- Managing School exams;
- Recording and monitoring Student performance and progress;
- Reporting to, and communicating with, Parents;
- Constructing timetables and School schedules;
- Budget tracking and expenditure management;
- Collecting outstanding debts and fees;
- Preparation and monitoring of School Improvement Plans.

Given this array of services and products being delivered by the MOE and Schools across their Educational cycles, and the need for timely and accurate information sharing between and across Educational functions, it is should be apparent that the proposed EMIS Solution will require its software applications (modules) to be fully integrated.

1.4 EMIS Solution Description

The efficiency of Corporate-type decision-making at the MOE level which requires cross-functional information, continues to be compromised. The accuracy and age of the information to be used in such decisions also come into question, especially when the same information is stored redundantly on various Systems, and is maintained by different individuals.

The proposed EMIS therefore should be a totally integrated Education and School Administration System that would support the need for efficient cross-functional decision-making about the Education and School system. It would provide a permanent mechanism for managing National Education and Individual School information on:

1. Individual Students and Student Groups;
2. Parents/ Guardians;
3. Principals, Teachers, Education Officers, and auxiliary staff;
4. School Timetables and Schedules;
5. Teaching Methods and Curricula;
6. Student Learning Outcomes;
7. Textbooks, Instructional Equipment and Materials;
8. School and National Education Budgets;
9. School Sites and Buildings;
10. Communities and School catchments areas.

This EMIS has to function in such a way, that it informs on the nature and extent of the demands for various levels of education. Data will automatically be summarized, grouped, and compiled into an array of pre-defined Reports that would allow more effective monitoring and evaluation of Education delivery processes. The System must also provide the ability to measure the quality of outputs and their impact on performance targets. Specific EMIS Reports and information would be available to individuals and/ or individual types (e.g. Parents, MOE Functions/ Departments), that are connected to the EMIS (directly or via the Internet), and are duly authorized by the System Manager.

The key components of EMIS Solution would consist of:

- EMIS software application package(s);
- Enterprise-wide Toolsets;
- Windows based Servers;
- Windows based Workstations;
- Software application training;
- PC Peripheral Devices (e.g. printers);
- Communications Devices (e.g. modems) and Networks.

1.5 Overall Implementation Strategy

The successful implementation of a fully functional integrated EMIS will be a key milestone in bringing Grenada's vision of Education Reform to life – it will be a realization of the promise and power of their Education vision.

A general strategy that could be employed by Grenada to successfully implement its EMIS Solution would contain the following Activities and Milestones:

- Finalization of an EMIS solution requirements
- Procurement of a fully integrated EMIS solution and a solution Provider that will function as the Prime Contractor for EMIS implementation;
- Collect Data required by EMIS not currently captured at the Schools and MOE Departments/ Units;
- Selection and empowerment of an EMIS Steering Committee and an EMIS Start-up and Acceptance Team;
- Installation and Set-up of required EMIS Equipment and Networks;
- Installation and Set-up of the EMIS Application(s) and Database(s);
- Conduct pre-implementation (Basic) EMIS Training for System Administrator(s), Data Conversion /Migration, Acceptance Testing, and Start-up personnel;
- Complete the Conversion and Migration of Data into the EMIS Database(s);
- Conduct an Acceptance Test of the EMIS Solution;
- Provide detailed User and System Management Training (possibly using a "Train The Trainer" strategy);
- Implement EMIS at Schools using a phased approach;
- Provide an appropriate level of "handholding", for an acceptable period of time during and after start-up of EMIS;
- Establish EMIS Warranty and Vendor Support Service processes;
- Set-up and establishment of an EMIS Help Desk;
- Implement EMIS at MOE Offices;
- Conduct Post Start-up Audit and implement "Lessons Learned";
- Update process descriptions and process standards; also update individual job descriptions and job standards;
- Transition Education and School administration to full EMIS usage, using appropriate performance milestones and measurements.

1.6 Summary of Critical Success Factors

The MOE must view EMIS as a renewable Asset of the children and citizens ofGrenada. Programs will have to be in place for the on-going support, maintenance and upgrade of EMIS and its Users. Some of these Programs could be designed on the concept that EMIS may be turned into a revenue generating, self-sustaining Asset.

Key Critical Success factors are:

- *To build/ rebuild User confidence, the System should have high availability, high reliability, and fairly quick transaction response times;*
- *The implementation of EMIS must be understood, viewed, and managed as the implementation of an Educational administrative and operational solution that will greatly influence how the MOE and Schools operate in the future, and not just as the implementation of Information Technology;*
- *Assign clear leadership, responsibilities and accountabilities for the transition and success of the overall EMIS Solution, not just for its start-up and/ or implementation. Provide the necessary support (including Human Resources) to ensure success;*
- *Demonstratable Stakeholder commitment to EMIS*
- *Provide adequate levels of training for all System Users, and a period of hand-holding for slow and fearful Users.*

1.7 Key Feasability Findings

There are compelling benefits to be derived from implementation of the Education Information Management Systems in the OECS. Direct benefits will be achieved in the areas of worker productivity process efficiencies, and operational costs.

Financial Summary

Successfully implemented, the Project has the potential of providing over a five-year period, the following in Savings:

Country	Five Year Savings ($US)
Grenada	$2,152,267

The calculations assume an investment hurdle rate of 20% and an inflation rate of 3%.

These are excellent returns for the five year IT investments of:

Country	Investments/ Expenses ($US)
Grenada	$969,469

The First Year accounting expense to be incurred by the Project is $587,326, and the Project payback period has been calculated as follows:

Country	Payback (years)
Grenada	1.51

The Net Present Value (NPV) of the investment is $634,934

Benefits

The overall potential impacts of successfully implementing EMIS solutions are presented in Section 1.8 below.

Risks

Key risks are presented in Section in Section 7.7 of the Report

1.8 Overall Solution Benefits

General Benefits

There are compelling reasons for the implementation of EMIS. Direct benefits will be achieved in the areas of worker productivity, process efficiencies, and operational costs.

The overall impact will be to:

- Increase the efficiency of publicly financed Education;
- More effectively utilize National Educational resources (e.g. Teacher Workforce balancing);
- Enhance the quality of service delivered throughout the Education cycle e.g. Administrators will be able to easily spot emerging trends, in time for action;
- Assist in the refocusing and strengthening of institutional capacity;
- Increase the effectiveness of operational and Teaching staff, by enhancing capabilities for the collection and analysis of their performance measurements/evaluations;
- Provide focused, timely, and as-needed feedback on Students performance - Feedback can be used to direct future learning, motivate Students, and identify Students who need additional support;
- Provide validated Data flows between MOE, Schools and External agencies (e.g. CXC). This will minimize the requirement for data input at the MOE;
- Achieve time-savings through the use of EMIS, which will allow Principals, Head of Departments, Teachers, Education Managers and Officers, to concentrate on their core activities, while having the information (evidence) they need to better support decision-making;
- Enhance Grenada's ability to design, plan, form, and implement, suitable education Policies and Reforms;
- Provide improved public access to Education administrative information (via the Internet).

OECS-wide Benefits

If same EMIS-type solution is to be implemented across the OECS:

- Substantial price discounts can be negotiated with the selected (preferred) EMIS Vendor/ Systems Integrator;
- Acquired solution expertise can be shared among member States, leaving individual States less vulnerable to the loss of a local expert (through migration, corporate raiding etc.);
- Costs can be minimized for annually keeping abreast of developments (keeping updated) relative to EMIS and EMIS-related Technology. This can be accomplished by selecting one or two individuals to represent the OECS at Training/ Workshops, and who upon their return disseminate the relevant information (a "Train the Trainer" approach). Versus, each State having to individually fund these "knowledge updates" (training), because their EMIS Systems are different;
- It will provide simple and convenient exchange of Education information (i.e. between those Countries having the same type EMIS Systems – common data dictionaries, database structures etc.) - including performance standards, results etc. between OECS member States, and facilitate the promotion of uniform development of their Education System capacities;

1.9 Key Recommendations

General Recommendations:

a) Go with the EMIS investment as soon as possible;
b) Appoint a highly experienced MOE Education Technology Officer or Program Manager to lead and drive specification and implementation of the EMIS Solution;
c) Complete the assessment and determination of MOE Organizational Impacts, then implement appropriate measures;
d) Provide appropriate levels of Project personnel to ensure an effective implementation and benefits realization;
   NOTE: Assigning Project milestone completion responsibilities and tasks to full-time Employees with regular workloads, can jeopardize Project success;
e) Plan and deliver an effective public/customer relations campaign **(What is EMIS; How EMIS will function in the workplace; How it will impact the lives of its Users and other employees. Its benefits to Stakeholders, Students and Communities; etc.),** to generate broad-based Public and System Users Support;
f) Encourage and enforce workplace discipline that supports and facilitates **Accurate data and information being entered into EMIS on a timely basis, and EMIS being used to progressively produce all MOE, District, and School Reports** (on all aspects of the system: personnel; student performance, resources utilization, expenditures etc.);
g) Pursue a simple, structured and measured EMIS Implementation Strategy – Consider using a "proof-of-concept" or "pilot" approach in the initial phase;

Specific Recommendations:

Using the EMIS requirements and design described in this Report, select an EMIS that has a widely established installed base, and currently operates in Educational environments similar to Grenada and the OECS in general. Using the implementation plan contained in the Appendix, develop a more comprehensive and detailed implementation plan. Execute the implementation plan.

2. General Background and Solution Development Methodology

2.1 General Background

The Government of Grenada has received through the World Bank, financial assistance from the Japanese PHRD Grant to support preparation activities, for a follow-on Project to its recently ended Basic Education Reform Project (BERP). The Government of Grenada through it Ministry of Education (MOE), requires that this follow-on Project (BERP II) address the areas in Grenada's Strategic Plan for Education Enhancement and Development (SPEED), that proposes strategies to several issues affecting the efficient management of the Education Sector.

A few initiatives have already been started for the purpose of establishing some type of Educational Management Information System (EMIS), to carry out several tasks that address issues affecting efficient management. A database system has been created for the Statistical Unit to aid in data collection and processing.

However, there remains a "limited" EMIS capability at the MOE. There is no systematized data collection, and no supervision system in place that uses the EMIS data to monitor school and staff performance. There is a scarcity of valid, reliable, timely and accurate education information to guide informed decision making, both at the policy and operational levels. There is a need for a mechanism whereby the MOE and Schools can easily report test results and other data (enrollment figures, attendance, repetition and transition rates, etc.) in a systematized way.

Also, under the OECS Education Reform Unit (OERU), there is an attempt to gain synergy between the EMIS' being used in /planned for member states, and to improve the potential for such systems in each OECS country by encouraging greater regional harmony in the collection, analysis and reporting of educational indicators.

This Consultancy provides specialized technical assistance at this point in time, to provide a clear definition of the requirements and design of an extended EMIS for Grenada.

2.2 Solution Development Methodology

To achieve the objectives of the Consultancy, the Consultant employed the following activities:

Phase I: Planning

- Validate consultancy requirements with Client(s) and MOE Stakeholders;
- Request past policies, reports, plans, studies, etc.
- Finalize consultancy plan and schedule;
- Develop and distribute data collection instruments;
- Build cost analysis model.

Phase II: Data Collection & Assessment

- Review past policies reports, plans, studies, etc.
- Collect completed questionnaires;
- Interview stakeholders *(see Appendix);*
- Complete and distribute initial Site Visit report;
- Review and assess (R&A) education administration and planning processes;
- R&A school administration processes;
- R&A curriculum, examination, and evaluation processes;
- R&A job descriptions;
- R&A information and communication flows;
- R&A existing system(s) and network(s);
- R&A current capabilities & capacities relative to an EMIS implementation.

Phase IV: Conceptual Design and Feasibility Study:

- Develop computing and application(s) architecture;
- Develop application and toolset requirements;
- Develop systems migration approach;
- Complete solution conceptual design;
- Finalize cost analysis model;
- Complete cost analysis.

Phase V: Report Generation & Consultancy Wrap-up:

- Prepare and distribute draft of final report;
- Receive feedback on draft of final report;
- Complete and distribute final report.

3. Overview of The Existing Environment

3.1 Organisational Overview

As the MOE in Grenada continues its transformation from a classic administration organization to an organization characterised by strategic participatory planning, and trusting internal and external relationships, the key tasks they must undertake as a modern-day MOE are:

- Policy formulation;
- Quality monitoring within the framework of policies, programs, and Educational reform.

This demands the sucessful delivery of the following products and services:

- Strategic Support Services (particularly Planning, Accounting, MIS, and HRD);
- Well Managed and Administered Educational Facilities;
- Relevant Educational Development Programs;
- Skilled Instructors, Administrators, Professional and Support Staff;
- Pedagogy (particularly curricula);
- Education Materials and Supplies;
- Planned Activities for Students and Learners;
- Accredited Examinations;
- Education Facilities.

The MOE inGrenada is primarily organised to provide Educational Services along the following functional lines:

- MOE Personnel Administrative Services;
- Financial Analysis and Tracking;
- Management Information Systems (MIS)/ Information Technology (IT);
- Library Administrative Services;
- Drug Control Services;
- MOE Operational Support Services;
- Teaching Personnel Administrative Services
- Instruction and Education Delivery Services that includes:
    - Schools Administration and Management;
    - Education Planning, Development, and Statistical Reporting;
    - Curriculum and Materials Development;
    - Measurement, Testing and Examinations;
    - Student Attendance Services;
    - Early Childhood Education;
    - Special Education;
    - Student Guidance Counseling;
    - Food Aid and School Feeding;
- Education Project Management Services;
    - Project Coordination
    - Project Administrative Services
    - Procurement;
    - School Supplies;
    - Maintenance;
    - Financial Tracking and Reporting;
- T. A. Marryshow Community College (TAMCC) Administration.

Principals of Grenadian Primary and Secondary Schools provide frontline School Administration at varying levels. These include:

- Effective management of the School admissions process;
- Set-up and maintenance of accurate Student and Parent/ Guardian records;
- Recording and monitoring of Student and Staff attendance;

- Managing Coursework and results;
- Managing School Exams;
- Recording, monitoring, and analyzing Student performance and progress;
- Recording, monitoring, and analyzing Teacher/ Staff performance and progress;
- Ensuring Teachers receive and take good quality training and development;
- Reporting to, and communicating with Parents, the MOE, the School Community, and other Stakeholders;
- Constructing and managing timetables and other School schedules;
- Budget tracking and expenditure management – even analyzing the cost of curriculum and School operations;
- Collecting outstanding debts and fees;
- Keeping accurate records on former Students;
- Preparing, monitoring, and analyzing School Development (Improvement) Plans and progress.

3.2 MOE and School Functions

In the organizational structure of the MOE, the Permanent Secretary (PS) is responsible for the overall administration of the Ministry, and is the Ministry's chief Financial Officer. Reporting to the PS are:

- The Chief Education Officer (CEO) (who is responsible for managing the delivery of Education at the pre-School, Primary, and Secondary School level);
- The MOE's Financial Analyst;
- The Drug Control Officer;
- The Administrative Officer of the Finance Unit;
- The TAMCC Principal;
- The Administrative Officer of MOE's Personnel Unit;
- The Director of Libraries;
- The Manager of the Project Management Unit;
- The Senior Administrative Officer of the MOE's administrative Unit.

Typical MOE functions involved in administering and delivering Grenadian Education are:

Education Planning and Development

This function is responsible for preparing implementation plans and strategies for the achievement of National education goals and policies. The function also assists with the derivation of educational policy, plus the allocation of all resources to regions and schools. This function collects all data on the Education system; it organizes analyses and produces statistical reports on educational targets, and disseminates data on education. This function also supports the annual Education budget preparation process. For special Education projects, this function may prepare proposals to international Donor and Lending Organizations; it may also participate in the negotiation processes.

MOE and Teacher Personnel Administration

This role of these functions are to administer the Human Resource base of Grenada's Education system through the recruitment of suitable persons, the provision of relevant training and performance management systems, in order to improve efficiency within the Education System. These functions administer and interpret all Human Resource matters with the MOE and Teaching Service in the areas of: recruitment, placement, training, benefits, and retirement. These functions also track and keep personnel/salary records of all MOE personnel, plus Teachers in all education Districts.

Financial Analysis and Financial Administration

These functions support the delivery of Education by ensuring and verifying the availability of funds under budget allocations, recording expenses in vote ledgers, monitoring the efficiency in use of resources, and ensuring compliance with National Financial Acts. These functions interface closely with the Ministry of Finance

(MOF) providing required Data, Analysis, and Reports for the MOF and MOE. Budgeting and Auditing are also supported by this function.

These functions administer and track not only national Program funds allocated by the Ministry of Finance (Central Government), but also funding from external donor agencies.

Measurement, Testing and Examinations

The key responsibilities of this function are to:

- Register Examinees for all local and overseas examinations;
- Develop and produce valid, reliable, and relevant local examinations;
- Procure all examination materials;
- Administer all local and overseas examinations;
- Diagnose the strengths and weaknesses of examination Candidates;
- Establish norms and performance indicators;
- Maintain accurate records and information pertaining to all examinations;
- Analyze all examination results and provide feedback to Stakeholders;
- Povide certification for examinations;
- Validate /certify academic and professional certificates;

Curriculum and Materials Development

This function provides quality instructional support services for the promotion of life-long learning and the development of Grenada's Students. It produces written curriculum and supporting materials. It disseminates Teachers' Guides and materials to accompany K through 7 curriculum. Through monitoring and supervision, it ensures the effective use of curriculum guides and other teaching materials for K-6 and Forms 1-3. It monitors and provides as needed, teaching assistance with several Subjects/ Courses. It also provide Student Guidance and Counseling Services.

Schools Administration and Management

District Education Officers are tasked with implementing the MOE's policies and decisions at the District level. They are also responsible for the monitoring and supervision of curriculum, as well as carrying out District Education administrative duties.

The key responsibilities of this Function include:

- Communication of Educational policies, decisions, and priorities to School Principals;
- Ensuring Schools are adequately staffed and administered;
- Quality professional development of School Teachers and Staff;
- Ensuring the accurate and timely collection of School and District operational data, as well as School and District performance results and statistics;
- The preparation of annual and periodical reports on School and District performance;
- Building alliances with the Distict's Community and Stakeholders;
- Assist in the production of School Development (Improvement) Plans;
- Providing resources to support instruction;
- Ensure the conduct "continuous assessment", end-of-term, and end-of-year tests;
- Ensure that all Schools effectively address matters of indiscipline.

This Function supervises early Childhood Programs and development. It also coordinates Schools' Feeding and Food Aid. It monitors and tracks Student attendance through School Attendant Officers.

Management Information Systems (MIS)/ Information Technology (IT)

The relevant responsibilities of this Function are to:

- Establish policies, standards, and procedures for information systems, and information services within the MOE and Schools;
- Evaluate and select all computer technologies that are being acquired by the MOE;
- Implement "turnkey" or custom-built information technology solutions;
- Coordinate the implementation of information technology in Schools;
- Provide technical support and maintenance for all hardware and software used within the MOE and Schools;

- Administer focused training programs to all computer Users, including Teachers.

Special Education Needs (SEN)

The key responsibilities of this function are to:

a) Facilitate the identification and assessment of Students requiring "Special Education Needs";
b) Maintain SEN information on any Student, showing the nature of their learning difficulties, what the associated School is doing about it, what are the targets, and who is responsible;
c) Maintain Records of the details of periodic Reviews;
d) Maintain a SEN register.

Schools/ Education Delivery Institutions

The key responsibilities of the Principals that head these functions are:

- Delivery, monitoring, and evaluation of School instructional Programs;
- Management and Supervision of all School resources;
- Recording, monitoring, and analysing Student, Teacher/ Staff, and overall School performance and progress;
- Establishment and maintenance of a secure and supportive working environment;
- Developing and maintaining good relationships with Students, Teachers and School Staff, MOE Officials /Officers, Parents, Community and other Stakeholders.

Other Additional Functions

- Drug Control Secretariat;
- Project Management Unit;
- TAMCC Administration;
- Library Services;
- MOE Operational support Services.

In Grenada, Carriacou, and Petite Martinique, the administration of education is entrusted fully to the Ministry of Education.

- The Ministry of Education has a total of approximately 39 desktop computers;
- The MOE is a housed in modern facility that is completely networked;
- Management Information Services are available via wall mounted face plates, as the building is fully networked;
- There are 58 Primary Schools containing in excess of 19,000 Students and approximately 760 Teachers. Two Primary Schools each have a computer lab with desktop computers and 1 File Server;
- There are 19 Secondary Schools containing in excess of 9800 Students and approximately 440 Teachers. At least eighteen of the Secondary Schools have functioning networked computer labs offering various levels of services influenced by the operational state of the equipment. The original design of these computer labs provided a File/ Print Server and 19 Workstations.
- There is one Tertiary level institution the T. A. Marryshow Community College (TAMCC). It does provide computer lab services for its students. TAMCC caters to in excess of 15oo Students who in turn supported by approximately 70 Teachers.

3.3 Existing EMIS Environment

A) MOE Finance and Accounting

The MOE has access to a full featured Finance and Accounting software application (GL, AP, AR, Fund Management, Cash Book, Purchasing, Inventory Management etc.) – SmartStream. However, the Ministry of Finance (MOF) which owns, administers, and supports SmartStream currently permits the MOE only limited access and use of the tool as part of a Pilot Project which has been ongoing for over two years.

The MOEs Financial Analyst and Accountants also use desktop applications to track budget expenses and revenues coming into the System. Monthly financial performance and expenditure reports are produced for review by the Ministry's Executive, and for submission to the Ministry of Finance.

Should the MOE be permitted greater use of SmartStream and any SmartStream-supported Project/ Job costing module, their need for a National Education financial management tool will be satisfied to a larger extent.

B) MOE Personnel and Teacher Administration

The Ministry is involved in the implementation of a Personnel database connstructed in Microsoft's Access.

There are no plans in place for direct integration between the Personnel database and Smartstream. Payroll updates/ changes will be entered manually or in a batch manner into the Personnel database, at approved frequencies.

Monthly or as-needed Personnel performance and statistical reports, are manually produced.

C) MOE Information Systems

This Unit is primarily involved in the maintenance and upkeep of PCs, Servers, and Printers at the MOE and Schools. The Unit also provides System, Network, and Internet Administrative services for the MOE.

D) Planning and Development

The Planning and Development Function is able to complete its annual Education Statistical Digests, by requesting and receiving School and Examinations data via Forms (a mostly manual process). However no Statistical digests were produced for approximately four years for the period proceeding 2002.

This Function use several desktop applications that are custom developed in: MS Access, MS Excel etc. to support their recordkeeping, analysis, forecasting, and reporting needs.

E) Project Management

This Function uses desktop Project Management software (MS Project) to support its project tracking and management needs.

Project Accounting employs desktop accounting software – Quickbooks Pro.

Procurement and Maintenance/ Facilities - These Functions use desktop applications to support their tracking, administration, and reporting needs.

The Procurement Function is in need of specific "Customs Brokerage Software" to support its procurement tracking, analysis, administration, and reporting needs.

F) Measurement, Testing, and Examination

The Function receives examinations results data from the CXC Organization.

They also use custom desktop applications (developed in: MS Access, MS Excel etc.) to support their recordkeeping, analysis, and reporting needs.

This Function is in need of specific "Examination Software" to support its process tracking, analysis, grading, management, and reporting needs.

G) Curriculum Development

The Curriculum Development Function receives information from Schools and Teachers via hardcoded forms etc. as required.

They also use custom desktop applications (developed in: MS Access, MS Excel etc.) to support their recordkeeping, analysis, and reporting needs.

H) School Administration

School Budget and Cash Book

SmartStream does not support financial and cash book management at the School level. All School cashbook record keeping is curently manual. Currently Schools are not allocated individual Budgets.

Teacher and Staff Records

These are primarily captured on School forms.

Student Records

These are primarily captured on School forms. Some may be summarised on Forms for the Planning Unit and for District Education Officers.

Student and Teacher Performance

These are primarily captured on School forms. Some may be summarised on Forms for the Planning Unit and for District Education Officers.

School Facilities Records

Little or no records are kept.

School Inventories (textbooks, stocks, materials etc.)

Record keeping varies from School to School. Where records are kept, they exist on School Forms.

3.4 Key Issues/ Concerns

The following key issues/ concerns from MOE Personnel and principals relative to the implementation of an EMIS, have been obtained during previous Site Visits to Grenada – See "Inception Report on the Initial Site Visit – BERP II Project: An Extended EMIS For Grenada; A. West; May 2003:

There is low level of EMIS awareness:

I) I have never attended any Workshops on EMIS – we have no idea what an EMIS is;

II) No documentation had as yet been produced to inform the MOE's principal clients of the expansion project of the EMIS, its potential and training opportunities;

III) Awareness of the project was conveyed through the staging by the OERU of a workshop for secondary school principals exclusively. There was limited dissemination of information as not all secondary schools were represented neither were primary school administrators invited to attend

IV) Government's goals have not yet filtered down to the Secondary and Primary Schools;

The need for adequate Policies, procedures, and Standards

V) Detailed written and MOE approved IT policies and procedures are definitely required;

VI) Revision of job descriptions to include new EMIS tasks, and/ or changed current tasks;

Emphasis needs to be placed on adequate Training

VII) The success of EMIS will depend on adequate training of staff and Teachers – a system being put in place for its sustainability – plus adequate promotion to ensure all stakeholders understanding of its benefits;

VIII) A moderate level of IT capability exists – However training is needed in database development/ management and in the use of Excel;

IX) The training needs of the IT staff members is a critical element which needs to be addressed at all levels, so as to support the existing system, and to avoid recourse to expertise external to the unit for addressing routine matters

The Turnover of Trained Staff

X) The high potential turnover of Personnel after receipt of training, should be effectively addressed in the implementation plan;

The Security of data, and Access to EMIS' data

XI) Confidentiality of Student grades and Teacher payroll information;

Level of Implementation Support and Handholding

XII) IT capability and capacity – there is currently a lack of trained resources available in the MOE to provide the needed level of support for Schools;

XIII) The current level of staffing of the IT Department is a major constraint – in fact the Help Desk is currently unmanned - a Resource for vacation relief has to be supplied by the Ministry of Finance;

XIV) There are only two Technicians in the MOE and they have to service all computers in all the Schools, - since we are not allowed to touch them – and rightly so;

XV) For the term we have only seen MOE technicians twice – this is the term where our children are required to do their SBAs, and right now as the children type, viruses are eating their work

The Reliability and Usability of the EMIS System and overall solution

XVI) Equipment reliability – What support will we have when the System goes down? – Will the system be able to survive our power surges? – What will happen during blackouts?"

XVII) The current bandwidth for communication with Schools is 64K – This is inadequate as Internet based communications are very slow;

XVIII) In our School we have a room full of Computers we received from the Ministry – most of them have stopped working;

XIX) There are approximately 9 PCs piled in the corner of our School Lab, because of sustainability issues – we would need more reliable and efficient maintenance support for the EMIS*;*

Accurate and timely entry of data (ownership of data) must be effectively addressed

XX) At present our Systems for data collection are weak – starting from a low level;

XXI) Principals saw data entry as additional responsibility and workload; which must be addressed in EMIS implementation requirements

XXII) Data from schools have to be valid;

XXIII) Data input would have to be more efficient;

XXIV) MOE Reporting at the School Level takes approximately two to three hours per week – time we don't usually have;

XXV) Additional Staff would have to be employed;

XXVI) In some Schools no Student records are available at all, nor are any kept;

4. EMIS Solution Alternatives

4.1 EMIS Solution - Option A

This option will require the upgrade of the OERU Pilot EMIS software.

PROS:

- ☑ Requires lower levels of maintenance and support than a fully integrated, complex custom developed software application, resulting in a lower overall *cost of ownership.*
- ☑ Generally, established EMIS Vendors have wider experience in developing, implementing, and supporting Schools and Education;
- ☑ For EMIS Vendors established in their product line (a fairly large installed base), there is a lower risk of them going out of business or changing business focus, than Vendors not established in the same product line (e.g. Custom Developers).

CONS:

- ☒ Very low enthusiasm and possibly suport from Officials in the Grenadian MOE, based on OECS EMIS Pilot experiences;
- ☒ Current solution architecture does not allow Schools to continue using the System if the central Server is down, or there are communications problems between the Server and Schools;
- ☒ This solution requires the Purchaser to be dependant on the Vendor for both Hardware and Software. This will tie the Purchaser into the Vendor's current and future pricing strategies. It will not allow the Purchaser the option of taking advantage of future Hardware or Software capability and/ or pricing advantages, that may become available in the marketplace;
- ☒ The software application used in EMIS Pilot would need to be upgraded to be an EMIS solution suitable for Grenada, and one with an international installed base; this would increase the time required for implementation, because of the additional development work that would be needed on the product;
- ☒ The upgrade work required for this Option will have to be custom development. This custom development will be untried and thoroughly field-tested, bringing with it am appropriate level of risk to the implementation;
- ☒ This Option will require the development of detailed in-house expertise to provide long term support for and to the customisation required;
- ☒ The list price for complex, fully integrated "Commercial Off the Shelf" (COTS) application usually appears to be higher than the *estimated acquisition cost* for complex, fully integrated, custom developed software application;
- ☒ This solution Architecture will require extensive ICT infrastructure to be in-place (additional ICT investments will be required);
- ☒ May have to change some business and operational processes and workflows to match those programmed in the COTS application and to minimize any requirement for customizing the software;
- ☒ Technology may not be the latest;
- ☒ Support may not be available locally and/ or regionally if the Vendor does not have a large international or regional product installed base.

PATH FORWARD:

- ➢ Revisit and determine appropriate solution requirements (software, enterprise-level database, hardware, network, start-up services, training, support services, and implementation timeframe) and estimate complete price of implementation;
- ➢ Agree with the OERU EMIS Pilot Vendor on the solutions Requirements and the price for the upgraded integrated EMIS Solution;
- ➢ Agree with the OERU EMIS Pilot Vendor on the Implementation, Start-up and Post Sstart-up requirements and prices;
- ➢ Establish funding;
- ➢ Complete te Procurement process;

- Appoint a Project Steering Committee, and an Implementation Team;
- Establish final implementation plans for the EMIS solution with the Vendor;
- Set User expectations;
- Implement.

4.2 EMIS Solution - Option B

This option will require the custom development of an integrated EMIS solution.

PROS:

- ☑ Estimated *acquisition cost* (and/ or effort) for a complex, fully integrated, custom developed software application, usually appears to be lower than the list price for complex COTS application;
- ☑ May not have to change some business and operational processes and workflows, this would be one of the key reasons why a custom developed software application would be selected over a "Commercial Off the Shelf"(COTS) application;

CONS:

- ☒ Custom development of complex fully integrated software is usually accompanied by Scope, Schedule, and Cost Creep (hidden and unplanned costs);
- ☒ Implementation time is longer than that for a similar COTS, because time for product development and Testing has to be included in the implementation schedule;
- ☒ Custom developed complex software usually requires higher levels of maintenance and support, resulting in higher overall *cost of ownership* (including the need for "in-house" *development*, *maintenance*, and support capability/ expertise) than that for a fully integrated complex COTS application;
- ☒ The potential custom developer of EMIS software will low levels of experience in developing, implementing, and supporting complex fully-integrated Schools and Education MIS solutions;
- ☒ Custom developed fully integrated software is usually not provided with adequate operational and technical documentation – Training Courses and Support Services are usually not well established and structured
- ☒ Vendors of custom developed software are not usually established EMIS Developers and Maintainers. There is a higher them going out of business or changing business focus (no longer supporting EMIS solutions), than Developers already established in the EMIS product line.

PATH FORWARD:

- Finalize requirements (software, enterprise-level database, hardware, network, start-up services, training, support services) and estimate price for a fully integrated custom EMIS Solution;
- Agree with the selected Developer(s) on a software development, implementation schedule, start-up and post start-up prices;
- Establish funding to suitably equip the effort for producing the deliverables in the agreed upon (contracted) timeframe;
- Complete te Procurement process
- Appoint a Project Steering Committee, and an Implementation Team;
- Set User expectations;
- Develop and implement.

4.3 EMIS Solution - Option C

Using the EMIS requirements and design described in this Report, select an EMIS Vendor/ Supplier that has a widely established base and currently operates in Educational environments similar to Grenada and the the OECS in general.

PROS:

- ☑ Solution architecture allows Schools to continue using the System if the central Server is down, or there are communications problems between the Server and Schools;
- ☑ Solution Architecture does not require extensive ICT infrastructure to be in-place (Additional snd possibly expensive ICT investments to be made);
- ☑ Requires lower levels of maintenance and support than a fully integrated, complex, custom developed software application, resulting in a lower overall *cost of ownership* (few if any hidden or unplanned costs; requires only "in-house" support capability/ expertise);
- ☑ Implementation time is shorter than for a custom developed software application, since no product development has to be included in the implementation schedule;
- ☑ An established complex, fully integrated COTS application is usually provided with adequate operational and technical documentation – Training Courses and Support Services are usually established and structured;
- ☑ An established EMIS product with a large international/ regional installed base would require limited customization or tailoring to make the product suitable to the OECS environment;
- ☑ EMIS Vendors with fairly large installed product bases, have wide experience in developing, implementing, and supporting Schools and Education Administration software;
- ☑ For EMIS Vendors established in their product line (a fairly large installed base), there is a lower risk of them going out of business or changing business focus (no longer supporting EMIS solutions), than Vendors not established in the same product line (e.g Developers of custom solutions).

CONS:

- ☒ The list price for complex, fully integrated COTS application usually appears to be higher than the estimated *acquisition cost* for complex, fully integrated, custom developed software application;
- ☒ May have to change some business and operational processes and workflows to match those programmed in the COTS application and to minimize any requirement for customizing the software;
- ☒ Technology may not be the latest;
- ☒ Support may not be available locally and/ or regionally if the Vendor selected is not one with a large international product installed base.

PATH FORWARD:

- ➢ Finalize solution requirements (software, enterprise-level database, hardware, network, start-up services, training, support services, and implementation timeframe) and estimate complete price of implementation;
- ➢ Establish funding;
- ➢ Complete Procurement process;
- ➢ Appoint a Project Steering Committee, and an Implementation Team;
- ➢ Establish final implementation plans for the EMIS solution with the Vendor;
- ➢ Set User expectations;
- ➢ Implement.

4.4 Key Decision Criteria/ Considerations

- ✓ Applicability and range of EMIS functionality;
- ✓ Applicability of EMIS database(s) for National duty;
- ✓ Applicability of EMIS architecture to MOE and Schools' business and operational needs;
- ✓ Level of risk associated with the implementation (amount of customization needed ******, experience of the Vendor, experience and quantity of Vendor's development and implementation personnel (Technical and Project Management), size of product installed base, internationally/ regionally installed and supported product, etc.);

- ✓ Implementation timeframe desired versus the implementation timeframe offered (needed by the Vendor);
- ✓ Cost of ownership for the EMIS (versus cost of acquisition).

**** Note**: *Level of customization needed (The higher the level of customization the higher the risks – Scope creep, Schedule creep, Cost creep, and Quality creep).*

5. EMIS Requirements

5.1 General Requirements

The EMIS system required by the Grenada needs to support Education administrative and decision-making processes:

- At the national/ MOE level;
- At the District/ Parish level;
- Locally, at the school level.

At the national level, the System must be able to support:

- The Education administrative planning and decision-making processes of the MOE;
- It must be able to respond to the MOE's needs for all types of reports including those that deliver information on resource utilization, and progress toward desired performance goals;
- It needs to provide information on how investments, intakes, outputs, and results have been trending;
- Perform "what if" processing, for example: if a particular school were closed, what would be the impact on performance targets, provide workload forecasts and staffing requirements etc.
- It should greatly facilitate communication between the MOE, districts/parishes, and schools.

At the District/ Parish level level, the System must be able to support:

- The monitoring, tracking, editing, and analysis of district/ parish specific information (information relative to all Schools Administrative and Teaching personnel in the district/ parish) contained in the central EMIS database;
- The administrative decision making processes of District Education Officers;
- The reporting requirements of District Education Officers including those reports that deliver information on students, teachers, and schools' progress toward desired performance goals.

At the School level however, the System must not only support School administrative processes. If it is to be embraced, it must perform functions that support the operations of the School, e.g. the generation of timetables, and routine correspondence.

As such the System's database will be the repository for information on: Students, Teachers, Exams, Curriculum, Student Learning, Schoolbooks, School Assets, School Budgets, and Schools Facilities etc. The System is also required to be backward compatible with Microsoft Widows environments as early as Microsoft Windows 95.

5.2 OECS Compatible System Architecture

In visits to Grenada and other OECS Countries, the Consultant has learnt that it is the preference of the OECS countries and the OERU that their EMIS solutions should be Web-based. Such a System would allow access and use via the Internet and/or their Intranets. However their EMIS' should permit queries from their EMIS Workstations to be submitted to their EMIS database Server(s) in an on-line manner, irrespective of point of origin. It should also allow communications with Education Stakeholders external to the MOE.

The EMIS should interface seamlessly with the Microsoft Suite of Office Productivity Applications (e.g. Word, Excel, Access).

In Grenada and each OECS country both the MOE and Schools will be using the EMIS. The system's architecture should be such that if the central EMIS Server, database or communications are unavailable, Schools will still be able to use the EMIS for day-to-day operations. Should this requirement necessitate

School-level databases be installed at each School, then the system must allow for information to be synchronized at regular intervals (as required) between Central and School-level databases.

5.3 Data and Information Requirements

A) STUDENT DATA

Biographical and Other Data:

a) Name(s);
b) Current and Past Addresses;
c) Residential Telephone Number;
d) E-Mail address;
e) National (unique) Student ID#;
f) School Assigned or Computer Generated Student ID#;
g) Nationality;
h) Gender;
i) Date of Birth;
j) Ethnicity;
k) Religion;
l) Date of School Entry;
m) School Fees/ Dues/ Funds paid versus unpaid;
n) Classes/ Subjects Assigned/ Enrolled;
o) Previous School;
p) School Entrance and Current Examination Results (School and National);
q) Health Information: Medical Conditions, Doctor's Name, Medication etc.;
r) Names of Student Relatives at this School;
s) House/ Club/ Group membership;
t) Academic Achievements/Awards and Dates;
u) Major Activities and Interests;
v) Learning Impediments;
w) Behavioral Observations;
x) Disciplinary Interventions;
y) Career Preferences.

Parent/ Guardian Data:

a) Parents/ Legal Guardians Names;
b) Parents/ Legal Guardians Addresses;
c) Parents/ Legal Guardians telephone numbers;
d) Parent/ Legal Guardian E-Mail Address;
e) Parents/ Legal Guardians daytime/ ***emergency*** contact information.

B) STUDENT ATTENDANCE DATA

a) Student Attendance;
b) Date of Absence;
c) Reason(s) for Absence(s);
d) Student Punctuality;
e) Date of Tardiness;
f) Reason(s) for Tardiness.

C) STUDENT BURSARIES/ GRANTS/ BENEFITS/ SUBSIDIES DATA

a) Amount(s) of Bursaries/ Grants/ Subsidies;
b) Date(s) of Bursaries/ Grants/ Subsidies;
c) Categories of Bursaries/ Grants/ Subsidies;
d) Effective Dates of Bursaries/ Grants/ Subsidies;
e) School Meal entitlement;

f) Effective dates for School meal entitlement.

D) SCHOOL DATA

School Operations:

a) School District;
b) School Levels (Grades);
c) School Classrooms and Classrooms capacities;
d) Subject/ Course Enrollments;
e) School Subjects/ Courses (core and non-core);
f) School Activities (academic, sporting, music, art etc.);
g) School Clubs/ Houses etc.
h) Student Schedules;
i) Teacher Schedules;
j) Classroom Schedules;
k) Student Textbooks and Textbook Assignments;
l) Instructional Materials (e.g. Teaching Guides, Instructional Aids etc.)
m) School Equipment (Science Lab, Agriculture, Art, Music, Sports etc.) List and Assignments;
n) School Assets (Computers etc.) List and Assets Assignments;
o) School Stock book (quantity and time of receipt of various items - distribution of these items, what, quantity, when, and to whom);

School Schedules:

a) Student(s) schedules;
b) Teacher(s) schedules;
c) Class schedules;
d) Rooms/ Facilities schedules;
e) Extra Curricula Activities schedule.

School Facilities (For each Site):

a) Address;
b) Education District;
c) Minimum two telephone Numbers;
d) A Fax number;
e) E-Mail address;
f) School related (associated) contact information (e.g. Principal, SEN Officer etc.);
g) Caretaker name and contact information;
h) Key holder name and contact information;
i) School contracts information by type and assignment;
j) Term dates, opening and closing times;
k) Internal Rooms/ Facilities by Type (Library, Gym, Toilets etc.), and area (L x W - sq. ft.) or (H x L x W - feet).
l) Condition(s) of School Facilities
m) External Facilities including playing field information;
n) Number of School Meal entitlements.

Equipment and Stocks Register/ Inventory

a) Inventory of School equipment and stocks;
b) Date received into inventory;
c) Equipment/ stock Item by type/ group;
d) Equipment/ stock assigned to – location or staff;
e) Date assigned from inventory;
f) Equipment/ stock quantities.

School Improvement Plan Monitoring:

a) Keeps a record of the Plan;
b) Records School self-evaluations against the Plan.

Budget and Cash Book:

a) Budgets by MOE Accounts (Programs);
b) Income (AR) Contributions/ Donations Amounts, By Types, Time and by Source (Students, Parents, Government, Clubs, and Organizations etc.;
c) Expense (AP/ Cash Book) Amounts by Time, Type;
d) Account Posting (GL) by MOE Accounts;
e) Student / Parent Billing (for outstanding fees etc.);
f) Bank Account information;
g) Petty cash tracking.

Library Book Tracking:

a) Library Book title and catalog information;
b) Library Book check-out time;
c) Library book check-in time;
d) Library Book Assignment by location, Student, Staff etc.

Special Education

a) Student Name;
b) Special Education Needs (SEN) Program;
c) SEN Assessments.

School Catchments Information

a) Student Distances from School;
b) Modes of Transportation
c) Etc.

E) TEACHER AND OTHER STAFF DATA

Biographical and Other Data:

a) Names;
b) Current and Past Addresses;
c) Residential Telephone Number;
d) E-Mail Address;
e) National Insurance (Social Security Number);
f) Nationality;
g) Gender (M/ F);
h) Date of Birth;
i) Marital Status;
j) Ethnicity;
k) Class Assignments;
l) Education Level/ Academic attainments and dates;
m) Current Status in Level/ Position/ Post (permanent, temporary, contract);
n) Teaching Level/ Position/ Post and date appointed;
o) Years in various Levels/ Positions/Posts;
p) Additional Professional Competencies/ Expertise/ Training/ Awards and dates attained;
q) Performance Appraisals Results Summary and Dates of Occurrence;
r) Disciplinary Interventions;
s) Health Information: Medical Conditions, Doctor's Name, Medication, etc;
t) Vacation Leave;
u) Sick Leave;
v) Special Leave;
w) Training Leave;
x) Other Leave.

Teacher and Other Staff - Spouse/Legal Guardian Information:

a) Spouse/ Legal Guardian Names;

b) Spouse/ Legal Guardians Addresses;
c) Spouse/ Legal Guardians telephone numbers;
d) Spouse/ Legal Guardians daytime/***emergency*** contact information.

F) TEACHER AND OTHER STAFF ATTENDANCE DATA

a) Teachers and Other Staff Attendance;
b) Date(s) of Absence;
c) Reason(s) for Absence(s);
d) Teachers and Other Staff Punctuality;
e) Date(s) of Tardiness;
f) Reason(s) for Tardiness.

G) CURRICULUM DATA

a) Curriculum Program;
b) Objective(s);
c) Examination Scores by Subject - by Evaluation (Test) Method and by Class Objectives;
d) Student Textbooks;
e) Instructional Materials;
f) Curriculum assessments.

5.4 Reporting Requirements

A) SCHOOL AND EDUCATION REPORTS (By Gender, Age, Previous School, District, Nationwide etc.)

- Gross and Net Student Intake;
- Gross and Net Student Enrollments;
- Gross and Net Teacher/ Student Ratios;
- Transition rate (to the "World of Work");
- Promotion Rate;
- Graduation Rate;
- Repetition Rate;
- Drop-out Rate;
- Literacy Rate;
- Punctuality/Truancy Rate;
- Attendance Rate;
- Performance on Standardized Tests;
- Performance on National Tests;
- Percentage of Students with Textbooks;
- Student to School Assets (e.g. Computers) Ratio;
- General staffing Reports by Teacher experience, Years to Retirement, Staff Qualifications, Staff Allocations, etc.
- Teacher Attrition Rate by age, level, gender, School, District, etc.
- Frequency of Teacher Training etc.
- Frequency of Teacher and Staff Appraisals;
- Student Bursaries/ Grants/ Subsidies;
- School Income and Expenditures – Summary and Detail;
- School Budget and Budget Variances;
- Current Expenditure per Student;
- List of School Facilities (Allocated Area, Recreational, Science Area, etc.);
- Status of School Facilities;
- Inventory of School Equipment and Assets (e.g. Computers), Assets Locations, and Assets Conditions;
- Inventory of School Stocks;

- School Stock Usage and Usage Rate;
- Average Square Feet of School Area by Student;
- Student Lists by Level, Gender, District, House, Age, Immunization, Activities, Subjects etc.;
- Classroom Assignments;
- Teacher Assignments;
- Teacher contact hours/Teaching Loads;
- School Catchments and Demographics-based Reports;
- Provisional Student admissions allocations in any assigned priority order;
- The proportion of Students allocated their first School preference;
- Letters to parents with allocated School;
- Student transfers by type and location.

B) TEACHER REPORTS

- Average Age of Teachers in the Classroom;
- Average Years of Teacher Experience;
- Teacher Nationalities by percentage;
- List of certified Teachers versus non-certified;
- Percentage of certified Teachers;
- Attendance and Attendance Rate;
- Punctuality and Punctuality Rate;
- Teacher Class Assignments List;
- Accumulations of occurrences of various categories of Leaves and Absences, for Teachers and Auxiliary Staff.

C) STUDENT REPORTS

- Performance on School Tests;
- Performance on Standardized Tests;
- Performance on National Tests;
- Attendance by Day, Week, Month, Year, Term, Quarter etc.
- Number of Days Tardy by Day, Week, Month, Year, Term, Quarter etc.;
- Attendance Rate;
- Punctuality Rate;
- Student Class Assignments List;
- Student Bursaries/ Grants/ Subsidies Letter;
- End-of-School-Term Reports;
- End-of-School-Year Reports;
- Student Transcripts;
- Standard Award and Achievement Letters;
- Standard Disciplinary Letters.

D) CURRICULUM AND LEARNING REPORTS

- Instruction Time on Core Subjects;
- List of Student Textbooks;
- List of Instructional Materials (e.g. Teaching Guides, Instructional Aids etc.);
- Curriculum assessments;
- Utilization Rate of Instructional Materials.

5.5 Educational and School-level Process Requirements

Admission and Transfers

- ✓ Permit automated provisional School allocations based on prioritized criteria (e.g. Parental preferences, catchments areas, home to school distances, examination results etc.);
- ✓ Provisional allocations to be printed in priority order;
- ✓ Generate Letters to parents with allocated School;
- ✓ Parental acceptance or rejection can be recorded;
- ✓ Provisional allocations can be overridden by manual allocations;
- ✓ Maintain an audit trail of changes to allocations, for each Student;
- ✓ Perform final transfers, by reassigning Students and their EMIS records to their new Schools, changing provisional allocations to firm allocations;
- ✓ Summary statistics Reports such as the proportion of children being allocated their first preference school should be available.

School Administration

- ✓ Perform Students Enrollment;
- ✓ Produce Student ID Cards (preferably containing Student Photos);
- ✓ Take Student Attendance by inclusion or exception via direct data entry and by data readable equipment e.g. Scanners and Barcode Readers;
- ✓ Produce End-of-School-Term Students Reports and End-of-School-Year Students Reports;
- ✓ Generate Student Transcripts;
- ✓ Generate Student Disciplinary Letters;
- ✓ Promote/ Repeat/ Graduate/ Suspend/ Terminate Students;
- ✓ Maintenance of all Student, Teacher data etc.
- ✓ Produce timetables/ Schedules for Students/Teachers/Classes/Rooms etc.;
- ✓ Publish timetable, class, and registration information so that it is available to parents, guardians, and staff over the Internet;
- ✓ Develop School calendars for maintaining scheduled school events (e.g. PTA meetings, Sports events etc.);
- ✓ Generate Student, Class, House, Teacher assignment lists;
- ✓ Assess Student activities and record progress by performance criteria;
- ✓ Perform comparison of results between those of different Student groups;
- ✓ Register, assign (including check-in and check-out), and schedule Textbooks, Library books, School equipment etc.;
- ✓ Track Student Bursaries/ Grants/ Subsidies;
- ✓ Transfer current grades/records to past Students records, upon Students graduation.

Curriculum

- ✓ Definition of a Curriculum plan for each Year/ Student/ Student group;
- ✓ Define and structure Programs of study and assessments, for each study unit;
- ✓ Manage required and optional courses;
- ✓ Verification of Course selections (e.g. prerequisites);
- ✓ Link materials and material types to Student groups and study units;
- ✓ Perform physical resource scheduling (e.g. Teaching Aids and Media, Assembly Rooms, Science Labs, Equipment etc.);
- ✓ Calculate Class Examination/Test Scores/Grades" (based on a weighted summations of "Level of Attainment Scores");
- ✓ Assessment of Student performance by Learning objectives, Evaluation types, Teacher, Class-size, Region, Class-type, Average Class-enrollments, Term, School year, etc.

Equipment and Stock Inventory

- ✓ Track items of equipment and stocks currently held by Schools;
- ✓ Allocate assets to allocated to Rooms or members of Staff;
- ✓ Maintain a record of the items of equipment that have been allocated to either a room or a member of Staff;
- ✓ Record periodical Stocktaking and Inspections.

Student Bursaries/ Grants/ Benefits/ Subsidies Tracking

- ✓ Maintain a history of Student Bursaries/ Grants/ Benefits/ Subsidies detailed against financial years and specific funds.

Financial Management and Accounting

- ✓ Track and monitor staff and operational costs by cost/ budget/ Program centers and account;
- ✓ Allows the modeling of future budgets using various Scenarios;
- ✓ Maintain a record of the items of equipment that have been allocated to either a Room or a member of Staff;
- ✓ Maintain records of periodical equipment and stock taking and Inspections;
- ✓ Generate and issue Invoices as required;
- ✓ Reconciliation of MOE and School bank accounts;
- ✓ Reconciliation of MOE and School expenses to a central accounting System *(Smartstream);*
- ✓ Operate a petty cash facility for disbursements.

Human Resource Management and Development

- ✓ Perform calculations of Staff projections;
- ✓ Accumulations of occurrences of various categories of Leaves and Absences, for Teachers and Auxiliary Staff;
- ✓ Analyses staff absences by reason;
- ✓ Link absence records to affected services;
- ✓ Establish an track budgets for training by Course and Course type;
- ✓ Linked training to the School and/ or Education Development Plan;
- ✓ Generate documents and letters to all employees with a particular type of service.

Management/ Supervisory Alerts

- ✓ Alert management that monitors the data in the EMIS database and gives early warning of potential problems and notifies relevant staff when an alert is triggered. For example: are Students cumulating unauthorized absences;
- ✓ Allow letters and reports to be produced overnight for later distribution;
- ✓ Send e-mails to non-Users of the System if they need to be alerted to situations.

5.6 Data Entry

The EMIS should allow data to be entered manually (keyboard data entry), via floppy disks, via CDRW disks, automatically (via modem, intranet, internet, WAN etc.), and via Text, Graphic, and Bubble Scanners, Barcode Readers, and other Data Readable devices.

The EMIS must be capable of performing validation of EMIS data, upon data entry.

5.7 Database

- ✓ Robust National (Enterprise) level database in the category of SQL Server, Oracle etc.
- ✓ Uses System User names and passwords to limit access to stored information;
- ✓ Database archiving and retrieval capability;
- ✓ Trace facilities for problem diagnosis;
- ✓ Audit trails;
- ✓ Statistical functions;
- ✓ Support for Graphical User Interfaces (GUIs), and Forms/Queries/Reports;

- ✓ Centralized/remote management of passwords across client-server engines;
- ✓ Trace facilities for problem diagnosis;
- ✓ Support for remote database access over common network protocols (e.g., TCP/IP);
- ✓ File system integrity: mechanisms for ensuring integrity of file structures following system crashes and abnormal process termination, including back-up and remote configuration;
- ✓ The System should for the User to define and report against User-defined database fields;
- ✓ Alert management capabilities that monitor the data in the EMIS database and gives early warning of potential problems e.g. are Students cumulating unauthorized absences;
- ✓ Must be capable of processing normal database transactions (e.g., add, update, delete, etc.) for Users of the System, within a five (5) second time period;
- ✓ All Teacher (Staff) information, should be accessible through unique Teacher (Staff) ID numbers – e.g. National Insurance numbers;
- ✓ All Student information should be accessible through a unique (School independent) Student ID, or a School assigned (School specific) Student ID;
- ✓ The EMIS database should be scalable. As additional Schools data are added to the EMIS, additional database spindles (capacity) should be easily added and configured – without impact to System performance.

NOTE: *The system's architecture should be such that if the central EMIS Server, database or communications are unavailable, Schools will still be able to use the EMIS for day-to-day operations. Should this requirement necessitate School-level databases be installed at each School, then the system must allow for information to be synchronized at regular intervals between Central and School-level databases.*

5.8 Security

- ✓ The EMIS should allow only authorized use and views (controlled by the System Manager);
- ✓ Security and password protection at all levels from database applications to the data element level;
- ✓ Allow Users to enter a password and User ID in order to access the System
- ✓ User passwords are to be encrypted;
- ✓ Limit the number of unsuccessful to three then reject the User – A System Administrator will be required to unlock the User Workstation;
- ✓ Automatically expire passwords after a System Administrator defined period, allowing the User the appropriate opportunity to change/ update their password;
- ✓ Provide selective access to applications and to modules of applications;
- ✓ Provide database security down to the field level;
- ✓ Journaling and audit functions for on-line transactions are to be fully implemented and should provide information relative to Username, date, time, and Workstation ID;
- ✓ Allocates User names and passwords to limit access to stored information.

5.9 Communications

The EMIS network will utilize existing public dial-up telephone lines as well as leased line capability. This network should permit any End-User system on the network to access the EMIS, as well as permit the transmission of electronic mail to any registered User on the network.

EMIS should allow data from Schools' databases to be manually uploaded into the central server, allowing data for upload to be transported via Floppy disks ("Sneaker-net"). Data may also be uploaded via Internet.

The EMIS file transfer system must provide error free transfer between systems, with logging of file transfer requests, actions, and failures.

EMIS needs to be a Web-based Education and School Administrative System that allows access and use via the Internet and/or MOE Intranets.

The System should be capable of allowing Parents and Students to receive Examination results (National and School) and other notifications via the Internet.

5.10 Enterprise-wide Toolsets

The following tools are intended to address a variety of needs within the Ministry of Education. Each of the toolsets are described in general terms. Most of the desired features in these toolsets are available as stand-alone or as networked solutions, in individual "off the shelf " (commercially available) software packages.

A) Electronic Mail Software

The Electronic Mail (E-mail) E-Mail system should enable the User to:

- Receive electronic mail messages;
- Compose and send brief messages;
- Reply to a message or messages;
- Forward messages;
- Manage private or public distribution lists;
- Attach or send files (including word processing, spreadsheets, etc.);
- Provide secure remote access.

The E-Mail system should provide visual and/or auditory notification of incoming messages, and provide for the intuitive management of mail once received. Mail Servers should, automatically synchronize Users addresses, directories, and distribution lists.

The E-Mail solution must be scalable and flexible enough to operate and expand as the MOE and National communication infrastructure is implemented.

The E-Mail system must be compatible with MS Exchange mail standards and be capable of sending and receiving mail via the Internet.

B) Office Productivity Software

A number of integrated software tools that support Office productivity are available in the marketplace. The MOE is currently interested in making the MS Office Suite of productivity-focused software, the MOE/ IT Standard.

This software suite can be implemented on a stand-alone basis on each User Workstation, or the networked version can be implemented on the Application Server and made available to Users over the network.

C) Report Writer

All MOE Departments and Units that will be using the EMIS will need to produce statistical or performance results Reports. Over time as Users and Managers become more learned on the EMIS the need for additional and unplanned Reports will grow. As such, a Report Writer will be extremely useful to the MOE and Schools in providing data and information views never previously imagined or requested.

A number of "state-of-the-art" Report Writers are readily available in the marketplace, or supplied with EMISs. This software suite can be implemented on a stand-alone basis on appropriate User Workstations, or the networked version can be implemented on the Application Server and made available to Users over the network.

D) Additional Software

There is a need for Department/ Unit specific software to greatly aid the productivity and efficiency of these Departments/ Units.

Project Management Software (e.g. MS Project Management) – Project Management Unit;
Customs Brokerage Software (e.g. Tariff Pro 2003) – Project Management Unit;
Statistical Analysis and Reporting Software (e.g. SPSS) – Planning Unit;
Network Management Software (e.g. Hewlett Packard's OpenView) – MIS Unit;
Examinations Software (TBD - Educational Testing and Examinations Unit).

5.11 Hardware

Typical School EMIS Workstation Specifications

- Operating System: Windows (XP) or 2000
- Processor: Intel Pentium 4, or AMD Athlon XP
- RAM: 256 Mb (upgradeable to 512 Mb)
- Monitor: 17" (with 1024 x 768 resolution)
- Communications Device: NIC and/ or Modem
- Storage: 20 Gb Hard Disk Drive
- I/O Devices: CD – ROM or DVD – ROM/ Floppy Disk drive, Keyboard, and Mouse
- Warranty: Three years parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Typical MOE/ School District EMIS Workstation Specifications

- Operating System: Windows (XP)
- Processor: Intel Celeron
- RAM: 128 Mb (upgradeable to 512 Mb)
  NOTE: *Additional RAM recommended for workstations doing Scheduling*
- Monitor: 17" (with 1024 x 768 resolution)
- Communications Device: NIC or Modem
- Storage: 20 Gb Hard Disk Drive
- I/O Devices: CD – ROM or DVD – ROM/ Floppy Disk drive, Keyboard, and Mouse
- Warranty: Three years parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Typical EMIS School Server Specifications

- Operating System: Windows 2000
- Processor: Intel Pentium 4, or AMD Athlon XP
- RAM: 512 Mb (upgradeable to 1024 Mb)
- Monitor: 17" (with 1024 x 768 resolution)

- Communications Device: NIC and Modem
- I/O Bus: SCSI with SCSI Interface
- Storage: 80 Gb Hard Disk Drive
- I/O Devices: CD –ROM or DVD - ROM/ Floppy Disk drive, Keyboard, and Mouse
- Back-up: CD – RW or DVD – RW
- Warranty: Three years parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Typical EMIS MOE Server Specifications

- Operating System: Windows 2000
- Processor: Intel Pentium 4, or AMD Athlon XP
- RAM: 512 Mb (upgradeable to 2048 Mb)
- Monitor: 17" (with 1024 x 768 resolution)
- Communications Device: NIC and Modem
- I/O Bus: SCSI with SCSI Interface
- Storage: 3 x 80 Gb Hard Disk Drive
- I/O Devices: CD – RW or DVD – ROM/ Floppy Disk drive, Keyboard, and Mouse
- Back-up: Tape Drive or DVD/RW
- Warranty: Three years parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Typical Heavy Duty Laser – MOE Department Laser Printer Requirements

- Printer Type: HP LaserJet 8150dn OR similar
- Network Interface: 10/100 Mbps (dual speed) NIC
- Speed: Minimum 24 ppm
- Resolution: 1200-dpi quality
- Duplexing: automatic duplexing
- Primary trays capacity: 500-sheet trays
- Secondary tray capacity: 100- sheet multipurpose tray
- Maximum paper size: 11" x 17"
- Compatibility: Windows 98, NT 4.0, Windows 2000
- Printer Memory: Minimum 16 MB
- Warranty: Three years parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Typical Medium Duty Laser –School Laser Printer Requirements

- Printer Type: HP LaserJet 2000dn OR similar
- Network Interface: 10/100 Mbps (dual speed) NIC
- Speed: Minimum 18 ppm
- Resolution: 1200-dpi quality
- Duplexing: automatic duplexing
- Primary trays capacity: 500-sheet trays
- Maximum paper size: 11" x 17"
- Compatibility: Windows 98, NT 4.0, Windows 2000
- Printer Memory: Minimum 8 MB
- Warranty: One year parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Additional Hardware and Equipment Needs

See Economic Analyses in the Appendices for additional Computer Hardware needs.

5.12 Networks

The Building that Houses the MOE is fully networked. However where Local Area Networks (LANs) are required, they should conform to a 10 Mbps IEEE 802.3 or ISO 8802/3 (CSMA/CD).

Typical Network Switch Requirements

- Switch Type: 3Com SuperStack 3 Switch 3300 OR similar
- Chassis: Desktop or Rack-mountable
- Port Type: 10/100BASE-TX (RJ-45) - 24
- Warranty: One year parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Typical Network Hub Requirements

- Switch Type: 3Com SuperStack 3 Baseline OR similar
- Chassis: Desktop or Rack-mountable
- Ports: 24 -10/124 10BASE-T/100BASE-TX
- Warranty: One year parts and labor
- Voltage: 110/240 Volts AC and 50/60 Hz

Additional Network Equipment Needs
See Economic Analyses in the Appendices for additional Network Equipment needs.

5.12 Power Conditioning Equipment

Typical Organization/ Company (MOE) Level UPS

- Type: Powerware, APC OR similar
- Capacity: 24 KVA
- Voltage: 110/240 Volts AC and 50/60 Hz
- Warranty: One year parts and labor

Typical Individual Workstation Level UPS

- Type: Powerware, APC, Tripplite OR similar
- Capacity: 600 VA
- Voltage: 110/240 Volts AC and 50/60 Hz
- Warranty: One year parts and labor

Typical Individual Workstation and Large Printer Line Conditioner

- Type: Powerware, APC, Tripplite OR similar
- Capacity: 1250 VA
- Voltage: 110/240 Volts AC and 50/60 Hz
- Warranty: One year parts and labor

Typical Individual Workstation Surge Strips

- Type: Powerware, APC, Tripplite OR similar
- Capacity: 15 Amps
- Voltage: 110/240 Volts AC and 50/60 Hz
- Warranty: One year replacement

5.13 Environmental Requirements

The country of Grenada, being islands located in the Caribbean Sea requires that special attention be given to the environmental conditions that infornation technology is to be placed into service, if its useful lives are to be maximized.

Consideration should be given to ensuring that any Hardware and Equipment requested / tendered must be supplied in accordance with the following local climatic conditions (unless otherwise stated):

- Maximum Ambient Temperature: 45 deg. Centigrade;
- Max. Relative Humidity (RH): 85%;
- Max. Temp of an Air Conditioned Room: 30 deg. Centigrade;
- Max. RH of an Air Conditioned Room: 65%.

NOTE: *All IT equipment should be operated only in air conditioned /temperature and humidity regulated rooms. The equipment should NOT be operated in a non-controlled environment where it is exposed to the Caribbean's breezes that typically contain moisture and some dust.*

Consideration should also be given to procuring dust covers for all monitors, workstation CPUs, and keyboards.

For Schools and MOE Buildings near the seaside, careful consideration should be given to sourcing computer and network equipment that are designed to operate in seaside environments (high humidity and salt concentraions in the atmosphere) and/ or preparing rooms to be used for house computing equipment in a way that the air inside these rooms are highly controlled.

6. Implementation Requirements

6.1 Introduction

The Education Management Information System (EMIS) is to be both a fully integrated national Education Information and a fully integrated local School Information System. The complete EMIS must be delivered, tested and implemented as a turnkey, fully integrated Education administrative and operational solution.

The new Systems will eventually be supported, and managed to the greatest degree possible by the MIS/IT organization of the MOE. Because of the complexity of an integrated EMIS, the implementer's (supplier's) Project team should include local /regional specialists with relevant experience to facilitate project sustainability, technology transfer, language and minimization of costs; if need be, local/ regional subcontractors may be integrated in the team to achieve these objectives.

6.2 Start-up

For Start-up of EMIS School Workstations and Servers (access to the central MOE EMIS Server) implementation includes at a minimum:

- EMIS Application loading and configuration;
- Database loading (of converted School Records);
- Data validation;
- Local Database set-up and configuration;
- Connection verification and data transfer with the central MOE EMIS Server;
- Local System tuning.

For Start-up of MOE EMIS Workstations (access to the central MOE EMIS Server) implementation includes at a minimum:

- EMIS Client software and loading and configuration;
- Connection verification and access to the central MOE EMIS Server.

For Start-up of the MOE EMIS Server, implementation includes at a minimum:

- EMIS Application loading and configuration;
- Database loading;
- Server start-up, check-out and configuration;
- Communications verification between Server and Clients;
- Overall System performance tuning.

6.3 Training

Most Training should be provided at a local Training Facility (preferably at the MOE) for cost minimization.

Computer Literacy

Dependening on the level of computer literacy and familiarization existing with potential EMIS Users in the MOE and Schools, the MOE should consider providing basic computer literacy courses as the first set of EMIS related Training. This could be considered as EMIS preparation/ readiness Training. This requirement became painfully apparent from input the Consultant received during Initial Site Visits to Grenada.

Introduction to EMIS

The next set of Training should be "Introduction to EMIS Training". This Training should be offered to a core group of EMIS Users (including MIS personnel). The main objective of this Training would be to help prepare these Users to better execute their roles in Acceptance Testing, and System Start-up.

Basic to Intermediate EMIS Training

Following upon the succesful completion of Acceptance Testing, Users could now be trained on overall EMIS system, application and database functionality, using a "Train the Trainer" approach.

Advanced EMIS Training

Approximately 6 months to one year after start-up, key users should be provided with advanced EMIS Training. This training would focus on coaching Trainees how to effectively apply EMIS's in specific Education and /or School Programs e.g. School Based Management; Continuous Assessment; Testing and Assessment/Measurement and Assessment; etc.

6.4 Overall Implementation Plan and Key Activities

A detailed overall EMIS implementation plan is presented in the Appendix.

6.5 Critical Success Factors

The critical success factors summarized below include inputs from EMIS Stakeholders, who were interviewed by the EMIS Consultant in trips to Grenada conducted in April 2003.

A) To build User confidence, the System should have high availability, high reliability, and fairly quick transaction response times.

- For high availability at the School level, the architecture of the selected EMIS should be such that if the EMIS Server, database or communications are unavailable, Schools will still be able to use the EMIS for day-to-day operations. Such a requirement necessitate a School-level EMIS databases to be installed at each School;
- High availability for all System Users would require redundancy across the key Hardware and Network components;
- Fairly quick response times could be achieved through a combination of efficient database design, high computer processing power, high amounts of computer internal memory, and increase network pipeline capacity;
- Fairly quick response times could also be attained by the overall Software Solution Architecture, which would favour the use of Client based rather than Server based processes, thereby minimizing the size of communications pacquets and volume of Network/ communications traffic;
- High reliability would require that the System selected (both Hardware and Software) be of high quality craftsmanship.

B) The implementation of EMIS must be understood, viewed, and managed as the implementation of an Educational administrative and operational Solution that will greatly influence how the MOE and Schools will operate in the future, and not just as the implementation of Information Technology.

- Select and appoint an EMIS implementation start-up team, made up primarily of the key EMIS Users. Select a key User to be the Team Leader, ensure IT/MIS representatives function as advisers and internal Consultants;
- Complete an assessment and determination of EMIS Organizational Impacts, and implement appropriate measures;

- Complete adjustments to affected job descriptions (Desk manuals) and job standards, to promote the effective use of the System in meeting MOE targets;
- Update the current MIS/IT Policies to support the safe, proper, and effective use of the EMIS Solution investments;
- Ensure early identification and establishment of EMIS Solution sustainability requirements.

C) Assign clear leadership, responsibilities, and accountabilities for the success of the overall EMIS Solution, not just for its implementation. Provide the necessary support to ensure success.

- Secure and appoint an experienced and high-level MOE Education Officer or Education Program Manager, to drive the pre-implementation, implementation, and post-implementation phases of the Program;
- The EMIS Program Manager should be made responsible for ensuring the EMIS solution does indeed provide the level of Resource and Operational capability envisioned, and/ or used for justifying the EMIS investment;
- Establish a Program Steering Committee with the Permanent Secretary as its Chairperson, and to whom the EMIS Program Manager Reports;
- Ensure Program and Contract management experience with a history of successful business and operational solution implementations, exists on, or is available to, the Steering Committee and Start-up Team;
- Ensure the Vendor selected for the EMIS product and implementation, has a long established product and implementation services track record;
- Ensure the funding and establishment of a viable Public Relation and Communications Plan, that will rebuild, support and generate new Stakeholder enthusiasm around the EMIS implementation;
- Implementation completion and success criteria should be clearly defined by the Project Sponsor(s) and/ or Key Stakeholders, and available to the Steering Committee and Start-up Team.

D) Demonstratable Senior Management commitment to EMIS;

E) Provide adequate levels of training for all System Users, and a period of hand-holding for slow and fearful Users.

7. Feasibility Analysis

7.1 Present State

There are no linked Information Systems for Education Administration and the capture of Administration/ Management data in the Schools. All transactions are captured manually on paper files/forms. This data is forwarded to the MOE's central offices for entry into:

a) An MS Excel or MS Access database and reporting tools;
b) Voter based Accounting files/registers.

Employees rely on their own memory and informal communications to effectively move and validate the data collected.

7.2 Desired State

An Education Management Information System (EMIS) running on a central Server/ s, and on School Workstations. The Server/s accepts/accept education administration information directly or indirectly from Client PCs (Workstations), located in the MOE, District Education Offices and Schools. School Teachers, District Education Officers and MOE personnel, will have on-line data to plan, administer, monitor and measure their educational programs and resources.

EMIS will enhance the MOEs' ability to design, plan for, and implement sustainable education reforms.

7.3 Non-Quantifiable Benefits

General Benefits

- Enhance the quality of service delivered throughout the Education cycle e.g. Administrators will be able to easily spot emerging trends, in time for action;
- Assist in the refocusing and strengthening of institutional capacity;
- Provide focused, timely, and as-needed feedback on Students performance - Feedback can be used to direct future learning, motivate Students, and identify Students who need additional support;
- Provide validated Data flows between MOEs, Schools and External agencies (e.g. CXC) will minimize the requirement for data input at the MOEs;
- Enhance the Grenada Government's ability to design, plan, form, and implement, suitable education Policies and Reforms;
- Provide improved public access to Education administrative information (via the Internet).

OECS-wide Benefits

If same EMIS solution is to be implemented across the OECS:

- Acquired solution expertise can be shared among member States, leaving individual States less vulnerable to the loss of a local expert (through migration, corporate raiding etc.);
- It will provide simple and convenient exchange of Education information (i.e. between those Countries having the same type EMIS Systems – common data dictionaries, database structures etc.) - including performance standards, results etc. between OECS member States, and facilitate the promotion of uniform development of their Education System capacities;

7.4 Quantifiable Benefits For an Overall EMIS Solution

Productivity Based Benefits	5 Year Value
Financial Information Availability	$30,479
Planning Information Availability	$31,350
School Information Availability	$142,816
HR Information Availability	$15,239
Issue/Complaint Research	$105,080
Routine Administrative Tasks	$67,054
TOTAL: US$	**$392,017**

Efficiency Based Benefits	5 Year Value
Student Analysis/Reporting	$78,374
Curriculum Analysis/Reporting	$137,736
Teacher (HR/Payroll) Analysis/Reporting	$19,666
Staff (HR/Payroll) Analysis/Reporting	$12,192
Facilities Analysis/Reporting	$20,029
Financial analysis/Reporting	$15,239
Administrative Communications/Feedback	$91,655
Facilities Scheduling	$4,848
Staff Scheduling	$4,644
Asset Scheduling	$0
TOTAL: US$	**$384,383**

Operations Savings	5 Year Value
Redundant Data Entry	$10,450
Reduced Paper Requirements	$6,144
Reduced Document Rework (Increased Quality and Consistency)	$81,858
Reduced Asset Evaporation	$0
TOTAL: US$	**$98,452**

7.5 Costs For an Overall EMIS Solution

EXPENDITURES	5 YEAR VALUE
Computer Hardware	$197,800
Computer Networks	$7,400
Software	$316,609
Computer Peripherals	$26,480
Infrastructure Readiness Work	$0
Software/ System Training & Handholding	$52,000
First Year Maintenance	$49,776
Implementation & Start-up	$95,500
Public Awareness Campaign	$7,400
TOTAL: US$	**$969,469**

7.6 Profit, Cash Flows, NPV, and Payback for an Overall EMIS Solution

YEAR	1	2	3	4	5
Profit Before Tax ($US)	$587,326	$808,019	$517,882	$320,084	$124,139
Profit After Tax ($US)	$587,326	$808,019	$517,882	$320,084	$124,139
Net Cash Flow ($US)	$745,566	$706,316	$387,112	$208,128	$78,944

NPV @ 20% = US$ $634,934

Payback Period: 1.51 Years

NOTE: The detailed Models are included in the Appendix.

7.7 Implementation Risks

Key implementation risks include:

i) Inadequate MOE Senior Level Project sponsorship;
ii) Assignment of a Program Manager with low experience levels in managing Contracts for, and implementation of, IT based Business and Operational Solutions - both at the Enterprise and Departmental (School) Level;
iii) Competing MOE political agendas;
iv) Inflexible implementation strategies and plans;
v) Weak Institutional capacity;
vi) Non-acceptance and use of the EMIS due to discomfort with the new Technology;
vii) Non-acceptance and use of the EMIS because of immovable attachment to, and high levels of comfort with, existing administrative processes (including manual processes) by key MOE Managers and School Administrators (including Principals);
viii) High turnover /migration of trained and key Users during implementation;
ix) Lack of visible Senior MOE, Education District and School ownership;
x) Slow procurement processes, which can adversely impact Project enthusiasm and momentum.

8. Recommendations

8.1 General Recommendations

A) Program Management:

Appoint an MOE Education Technology Officer or Program Manager to lead and drive implementation of the Solution

The MOE needs to appoint an Education Technology Officer or Program Manager as soon as possible, to provide Senior MOE Management expertise for driving and managing the Project. The MOE Education Technology Officer or Program Manager will be responsible for:

- Ensuring continuity of EMIS Project "know-how" and expectations; from the implementation stage into and through the operational stage;
- Facilitating the final resolution of any outstanding or escalated Project Issues, on behalf of MOE;
- Assuring that the MOE receives ***value*** for its Project Dollars. That the Supplier does not receive full payment for their Solution until they demonstrate to the MOE that their Solution works and meets MOE's needs and Project expectations;
- Ensuring that "MOE is not left with a System that makes them dependant on outside Sources for the next decade";
- Ensuring EMIS investments provide the level of Resource and Operational capability used to justify EMIS Funding approval (EMIS being employed for enhancing quality and efficiency of MOE's Services, as well as being the corner stone for a Program of Continuous Improvement within the Ministry);
- Developing and institutionalizing proper and effective MOE Computing policies that cover the proper use and administration of EMIS and other MOE Educational Technology investments;
- Forging agreements and commitments that would ensure the sustainability of EMIS and other MOE Education Technology investments;
- Influencing and driving MOE fiscal policies to ensure regular periodic refreshment of EMIS and all other MOE Education Technology Investments.

B) Organizational Impacts:

Complete the assessment and determination of Organizational Impacts, and implement appropriate measures

With the implementation of Education Technology, work processes will change, new Job skills will be required, and MOE's performance goals will change. The impact of these and other changes on the Organization must be assessed and determined.

Employee dissatisfaction from the changes if not adequately addressed may block successful implementation of Education Technology, and hinder systematic Reform.

For MOE Officials and School Officials, capitalizing on Education Technology is about making a commitment to fundamentally change how Education is administered and delivered.

To facilitate this change the following guidelines are suggested:

- Complete the assessment and determination of Organizational impacts from the introduction and use of Educational Technology at Schools and in the MOE;

- Review the MOE's Organizational Structure for congruency with the aims and objectives of its Educational Technology policies. Amend as required;

- Review and amend as required affected Job procedures, Job standards, and job descriptions;

- Review and amend as required Personnel Policies, Human Resource Development plans, Compensation policies and plans, etc.

C) School Administration:

Re-examine the System (People, Processes, Practices, and Tools) of School Administration, relative to the implementation of EMIS. Determine if for EMIS to be successfully implemented and used in Schools, the position of a School Administrative Assistant should be defined, approved, and staffed.

Determine if the processes (data entry, *data analysis*, non-standard report generation etc.) for this System were to be executed in a timely manner, what type Resource(s) would be needed.

- Principals have communicated during interviews for this Study, that their work load and work demands are so great that their performance of administrative responsibilities is usually compromised (e.g. lateness in Report compilation, and in filling requests for School data and information);

- However, all Principals interviewed have shown a willingness to receive EMIS-type functionality into their Schools. In fact the Principal of Presentation Boys College, has volunteered to have his School serve as a Pilot site for any EMIS implementation in Grenada;

- If a School Principal can be considered the CEO of their organization, then it could be safe to conclude that they would need a dedicated administrative assistant capable of using EMIS for data entry, ***data analysis***, standard report and non-standard report generation, Schools records management – including System back-ups, etc.

- Consider that the skills and experiences needed by the type of individual briefly described directly above, not to be all those currently required from current Schools' Secretaries/ Receptionists;

- Careful consideration should be given to recruiting, or converting (through training and developmental experiences) existing School Employees (e.g. Secretaries) to function in the job responsibilities described above. An overall job function that could be described a School Administrative Assistant;

D) Human Resources:

- ✓ Provide appropriate levels of Project personnel to ensure an effective implementation and benefits realization.
  NOTE: Assigning Project milestone completion responsibilities and tasks to full-time Employees with regular workloads can jeopardize Project success;

- ✓ Demonstrate measurable high levels of support from **EMIS Sponsors** (*Senior MOE Officers/School Principals*);

- ✓ Develop an **EMIS Champion** (*Expert User*) for each School and Education Department/ Unit;

- ✓ Plan and deliver an effective public/customer relations campaign **(What is EMIS; How EMIS will function in the workplace; How it will impact the lives of its Users and other employees. Its benefits to Stakeholders, Students and Communities; etc.),** to generate broad-based Public and System Users Support;

- ✓ Provide extensive on-site support (hand-holding) after initial EMIS training, especially for Users new to working primarily with PCs.

E) Job and Work Processes:

- ✓ To ensure System Users maximize their knowledge of the processes contained in EMIS relative to their current work environments, it is recommended that EMIS Users initially be exposed to process re-engineering workshops. These workshops will serve to infuse and establish new education administration business/operational process paradigms for EMIS Users.

- ✓ Encourage and enforce workplace discipline that supports and facilitates **Data and information being entered into EMIS, on a timely basis** (on all aspects of the system: personnel; student performance, resources utilization, expenditures etc.)

- ✓ Update process descriptions and standards to reflect the new more efficient ways of conducting Ministry and School operations

F) Conduct of a Primary School Pilot:

- ✓ The EMIS implementation will need success stories to propel its acceptance by Users, as expansion into primary schools. Serious consideration should be given to carrying-out a Primary school Pilot in this phase of the implementation.

  Such a site could be the Grand Roy Primary School, with its history of initiative, drive, and success in the Education Technology field.

  A Grand Roy success story will propel the use and acceptance of EMIS in Grenada's Secondary Schools, and also develop interest and desire for such a system in Grenada's Primary Schools.

G) System/ Applications/ Information Technology

- ✓ The SCAS Software being employed by the MOE in St. Lucia, contains Education budget tracking features for Schools not available in most "Commercial Off The Shelf" (COTS) EMIS Solutions. As such serious consideration should be given to investigating and possibly acquiring this Package for use in Grenada;

- ✓ The National EMIS database should be a robust Enterprise-level database in the category of SQL Server, Oracle etc.;

- ✓ Begin conversion of School data and records to electronic format long before effective acquisition of the EMIS. This lead time is necessary if the EMIS is to put into useful Service, shortly after it effectively acquired;

- ✓ **Ensure High levels of system availability** (hardware and applications) especially during the initial stages of the implementation, to facilitate system usage, acceptance, and growth of ownership;

- ✓ To further facilitate decision making and planning – future consideration should be given to incorporating a geographic information system (GIS) with the proposed EMIS.

- ✓ For Schools and MOE Buildings near the seaside, careful consideration should be given to sourcing computer and network equipment that are designed to operate in seaside environments (high humidity and salt concentraions in the atmosphere) and/ or preparing rooms to be used for house computing equipment in a way that the air inside these rooms are highly controlled.

H) Implementation Guidelines:

Pursue a simple, structured and measured EMIS Implementation Strategy

The implementation of, and transformation to Education Technology, can be fraught with difficulties. The following recommendations are offered:

- o **Employ an integrated EMIS Implementation Plan** – one that adequately addresses the People, Processes, and Technology implementation requirements;

- o *Execute the EMIS implementation plan, with a deliberate pace that is structured to initially achieve success via small steps;*

- o Utilize a phased implementation approach. For example phases could be based on: Groups of EMIS functionality, Educational District (geographical location), Data capture in all Secondary Schools (Work processes);

- o Start simple use a "proof-of-concept" approach in the initial phase;

- o Operate in a high availability, and safe environment;

- o Make informed decisions relative to the Implementation based on acquired knowledge from the "proofs-of-concepts";

- o Complete the transformation by expanding out the "proofs-of-concepts".

I) Sustainability Considerations:

Determine the on-going/ recurrent costs for successfully operating and maintaining the Grenadian EMIS Investment. Ensure Funding Sources are identified, and committed (Budgeted) to the Program.

Develop a Policy for Technology Refreshment. Consider refreshing the Technology Investments on a sliding scale after the first four years. For example, 25% of the Technology would be upgraded in year five, another 25% in year six and so on. Such a Policy will keep the Investments refreshed and not becoming obsolete.

8.2 Specific Recommendations

Option C (See EMIS Solution Alternatives) is recommended, because it best addresses the critical needs and concerns of Grenada's MOE and Schools.

Current EMIS implementation constraints faced:

- School Administrators are concerned about System availability and not being held-up by central Server problems and/ or the non-availability of System communications with a central Server;
- A low level of ICT Professionals available in the MOE and nationally;

See Section 3.4 for additional constraints and expressed concerns.

The key benefits of Option C are as follows:

- Its solution Architecture does not require extensive Information and Comminications infrastructure to be in put in place (Requiring additional ICT investments to be made, plus the large recurrent expenses associated with operating such an infrastructure);
- It can be implemented in timed Phases that would be supportive of Budgeted Funds (e.g. Phase A –TAMCC; and Secondary Schools; Phase B – the MOE; Phase C– Primary School Pilot)
- It requires lower levels of maintenance and support than a fully integrated, complex custom developed software application, resulting in a lower overall *cost of ownership* (few if any hidden or unplanned costs; requires only "in-house" support capability/ expertise);
- Its solution architecture allows Schools to continue using the System if the central Server is down, or there are communications problems between the Server and Schools;
- Its implementation time is shorter than for a custom developed software application, since no product development has to be included in the implementation schedule;
- The reqiuirements for this option are already defined in this Report. They can be transferred directly into Tender document (Sections: Technical Specifications and Special Terms of Contract) to fast-track the procurement process;
- If this option is selected by other OECS countries, volume purchase and support prices can be negotiated through a central body. Plus back-up support and troubleshooting capability would be available from other OECS States, making the System less vulnerable to scarce local IT resources.

Financial Considerations

The Economic model presented in the Appendix is a live working model. It currently looks at a full and complete EMIS implementation for Option C, and shows where the biggest costs and benefits reside.

The model can be adjusted to analyze investments that cover partial (EMIS Secondary School Pilots) or fuller implementations (all Secondary and Primary Schools) of the EMIS Solution e.g. only Secondary Schools.

On the other hand, several instances of the model can be used to compare the costs and benefits between different EMIS Solutions.

Implementation Strategy

A phased approach should be utilized.

Phase IA – Select the Locations for which EMIS would be procured;
Phase IB – Finalize the overall EMIS Solution Requirements (e.g. Equipment physical security needs, System environmental needs, amount of data needing to be converted, the data conversion timeframe);
Phase IC – Procure the appropriate EMIS Solution;

Phase ID – Migrate Schools and Districts data that have already been converted (encoded) to electronic format into the these Systems;
Phase IE – Train relevant Users, using a "Train-the-Trainer" approach to use the System's functions for which data has been migrated;
Phase IF – Commission the Systems using a combination of actual and test data;
Phase IG – Start-up the System. Begin using the System to support those School administrative functions for which relevant data has been electronically converted (See Section 8.1 – G, above) and migrated into the EMIS database;
Phase IH – Enter data for other School and District and MOE functions and begin using the System to administer these functions.

NOTE: For additional details/ activities, see the Overall EMIS Implementation Plan in the Appendix.

EMIS Developer/ Supplier Considerations
For additional information on EMISs, a list of Developers/ Suppliers of EMIS-type Software is included in the Appendix

Human Resource Considerations
The following is extracted from the general recommendations presented in Section 8.1 and 8.2 above:

- Appoint as soon as possible an MOE Education Technology Officer or Program Manager;
- Consider creating the post of Administrative Assistant to each School. The Admin Assistant would provide direct support to Principals, Assistant Principals and Heads of Departments in administering Schools.
- Carefully select your EMIS Champions (Expert Users); consider years to retirement, technical apptitude, leadership and motivational ability, career plans and schedule, current and planned workload, reliability, etc.
- Determine the the quantity of data conversion Resources that would be needed for the initial conversion of data into electronic format, for migration into the EMIS (loading the EMIS database);
- Consider the quantity of data entry effort needed to support the on-going data entry needs of Schools and Districts. There will be times during the School year when the data entry workload will be higher than normal e.g. At the start of the School Year - for Student Registration, and at the end of the School Term/ Year - for input of Examination/ Test results. Normal data entry will cover the maintenance of Student, Teacher, and School data (i.e. updates to data as changes occur), the input of attendance data, and School, Student, Teacher and Curriculum performance data.

APPENDICES