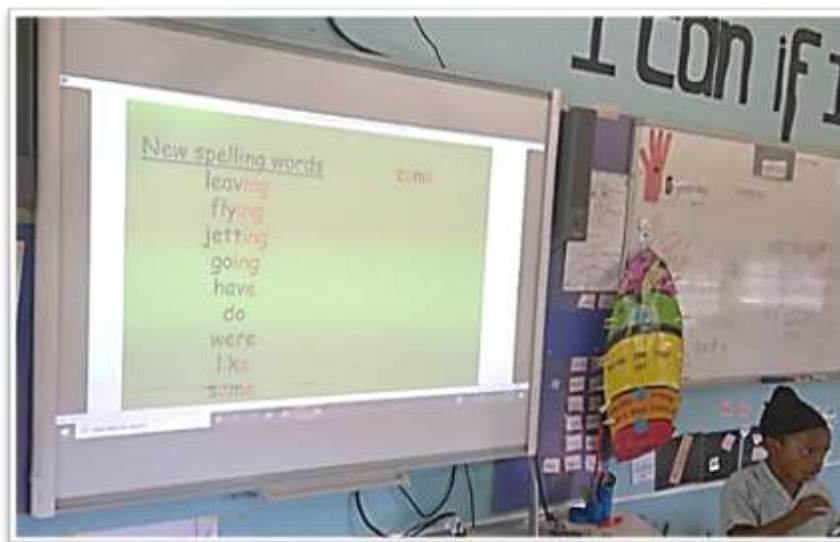**INTEGRATED INFORMATION TECHNOLOGY**

ASSET MANAGEMENT AUDIT REPORT

ON

MINISTRY OF EDUCATION

INTERACTIVE WHITE BOARDS IN SCHOOLS

2008 - 2020

Office of the Auditor General
July 2022

INTERACTIVE WHITE BOARDS IN SCHOOLS

This is a report of an Integrated I.T. Asset Management Audit conducted by the Office of the Auditor General.

Marsha V E Meade
Auditor-General (Ag)
Office of the Auditor General
July 2022

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ABBREVIATIONS

BNTF	Basic Needs Trust Fund
BPS	Brades Primary School
CDB	Caribbean Development Bank
CSEC	Caribbean Secondary Education Certificate
DITES	Department of Information Technology & E-Services
FCDO	Foreign, Commonwealth and Development Office
GoM	Government of Montserrat
ICT	Information and Communications Technology
IDI	INTOSAI Development Initiative
INTOSAI	International Organization of Supreme Audit Institutions
ISSAI	International Standard of Supreme Audit Institutions
IWB	Interactive White Board
LEAP	Lower Education Attainment Program
LOPS	Look Out Primary School
MCWLE	Ministry of Communications, Works, Labour & Energy
MoE	Ministry of Education
MSS	Montserrat Secondary School
NICT	National Information and Communications Technology
OAG	Office of the Auditor General
PSU	Pupil Support Unit
SCAF	Small Capital Assets Fund
WGITA	Working Group on IT Audit

PREAMBLE

Vision Statement

"To be a proactive Supreme Audit Institution that helps the nation make good use of its resources."

Mission Statement

"The O.A.G is the national authority on public sector auditing issues and is focused on assessing performance and promoting accountability, transparency and improved stewardship in managing public resources by conducting independent and objective reviews of the accounts and operations of central government and statutory agencies; providing advice; and submitting timely Reports to Accounting Officers and the Legislative Assembly."

The Goal

"To promote staff development, enhance productivity, and maintain a high standard of auditing and accounting in the public sector, thereby contributing to the general efficiency and effectiveness of public finance management."

AUDITOR GENERAL'S OVERVIEW

The Government of Montserrat in seeking to build a better economy has introduced a number of public sector reform initiatives which emphasises the need for a more efficient and effective public service. Some of these initiatives focused on the use of providing e-government services by using information and communication technology systems to facilitate easier and timely accessibility to information. A number of systems were implemented to support resource management and to facilitate learning. The procurement of information and communication technology assets project was one such initiative in an effort to improve teaching and learning at the various schools on island.

Our review revealed that the benefits of utilising interactive whiteboards and other related devices made learning more enjoyable, easier and engaging. This was reflected in the feedback from the teachers and the students that were interviewed. However, we found that the Ministry of Education has an unendorsed ICT Policy which will need to be updated and implemented and be shared with all the relevant stakeholders. This review highlighted that constant internet disruption affects the viewing of online material on the interactive whiteboards. Further, the ICT assets such as the whiteboards, printers and other devices were not labelled and recorded in the fixed asset register.

Overall, we have determined that value for money was not achieved for the Government, for the teachers or for the students and recommend that with corrective action greater benefits for which this project was initiated will be realised. We have highlighted other findings and recommendations, and the acceptance and implementation of these will improve the teaching and learning interaction throughout the schools.

Marsha V. E. Meade
Auditor-General (Ag)
8 July 2022

EXECUTIVE SUMMARY

Overview

The Ministry of Education developed an Education Development Plan in alignment with the Government of Montserrat's (GoM) national long-term objectives and goals that were established in both the Sustainable Development Plan and the National Information Communications & Technology Policy, Strategy & Implementation (NICT) Plan. Under the focus area of "Learning", the NICT policy objective is to *"…Use ICTs to improve the management and delivery of education services, and enhance the learning experience and outcomes throughout the education system…".* Interactive Whiteboards (IWBs) were one of the chosen ICT assets that were procured for the Montserrat Secondary School, and the Brades and Lookout Primary Schools under various projects.

Key Findings

- The surveyed teachers highlighted that the use of Interactive Whiteboards for teaching lessons with images, videos, and/or audio files, has made learning more enjoyable. The online educational games, the question and answer sessions, the group problem solving and learning exercises, make the lessons more interesting and capture the students' attention. The Interactive Whiteboards also provide teachers with a different method of engaging students with disabilities, and/or those who have difficulty understanding the learning materials through the traditional way, that is, via visual, auditory, and kinetic elements. Therefore, the students are more interactive with the teachers and participate more in class lessons, which are now more vibrant and engaging.

- Occasionally, there are disruptions in the Internet service from the local service provider(s), which hinders the viewing of online learning material during class (for example, YouTube).

- There is a draft ICT Policy; however, it is not a recognised policy for regulating the ICT initiatives undertaken and implemented by the Ministry of Education.

- Adequate asset records of the Interactive Whiteboards are not being kept: that is, they are not labelled with asset tags, nor are they recorded in the MoE's and Treasury Department's digital Asset Register. The MoE and public schools are not adhering to the various GOM policies and of the Public Finance (Management and Accountability) Act.

- The four (4) all-in-one printers were never installed in the Science Labs and classroom for reason(s) that are unclear. Reportedly, all four of these heavy duty printers are still in the sealed, original boxes, and being stowed in various storage rooms on the school's campus. During the audit, only one sealed box was observed by the auditors; the storage sites of the remaining three (3) devices could not be verified.

- There is failure by Management to make provisions for the essential and ongoing capacity-building training of the MSS teachers to effectively use IWBs in the classrooms; especially with the high turnover of teachers. Therefore, both the teachers and the students have not fully benefited from the effective and efficient use of these very costly ICT assets; resulting in value for money not being achieved.

Recommendations

- It is urgent and overdue for the Ministry of Education (MoE) to review, update, and officially endorse an ICT Policy, as it is very important to have structured principles to ensure Governance in ICT undertakings.

- ICT assets in the public schools should be properly labelled with asset tags, recorded in the MoE's and Treasury Department's digital Asset Registers, and also in hardcopy. It is the responsibility of the MOE and school officials to ensure that all assets distributed or receive by the Schools are appropriately registered.

- The Montserrat Secondary School needs to give an account to the MoE about the locations and the operational status of the four all-in-one printers. If they are in working order and are not being used, they should be installed in the Science Labs and classroom with fully functioning IWBs, as per the original purpose they were purchased for with the awarded NICT grant funding.

- The MoE must make provisions to facilitate continuous capacity building training for all GoM's public school teachers in the effective use of the IWBs, and full integration of these assets into individual lesson planning.

Audit Conclusion

Overall, the Office of the Auditor General has determined that the Ministry of Education and the other stakeholders involved in the various GoM initiatives to introduce the use of IWBs into the island's public schools, were compliant with the required procurement process as outlined in *CAP 17.07 Public Finance (Management and Accountability) Act* 2008, and the *Public Finance (Management and Accountability) (Procurement) Regulations,* 2019*.* The Interactive Whiteboards have proven to be useful teaching tools in the three Government-run schools; they have improved the quality of teaching, and enhanced the learning experiences of both teachers and students.

A strong regulatory framework is in place, but in practice, the Ministry of Education and the Montserrat Secondary School, have failed to meet the necessary requirements of registration, maintenance, write off and disposal of the Interactive Whiteboards and related devices.

Our findings also show that some of the IWB implementation projects were not very cost-effective, i.e. the Lookout Primary School Expansion project, and the incomplete BNTF funded

ICT in Schools project. In addition, no consideration was given for the provision of a recurring budget towards the maintenance of the IWBs and the associated devices, or ensuring that there is a trained professional readily available within the MoE, or on island, to perform maintenance services. Consequently, a number of items (practically brand-new, obsolete, and/or inoperable ICT devices), remain mounted but useless in the classrooms. In each of these instances, there was no value for money for the Government, for the teachers, or for the students.

CHAPTER 1   INTRODUCTION

Background

1.1   Assets are the basis for any organization delivering what it aims to do. Whether in the public or private sector and whether assets are physical, financial, human or 'intangible', it is good asset management that maximizes value-for-money. It involves coordinated and optimized planning, asset selection, acquisition or development, utilisation, care and ultimate disposal or renewal of assets and asset systems.[1]

1.2   The Ministry of Education (MoE) developed an Education Development Plan (EDP) 2011 – 2020, in alignment with the Government of Montserrat's national long-term objectives and goals that were established in both the 2008 – 2020 Sustainable Development Plan (SDP) and the 2012–2016 National Information Communications & Technology Policy, Strategy & Implementation Plan (NICT).

1.3   In the NICT plan under the focus area of "Learning", the desired outcome of this policy objective in relation to education, is to "…use ICTs to improve the management and delivery of education services, and enhance the learning experience and outcomes throughout the education system…" [2,3,4]

1.4   Therefore, to actuate the outlined long-term goals, objectives, and initiatives of the Government of Montserrat's (GoM) plans and policies, five (5) Interactive Whiteboards (IWBs) were procured for the Montserrat Secondary School, circa 2015/2016. An additional thirteen (13) IWBs and associated peripherals were purchased in 2017 under the Basic Needs Trust Fund (BNTF) Project and distributed to the Brades and Look Out Primary Schools.

Management Responsibility

1.5   Management was responsible for ensuring that the IWBs in Schools project objectives were achieved. More specifically, management was to ensure that the project output was in compliance with the GoM's legislation and regulations, and that the project is advantageous to the beneficiaries and users of these Information and Communications Technology (ICT) assets.

Auditors Responsibility

1.6   Our responsibility is to independently express a conclusion on the IWBs in Schools project based on our audit. Our work was conducted in accordance with International Standards of Supreme Audit Institutions (ISSAI) 100 and International Standard on Assurance Engagements (ISAE) 3000. These principles require that we comply with ethical requirements and plan and

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[1]https://www.assetmanagementstandards.com/#:~:text=What%20is%20ISO%2055000%3F,for%20Asset%20Management%20and%20includes%3A&text=ISO%2055001%20specifies%20the%20requirements,of%20such%20a%20management%20system
[2] https://www.gov.ms/government/ministries/ministry-of-education-youth-affairs-sports/
[3] Montserrat Sustainable Development Plan 2008 - 2020
[4]Montserrat's National Information & Communication Technology Policy, Strategy & Implementation Plan 2012 -2016

perform the audit in order to obtain reasonable assurance whether tried and true policies, plans, procedures, and internal controls exist and are functioning effectively, proper records have been and are being kept, and all the necessary information and explanations for the purpose of our audit, has been obtained.

Audit Mandate

1.7 The Office of the Auditor General (OAG) is mandated through the Montserrat Constitution Order 2010 to perform various audits. This mandate is supported by International Standards of Supreme Audit Institutions (ISSAI) 1, 200, 300, 400, and strengthened by the revised CAP 17.07 Public Finance Management and Accountability Act (PFMAA) and the Public Finance Management and Accountability Regulations (PFMAR).

Audit Standards and Guidelines

1.8 The standards and guidelines used to assess the IWBs in Schools project included the use of International Standards of Supreme Audit Institutions (ISSAI) 3100, 4100, and 5300; and the International Organisation for Standardization (ISO) 55002.

Audit Objectives

1.9 The objectives of this Integrated Information Technology Asset Management (ITAM) audit, was to provide assurance to the Government of Montserrat (GoM), and the general public, that:

i) The Ministry of Education's procurement and management practices were in compliance with the relevant legislation and regulations.

ii) The anticipated benefits and impacts of the SDP, and Montserrat's NICT plan policy and strategies for the Educational system, were achieved.

Audit Scope and Methodology

1.10 The study mainly covered the period 2008 - 2020, and focused on the examination of the IWBs in Schools project. The Auditors would have monitored the audit in the field and may have amended any area of the audit scope in consultation with the Auditor General, so as to maximize the efficiency of the audit.

1.11 A combination of techniques was utilized to gather information and validate the beneficial achievements for implementing IWBs into the schools' curriculums and classrooms. These included, but were not limited to, interviewing the key stakeholder(s) at the Permanent Secretary (PS) of Education, Director of Education, MoE Procurement Officer, MoE I.T. Technical Support staff, Primary Schools Head Teachers, Class Teachers and Students, Principal of Montserrat Secondary School, and Teachers, Basic Needs Trust Fund Project Manager, and other

stakeholders; inspection of documents; and observation of the ICT assets and associated peripheral devices, in order to gather in-depth information about the IWBs project.

1.12   The findings of this study were discussed with the P.S. and Director of Education, MoE I.T. Technical Support staff, and other interested stakeholders; their views were taken into consideration when finalizing the report.

CHAPTER 2   GOVERNMENT OF MONTSERRAT'S NATIONAL SUSTAINABLE   DEVELOPMENT & ICT POLICY OBJECTIVES AND STRATAGEMS

Sustainable Development Plan Strategic Goals and National Outcomes

Strategic Goal 2: Human Development[5]

2.1   The 2003 - 2007 and 2008 - 2020 Sustainable Development Plans were developed with the overarching aim of providing the Government and people of Montserrat, with a framework for national development of the public and private sectors. These plans had clearly defined goals, outcomes, and strategies that were modified whenever the needs and circumstances of the country changed. The strategic objectives from 2003 - 2007, formed the long-term strategic goals that served as a guide for the Medium-Term Action Plan. These objectives consisted of strategic actions that were given the highest priority and achieved quick wins and targets, for the sustainable development of Montserrat for 2008 – 2012 and onwards to 2020.

2.2   The National Vision in the 2008 - 2020 SDP, was to rebuild a healthy and wholesome Montserrat, based on a thriving modern economy, via enterprise and initiative. For the purpose of this Integrated I.T. Asset Management audit, the focus was placed on the second strategic goal of Human Development. This long-term goal was to be achieved by implementing a well-developed and effective education and training system that produces well-rounded, and qualified life-long learners.

Figure I – SDP 2008 – 2020 Strategic Goal

Strategic Focus

2.3   The strategic focus that was to be adopted for the long-term, was Training and Capacity Development which was to be achieved by:

(a) Strengthening the primary education system to ensure graduates are adequately prepared to move on to secondary education;

(b) Making provisions for increasing access to formal and informal education programmes through varying modalities; and

(c) Equipping institutions of learning to produce high school and college graduates who are qualified to function effectively in the job market, or qualified enough to pursue further training in the areas critical for Montserrat's medium- and long-term development.**6**

National Information & Communication Technology Policy, Strategy & Implementation Plan

2.4   The National ICT Policy Objective and Learning stratagems in the 2012 - 2016 National Information & Communication Technology Policy, Strategy & Implementation Plan were designed to support, enable and accelerate the achievement of the GoM's Sustainable Development Plan (SDP) goals. In the most recent version of the National Information & Communication Technology Policy, Strategy & Implementation Plan, the SDP Targets for ICT in Education are as shown below in *Figures II & III:*

Figures II & III - 2017 to 2021 NICT Policy Objective and Stratagems

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6 *Journey to Sustainable Prosperity, A healthy and wholesome Monserrat, Montserrat Sustainable Development Plan 2008 – 2020*

STRATEGIC THRUSTS	KEY PROGRAMMES	SDP Goal	KEY PROGRAMME ELEMENTS	TARGETS	TIMELINES	KEY AGENCIES
			Integrate ICTs into the curriculum (ICT as a subject) to foster enhanced programming and system integration skills	Curriculum revisions determined and made	2017 - 2018	
				Plan formulated	2017	
			Integration and training of private school teachers/educators in the use of ICTs for education	Training ongoing	2017 and ongoing	

Ministry of Education, Youth Affairs & Sports

2.5 The Ministry of Education (MoE) is mandated by general and specific goals and objectives within the *CAP 16.01 Education Act*, as outlined below in *Figure V*. As per CAP 1, Part 1, Section 3 (2) (c), and (d), of the Education Act, the MoE has to develop an Educational Policy in alignment with the GoM's Educational Policy and Strategies.

Figure IV - CAP 16.01 Education Act Goals and Objectives excerpt

CHAPTER 1

ADMINISTRATION OF THE EDUCATION SYSTEM

PART 1

GOALS AND OBJECTIVES

Goals and objectives

3. (1) The Minister shall, subject to available resources, establish and pursue for the education system general and specific goals and objectives as provided in subsections (2) and (3).

(2) The general goals and objectives which the Minister shall establish and pursue are—

(a) the establishment of a varied, relevant and comprehensive educational system that is characterised by excellence;

(b) the promotion of the education of the people of Montserrat by the establishment of educational institutions for the purpose of fostering the spiritual, cultural, moral, intellectual, physical, social and economic development of the community;

(c) the framing of an educational policy designed to give effect to the purposes of this Act;

(d) the effective execution of the educational policy of the Government; and

(e) the establishment of a co-ordinated educational system organised in accordance with this Act.

Education Development Plan

2.6 [7]The Education Development Plan (EDP) provides the long-term strategic vision for raising the country's educational standards, in alignment with the SDP's goals and national outcomes which is "A well developed and effective education system, that produces well rounded, and quality life-long leaners."

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[7] *Draft Education Development plan 2012 - 2020*

2.7   The expectation for all young people leaving the school system, is to have achieved high standards in literacy, numeracy and ICT capability. In the ICT context, the grand intention of equipping school leavers with functional these ICT skills, is to enable them to:

- find, select and bring together relevant information;

- develop, interpret and exchange information purposefully; and

- apply ICT safely to enhance their learning and the quality of their work.

2.8   The MoE selected Interactive Whiteboards as the alternate technological resource to the traditional "chalk and talk" method of teaching, in order to achieve the SDP and EDP goals and objectives.

Montserrat Secondary School

2.9   **Change Manager.** A UK-based Change Manager was contracted by the Ministry of Education between 2008 and 2010, to develop and initiate phased reforms at the Montserrat Secondary School (MSS). One of the tasks in the *Terms of Reference* was to enhance the teaching and learning process.

2.10   To help effect this reform, the Change Manager introduced and implemented ICT into the school's curriculum and classroom setting. A significant investment was made in ICT resources, to include five (5) Interactive White Boards with Projectors and associated devices. These ICT assets were distributed to the subject areas of English, Math, Math Business, Art, and the Lower Education Attainment Program (LEAP).[8]

2.11   **ICT in Caribbean Secondary Education Certificate Sciences project proposal.** In April/May 2015, the Ministry of Communications, Works, Labour & Energy (MCWLE) placed an ad on the local radio station inviting members of the public to submit ICT Project Proposals to obtain ICT Grant Funding to launch their ideas. Fourteen (14) ICT project proposals were shortlisted and awarded substantial amounts of funding and MSS's *Using ICT in CSEC Sciences* was one the successful project proposals that received a grant to procure six (6) Interactive White Boards and associated ICT devices (six all-in-one printers, six Internet/Wi-fi routers, six surround sound speakers, and additional electrical services for each classroom[9]). However, only four (4) of each set of ICT devices were procured.

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[8] *The Final Report, Change Process: March 2008 - September 2010, Tricia Campbell BA Med CBE, Change Manager*
[9] *Using ICT in CSES Sciences (Biology, Chemistry, Physics, Agriculture & Integrated Science) 2015, ICT Concept for Grant Funding, Simone Thomas*

Brades and Look Out Primary Schools

2.12   **Basic Needs Trust Fund.** To fully achieve ICT Integration in the Public Primary Schools on Montserrat, there was collaboration between the MoE and the Basic Needs Trust Fund[10] (BNTF) to develop and implement this ICT integration in Education project.

2.13   The ICT project had several goals to fulfil as follows:

- Evaluate the status of ICT integration in the Montserrat primary education sector.

- Identify critical improvements to be made in the primary education sector to institutionalise ICT integration in the curricula, instructional practices, school practices, school polices, instructional supervision standards and practices.

- Provide recommendations on the capacity-building needs of Montserrat teachers, school heads, and MoE administrators to implement and sustain the ICT integration process.

- Provide Interactive Whiteboard and ICT teaching and learning capacity-building training to teachers.

- Provide ICT integration leadership capacity-building training to school heads and educational administrators.

2.14   The MoE partnered with BNTF and the Caribbean Development Bank (CDB), in order to implement the upgrade of the ICT network infrastructure in both of the GoM administered primary schools; provision of ICT equipment for classrooms and ICT labs (laptops, desktop computers, and IWBs); and also the solicitation of an International ICT consultant to conduct an audit of ICT in education practices in the primary education sector.

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[10]*Final Report, Consultancy to enhance the integration of Information and Communication Technology in Primary Schools in Montserrat, West Indies, April 10th, 2017, Project Consultant Dr. Kathy-Ann Daniel-Gittens*

CHAPTER 3   INTERACTIVE WHITE BOARDS IN MONTSERRAT'S PUBLIC SCHOOLS

Interactive Whiteboards

3.1   An Interactive Whiteboard (IWB) is a modern replacement to the traditional chalk boards and dry erase whiteboards; the device is a combination of a dry erase whiteboard with an LCD projector and is usually mounted on a wall or floor stand. Powered by easy-to-use software, the whiteboard becomes a computer screen that can be viewed by an entire classroom. The projector shows the content from a computer onto the surface of the board while the instructor controls the information either with a pointer or a touch of the hand instead of a keyboard and mouse.

3.2   The interactive features enable items to be dragged, clicked, and copied, and the teacher can handwrite notes using their fingers, which are transformed into text and saved. Teachers can create interactive lessons that focus on tasks such as a matching activity where students use either their fingers or a pen to match items; whereas, another teacher might integrate multiple items into a lesson plan that may include websites, photos and music that students can interact with, respond to verbally or make comments on by writing on the board. Image size and placement can change with a simple touch to the screen. This technology makes the one-computer classroom a workable instructional model.[11]

Figures V & VI – Examples of Interactive Whiteboards and available features

3.3   There are two types of IWBs being used in the Secondary and Primary Schools on island:

a) Interactive display boards that operate by touchpads and other peripherals connected to a computer and a projector. The image of the computer screen is displayed onto the interactive board that offers touch screen capabilities.

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b) Interactive SMART board monitors that looks like large television screens, that are connected to, and operated via a computer.

Procurement of Interactive Whiteboards in schools.

3.4   The MoE's procurement process of the ICT assets was compliant with the GoM procurement directives. The estimated collective cost for the four (4) IWB implementation projects, was EC$841,368.35 with source funding from the following contributors:

- **Ministry of Education** - provided the Change Manager with an estimated EC$132,265.35 to procure IWBs and associated devices for the Montserrat Secondary School.

- **Ministry of Communications and Works ICT project grant funding** - provided grant funding of EC$44,171.00 for the proposed "Using ICT in CSEC Science" project, to provide Interactive Whiteboards and additional associated devices in 2015/2016.

- **Basic Need Trust Fund (BNTF)** - in collaboration with the Ministry of Education, provided the contractor Converge Solutions Montserrat Ltd, with approximately EC$554,932.00 for the procurement, installation, and configuration of the network for the Interactive Whiteboards and additional hardware at the Brades and Look Out Primary Schools.

- **Ministry of Finance Small Capital Assets Fund (SCAF)** - approved EC$110,000 in 2019 for the procurement of Interactive Whiteboards and iPads for the MoE.

CHAPTER 4   IMPACT OF UTILISING ICT ASSETS

4.1   There are four types of learning styles in education:

(a) **Visual** - Visual learners learn from information presented in the form of patterns, shapes, and other visual aids; for example, charts, maps, graphs, and diagrams.

(b) **Auditory** - Auditory learners learn best when information is heard or spoken; therefore, they gain more from lectures, group discussion, recordings, etcetera, that involve talking things through.

(c) **Reading/Writing Preference** - Pupils who learn this way, prefer information to be presented using words (text-based input and output). They learn by reading and taking notes, which they study later to better retain the information. They tend to be avid readers and do well in written assignments.

(d) **Kinesthetic** - Kinesthetic learners learn best through experiencing or doing things; they like to get involved by acting out events or using their hands to touch and handle in order to understand concepts.[12,13,14]

Findings

4.2   **Impact of using IWBs in the GoM's public schools.** The teachers at the Secondary School and the public Primary Schools, utilise interactive teaching strategies that includes and support all of the four (4) learning styles, via the viewing of educational videos and games, and incorporating other supplemental hands-on activities. From most reports across the board (pupils and teachers), the impact of using IWBs in the classrooms has been very positive, especially at the Primary School level. Majority of the Primary School pupils stated that lessons were more enjoyable and interesting, compared to just the traditional "chalk and talk" and the reading and writing methods of teaching and learning. However, a very minute percentage of the students still prefer the "chalk and talk" system.

4.3   Both Primary and Secondary School surveyed teachers have also stated that one of the notable downsides to this interactive way of learning and teaching, is that students tend not to record the information shown on the IWBs for revision purposes, as they are too focused or engaged during the lesson. Note-taking is still an essential part of learning. The auditors were unable to gather any feedback from the Secondary School students, as they were unavailable at the time of the audit.

4.4   **Benefits of using the Interactive Whiteboards.** At each of the Government schools, a sample of aggregated data from three (3) teachers and the students from their respective
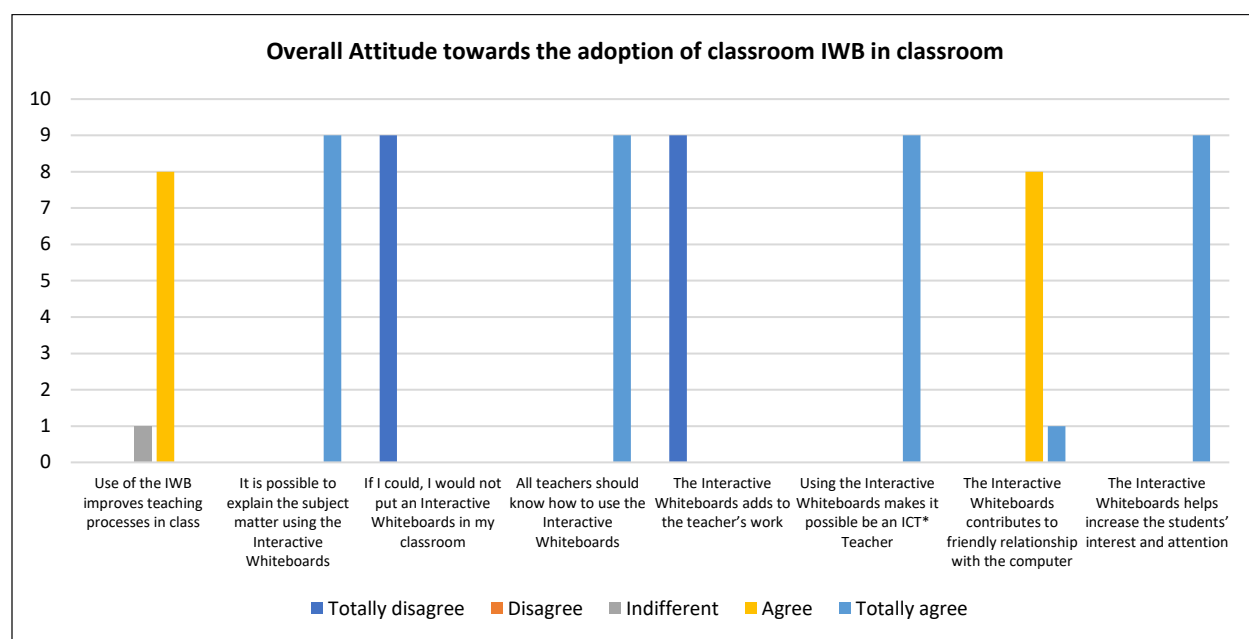
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[12] https://bau.edu/News/types-of-learning-styles/

[13] https://blog.advancementcourses.com/articles/4-types-of-learners-in-education/

[14] https://www.rasmussen.edu/degrees/education/blog/types-of-learning-styles/

classrooms, were used to generate the quantitative chart below on page 19. The questions asked, focused on the benefits of, as well as the issues encountered using the IWBs, and personal experiences and attitudes towards the ICT devices in general.

Chart 1 – Quantitative responses of sample size of teachers from the public primary schools & secondary school

Overall Attitude towards the adoption of classroom IWB in classroom

Legend: Totally disagree, Disagree, Indifferent, Agree, Totally agree

4.5   Overall, the six (6) main benefits of using Interactive Whiteboards stated by the teachers and students alike, were as follows:

- **Encourages student engagement.** Teachers stated that the use of Interactive Whiteboards for teaching lessons with images, videos, and/or audio files, captures the students' attention. The students are more interactive with the teachers and lessons have become more vibrant and engaging.

- **Make the learning process enjoyable.** The Interactive Whiteboard feature makes it easy for teachers to use online educational games, question and answer sessions, group problem solving and learning exercises, making courses more interesting for students. Learning and classroom sessions are more enjoyable for both teachers and students.

- **Use of internet connectivity.** Connecting to the Internet also means that classroom time is significantly improved as this limits the time for teachers to write, read or utilise books or other teaching aides. Teachers can obtain inexhaustible resources for their courses, allowing educators to rely on countless content, videos, games, programs, and curriculum resources.

- **Accommodate different learning styles.** Some students have difficulty understanding materials/courses by restrictive traditional educational methods, Interactive Whiteboards provide teachers with a different method of engaging students through visual, auditory, and kinetic elements.

- **Review of lessons made easier.** Teachers can easily summarize each lesson using presentations, videos, or other online resources to simplify subject matter for students to understand.
- **Integrated co-teaching.** By using Interactive Whiteboards, teachers can provide guidance to students with and without disabilities.

4.6 **Drawbacks of using Interactive Whiteboards.** The following drawbacks of using the IWBs in the classrooms were pinpointed by teachers, students and other stakeholders from the MoE:

- **Inconsistent Internet connectivity to the schools.** Occasionally, there are disruptions in the Internet service from the local service provider(s), which hinders the viewing of online learning material during class (for example, YouTube).

- **Downtime of the asset.** When an IWB malfunctions, the downtime is dependent on the type of issue(s); for example, if the ICT asset requires a replacement part, or overall maintenance of the unit, the down time can take days, weeks or months. In such cases, the teachers revert to the traditional teaching methods of writing on black or dry erase white boards, printed handouts, and dictation of notes.

- **Costs.** Interactive Whiteboards are very expensive ICT devices, some more than others depending on the models, in addition to the high maintenance and repair costs.

4.7 **Challenges experienced by some teachers.** Although IWBs are being used in the classrooms along with standard blackboards and traditional whiteboards, it was noted that some of the older generation of teachers had difficulty adapting to, utilising, and incorporating the IWBs into lesson plans, in comparison to the younger teachers.

Chart 2 - Usage of Interactive Whiteboards in Classrooms
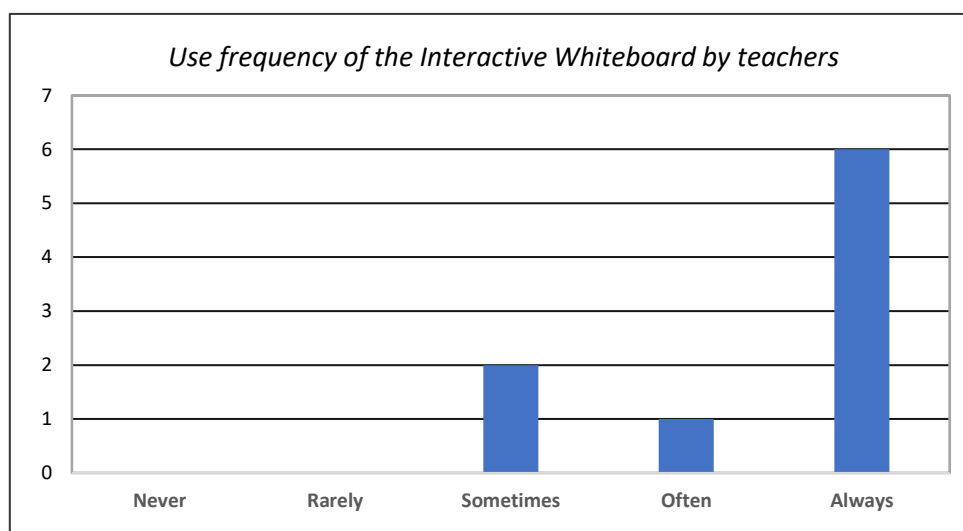
4.8 **Absence of performance assessments.** Prior to, and after the IWBs implementation projects in the schools, the MoE did not conduct performance assessments, or requested performance reports from the school administrators, regarding the impact of the ICT devices on teachers and students. For example: asset impact, teachers and student's performance and reported experiences. These assessments would have:

(i) ascertain whether the SDP objectives were being met;

(ii) pinpointed the benefits of or issues encountered with the ICT assets;

(iii) guide the reallocation of financial resources to other areas if necessary;

(iv) track and observe whether classroom performance of the teachers and students had actually improved over time; and

(v) direct for future development in providing cutting-edge educational materials and resources to teachers and students.

4.9 **Comparison cost of resources spent in schools.** There are no reports or information from any of the three schools, or the MoE, to show a comparative of the resources (chalk, markers, printing paper, etc.) that were being used before the introduction of the ICT devices, and maintenance costs, since being implemented at the schools. This comparison would have shown whether there was an increase or decrease in expenditure on resources and maintenance of non-ICT assets such as the traditional blackboards and whiteboards against the procurement and operational cost of the IWBs.

4.10 **Rudimentary or no training provided to the Secondary School teachers.** The following observations were noted in relation to training of the MSS teachers, on the use of the IWBs:

I. **Change Manager.** The five (5) teachers at the Montserrat Secondary School that received the first set of IWBs brought in by the Change Manager, were reportedly only taught the very basics once the IWBs were installed in the classrooms. There was no proper in-depth training sessions involving the various features of these ICT devices or the incorporation of the ICT devices into their lesson plans and teaching styles. The teachers had to exercise their own initiative and impart the acquired knowledge amongst themselves.

II. **ICT in CSEC Sciences.** The three (3) MSS Science teachers that received IWBs procured with the ICT Grant, were not trained at all, although it was stated in the school's ICT project proposal that *"…brief training of the devices to the science teaching staff will be undertaken…"* [15] They also had to exercise their own initiative to teach themselves and their

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[15] *Using ICT in CSEC Sciences (Biology, Chemistry, Physics, Agriculture & Integrated Science), ICT CONCEPT FOR GRANT FUNDING, 2015, Simone Thomas*

peers, how to operate and navigate the features of the IWBs via online research (for e.g. watching instructional videos on YouTube).

4.11   Overall, the MoE has demonstrated lack of foresight or oversight, by failing to make provisions for the essential and ongoing capacity-building training of the MSS teachers, to effectively use IWBs in the classrooms; especially because of the high turnover of teachers. Therefore, both the teachers and the students have not fully benefited from the procurement and implementation of these very costly ICT assets; this is not good value-for-money.

4.12   **Provision of training workshops for Primary School teachers.** Teachers from the four (4) Primary Schools (at the time) on island (Brades, Look Out, St Augustine and the former Lighthouse Academy) attended workshop for four days in October 2016, facilitated by the CDB/BNTF contracted BNTF Project Consultant.[16,17] The objectives of these workshops, were to educate the teachers of the benefits of utilising ICT to enhance the teaching and learning experience in the classroom.

4.13   Additional training was also provided for the Brades and Lookout Primary Schools teachers, during the summer of 2017 by a representative from the St Lucia-based contractor, prior to the formal handover ceremony in October. One of concerns highlighted by some teachers, was that the summer training sessions were intense and the timeframe of 2 days was too brief. In their opinion the training sessions could have been extended to 3 or 4 days, if not a week. A small percentage of the teachers have also highlighted the need for refresher courses which, in their opinions, would be very constructive.

4.14   **No training provided for MoE's IT Tech Support personnel**. The contracted BNTF Project Consultant, developed a very comprehensive and achievable "road map" in the final report that addressed critical macro, meso, and micro institutional changes, required for the sustainable integration of ICT in the Primary Schools. Notably, one of the critical areas and critical actions identified for ICT capacity building, involved the provision of ongoing training of the MoE's technology support personnel in the diagnosis, maintenance, and repair of IWBs and associated devices. The MoE has never actualised this recommendation.

Recommendation

4.15   **Critical areas of improvement identified in BNTF project consultant's report not implemented.**   We recommend that the critical actions outlined in the project consultant's final report (*Road Map for ICT Integration*) regarding the provision of an ICT Budget

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[16] *Final Report Consultancy to enhance the integration of Information and Communication Technology in Primary Schools in Montserrat, West Indies, April 10th, 2017, Project Consultant Dr. Kathy-Ann Daniel-Gittens*

[17] *https://www.themontserratreporter.com/primary-schools-teachers-and-administrators-receive-ict-training/*

for capacity building, be adopted and effected; that is, for the continuous training of the Primary School teachers to include the MoE's IT support personnel.

4.16   This action should also be extended to the teachers at the Montserrat Secondary School.

Figure VII – Extract from Road Map Table for sustained ICT integration in the Primary Schools

Critical area for improvement	Critical actions	Projected outcomes
ICT capacity-building	• Provide on-going interactive whiteboard training for teachers (BNTF provided initial training)	Teachers increased skill level in utilizing IWB for teaching and learning
	• Provide ongoing teacher training in ICT-integrated teaching strategies	Teachers' increased knowledge and skill levels in a variety of ICT integrated instructional strategies
	• Provide ongoing professional development training in ICT leadership for school heads and education officers	Educational leaders increased knowledge and skills in utilizing, ICT for educational management Educational leaders increased knowledge and skills in supporting and promoting ICT integration activity among their teachers and in their school eco-system
	• Provide ongoing training for technology support personnel at the Ministry of Education	Improved ability to diagnose and resolve issues with ICT equipment Improved ability to execute successful ICT equipment maintenance and repair plans

CHAPTER 5   GOVERNANCE FOR ICT ASSETS

5.1   Governance plays an important role in determining control environments and for establishing the basis for setting sound internal control practices. Currently, the highest level of regulatory oversight is by the MoE through its Permanent Secretary who has primary responsibilities for policies and for strategic planning, and through its Director of Education, who has overarching responsibility for education at all schools on the island (*Chapter I, Part 2* of the *Education Act*).

Findings

5.2   **MoE's Information and Communications Technology Policy**. To aid in the realisation of ICT reform in the public secondary and primary schools, an Information and Communications Technology Policy (ICT) was drafted for the Education System in Montserrat. This ICT Policy focuses on the use of computers with educational applications to teach, learn, and support computer literacy, computerized instruction, use of internet, professional development of teachers, and management of the education system.

5.3   The ICT Policy has eleven objectives, and thirty-six policy statements that fall under three main categories:

(i)   Curriculum, Training and Instruction

(ii)   Planning and Administration of ICT Initiatives and

(iii)   Assessment, Support and Sustainability of ICT Initiatives.[18]

5.4   However, although the ICT Policy has been in existence for a number of years, the document is not approved and therefore is not a recognised official policy for regulating the ICT initiatives undertaken and implemented by the Ministry.

5.5   **Omission of detailed information in asset registers.** The MoE and public schools are not adhering to the various GOM policies and of the Public Finance (Management and Accountability) Act. The IWBs are not labelled with assets tags from the Treasury, and there is no corresponding detailed information logged in MoE's digital asset register; in the Treasury's Mobile Asset Register; or in hardcopy. Reportedly, the records containing the information were either lost, misplaced or damaged.

5.6   In addition, the teachers at the Secondary and Primary schools are required to complete an annual inventory of all assets at the end of the school year, on paper asset registers that are collectively sent to the MoE. Notably, only minimal information is provided on these handwritten asset registers, pertaining to the IWBs; i.e. the model, condition, and location of the ICT devices.

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[18]*Information and Communications Technology Policy for the Education System in Montserrat*

Recommendations

5.7　　**Implementation of the ICT Policy.** We are recommending that the MoE review, update, and fully endorse the ICT Policy. It is very important to have structured principles to ensure Governance in the MoE's ICT undertakings; that is, procedures and or processes that state how the Ministry's ICT-related schemes are to be accomplished and controlled, and at the same time comply with regulatory and legal requirements.[19]

5.8　　**Proper recording of MoE ICT Assets.** The MoE should make it a priority for all the ICT assets to be properly labelled with asset tags, and update their records in the MoE's and the Treasury's digital asset registers, with the necessary information; such as the manufacturer, model, serial number, condition of the item, cost, purchase date and location of the assets. It is also important for the MoE to ensure that a proper system is in place regarding the storage and security of Assets Registers in hard copy; that is, against damage, misplacement, or the loss of these registers.

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[19]*WGITA – IDI Handbook on IT Audit for Supreme Audit Institutions, February 2014*

CHAPTER 6   PROCUREMENT OF ICT ASSETS FOR SCHOOLS

6.1   The GoM has set procedures for the procurement of assets, as outlined in the CAP 17.07 Public Finance Management and Accountability Act (PFMAA) (2008) and the Public Finance Management and Accountability Regulations (PFMAR) (2019).

Findings

6.2   **Procurement of IWBs projects**. The following activities regarding the procurement of IWBs for the Secondary and Primary Schools were noted:

Montserrat Secondary School

6.3   **Change Manager.** Archival documentation of the full procurement process for ICT assets that were bought and installed at MSS, could not be provided to verify whether or not the Change Manager was in full compliance with the GoM/MoE procurement regulations. However, the Change Manager did keep electronic records of the ICT assets that were purchased, as required by regulations.

6.4   There was limited information available on the reasons for the non-operable IWBs that were purchased by the Change Manager. It was highlighted that the lack of information on the IWBs were as a result of high turnover in the teaching and office administrative staff who were unaware of the GoM's established protocols for recording of Government owned assets leading to non-compliance.

6.5   **ICT in CSEC Sciences.** The Montserrat Secondary School applied for, and was granted, funding from the MCWLE. The key persons at MSS responsible for actually procuring the ICT assets were unavailable at the time of the audit; therefore, it cannot be verified whether or not the procurement process utilised, was in compliance with the GoM's laws and regulations.

6.6   The Biology and Integrated Science teacher (at the time), was tasked with producing the ICT project proposal the day before the deadline date; and according to the project proposal, to also be one of the key persons involved in the procurement and implementation phases. However, the teacher was not included or consulted; the administration of the grant received from MCWLE, was overseen by person(s) in authority at the MSS.

6.7   **School Rehabilitation Project at the Pupil Support Unit.** The Department for International Development (DFID) now FCDO (Foreign, Commonwealth and Development Office) personnel came to Montserrat over 3 years ago and assessed the Montserrat Secondary School (MSS), and found it to be severely lacking. As a result, they allocated special funding for a School Rehabilitation Project to upgrade/rectify the deplorable conditions they observed at MSS.

6.8   The Pupil Support Unit (PSU) at MSS, provides guidance and counselling services, and also specialised support for the LEAP students. At the time, the MoE was in the process of searching for an alternative space to relocate the PSU from the rented building parallel to MSS compound; it was in disrepair and its upkeep was being neglected by the landlord. The MoE elected to rent a section of the University of the West Indies' (UWI) as the location was in close proximity, and this eliminated the need for students to cross the busy public main road to get to the PSU. Subsequently, the designated section was refurbished and outfitted.

6.9   Two 2 IWBs were to be provided for the Unit, which the MoE bought from the special funding provided by the DFID. The procurement process for these were overseen by a Procurement Board, the MoE's Procurement Officer and Computer Technician, DFID's Project Officer at Ministry of Finance, and the former Permanent Secretary (PS) of MoE. The MoE's Computer Technician was instrumental in researching prices and specifications for the IWBs and related ICT assets, and advising the evaluation team when comparing the tendered bids.

6.10   Tenders were invited from the general public and bids were received from local and overseas entities. In October 2019, a local contractor was awarded the contract for the tender that was submitted 4 months prior i.e. June 2019 for the supply of eight (8) IWBs and ten (10) iPads. However, the selected contractor who owns and runs a small business, encountered the following issues:

(a) The proposed source company ceased manufacturing the recommended IWBs. Therefore, the contractor sought to find replacement IWBs, which ended up costing considerably more.

(b) Consequently, the contractor was unable to fulfill the order of that magnitude, which included 10 additional ICT devices. Secondly it is the policy of the business to receive a full down payment before placing an order. The total monies requested were not received as it is the Ministry's policy to provide only 50% of the total cost, and the remaining 50% after the asset(s) or service(s) have been received or rendered. The contractor procured a total of 2 SMART projectors, 2 Interactive SMART boards and 1 Interactive SONY Television. To date, the PSU has not received any IWBs.

(c) The procurement process was further hindered due to the revision of legislation concerning the sums of monies which were considered to be "petty", and can be paid without advancing to the Public Procurement Board.

Brades and Lookout Primary Schools

6.11   **Basic Needs Trust Fund.** A St. Lucian-based company was awarded the contract for the MoE/BNTF '*ICT in Primary Schools'* project, which commenced in January 2017. Within this agreement, the successful contractor was responsible for sourcing, procurement and installation of all the ICT devices and network equipment. The GoM's procurement process was not relevant in this instance, as the BNTF outlined its own procurement rules in the tender document (contract).

6.12   The BNTF tender document and the contractor's final report, included a requirement that the successful contactor should work closely with the MoE's IT Technician to ensure adequate administration of the schools' networks, after the project was concluded. The contractor did not fulfil this requirement.

6.13   **Issues identified after completion of BNTF project**. Concerns were raised regarding the non-execution of standard protocols that should have been performed at the end of this type and scale of ICT project. Additionally, a live demonstration was not conducted by the contractor during the handover ceremony; therefore it was not noticeable that some of the IWBs and the network infrastructure were not fully operational for classroom use, until after the ICT assets were distributed to the MoE.

6.14   In addition, the following discrepancies regarding the networks and ICT devices at both Primary Schools, were identified as either not being done or not available after the project was concluded and the ICT assets were handed over to MoE by the contractor in 2018:

- pre-evaluation testing and walkthrough
- onsite testing
- inventory audit
- hardware performance benchmarks
- wi-fi performance benchmarks
- desktop and laptops testing
- Interactive Whiteboard testing
- cabling (network cabling for servers)
- electrical outlets positioning
- server operations testing in both onsite/offsite mode
- testing laptops on the network
- testing wi-fi connection on laptops
- backups (for the interactive whiteboards; i.e. uninterruptible power supplies)
- desktop client access licenses (for connection to server domain)
- network continuity

6.15   In order to resolve the above-mentioned network connectivity and access issues, funding was sought through SCAF (Small Capital Assets Fund) to procure replacement parts for some of the IWBs, and the additional server and network hardware and software. All of the highlighted problems above were not resolved until a year later in September 2019.

6.16   **Interactive Whiteboards bought pre-BNTF project.** Subsequent to an expansion project completion at the Lookout Primary School in 2013, the school was furnished with two (2) new IWBs. However, the teachers were never trained to use these ICT devices, mainly due to the lack of an ICT infrastructure (application and file servers, Internet access, etc.) to facilitate and

support the operation and use of these ICT assets. Consequently, the two IWBs remained un-used for over three (3) years.

6.17 **Alternative ICT assets or equipment that could have been deployed.** The Heads of the of the public schools, indicated that they were not consulted by the MoE for their input regarding the IWBs, or other likely technologies deemed more appropriate as an educational tool to enhance the teaching and learning environment. They stated that SMART interactive projectors were alternatives that would have met both the Ministry's goals and the educators' needs as they are:

• more cost effective

• easily maintained

• is compact and portable and offers the same features as the IWB

• is user friendly with the 'plug n' play' feature that is compatible with existing technologies, and the setup is not complicated or technical.

• can be use with laptops to project onto any blank surface

• does not require much training to be used.

6.18 Other alternatives to the IWBs mentioned by teachers and students, were Smart TVs, tablets, laptops, and smart phones.

CHAPTER 7 MANAGEMENT AND USE OF ICT ASSETS

7.1   IT asset management ensures that an organisation's assets are accounted for, used, maintained, upgraded, and disposed of. The GoM has set procedures for the management of Government-owned assets in the *CAP 17.07 Public Finance Management and Accountability Act* (PFMAA) and the *Public Finance Management and Accountability Regulations* (PFMAR).

Findings

7.2   **ICT in CSEC Sciences IWBs and associated devices.** The proposed number of ICT assets in the ICT Grant Funding project proposal were:

(i)   6 Interactive Whiteboards

(ii)   6 internet/Wi-Fi routers

(iii)   6 all-in-one printers

(iv)   6 surround sound speakers

(including electrical services), were earmarked for the Biology, Chemistry, Physics, Agriculture, and IS labs/classrooms.[20]

7.3   However, only four (4) IWBs and the related devices, were subsequently acquired and distributed; that is, 1 each to the Biology and Chemistry Labs and the other 2 to the Integrated Science Lab and classroom. An IWB was not purchased for the Physics classroom, as there were concerns about the security of the ICT asset due to the high volume of unmonitored student traffic in and out of the classroom. The Physics teacher was required to share the IWB in the IS classroom.

7.4   These four (4) IWBs started to malfunction almost concurrently; it was reported that a pinkish tinge was being projected onto the IWBs. A technician was recruited from overseas to affix the problem over 3 years ago; however, the individual did not resolve the issues and reportedly left the campus with a few IWB-related devices and peripherals (2 IWB remotes and 1 Video Graphics Array (VGA) cord). Reportedly to date, the repairs are incomplete and the items taken were not returned or replaced.

7.5   The four (4) all-in-one printers were never installed in the Science Labs and classroom for reason(s) that are unclear. Reportedly, these heavy-duty printers are still in the sealed original boxes, and being stowed in various storage rooms on the school's campus. During the audit, only one sealed box was observed by the auditors; the storage sites of the remaining three (3) devices could not be verified.

7.6   Four (4) new laptops were to be procured for the Science teachers to use with the IWBs; however only 3 refurbished laptops were received; and which no longer work. Reportedly, the

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[20] *USING ICT IN CSEC SCIENCES (Biology, Chemistry, Physics, Agriculture & Integrated Science), ICT CONCEPT FOR GRANT FUNDING, 2015, SIMONE THOMAS*

fourth laptop was not acquired as the funds were reallocated towards procuring additional printer ink cartridges.

7.7   Lack of funding for operational and maintenance expenses. The BNTF network infrastructure and hardware were factored into the procurement costs of the ICT assets, but the MoE did not consider the operational or maintenance costs of the IWBs and associated devices. Contingency funding was not included in the Ministry's annual budget for the provision of service delivery; that is, for annual payment of required software and server licenses, and also for the maintenance and or repair of the ICT assets.

7.8   Notably, the non-provision for future operational or maintenance costs also occurred with prior ICT projects implemented in 2008 - 2010 (Change Manager), and 2015 - 2016 (Using ICT in CSEC Sciences), at the Montserrat Secondary School.

7.9   No disposal of inoperable ICT assets. The prescribed disposal process for the GoM-owned assets that no longer work, are not being followed by the schools; for example, there are IWBs and projectors at MSS that are outmoded and no longer operational because they are beyond repair, and are being used as display boards or as ornaments on the classroom walls.

7.10   Minimal availability of historical and detailed information on Interactive Whiteboards to aid in regular maintenance. ITAM broadly defined, refers to any system where things that are of value to an entity or group are monitored and maintained. It is mainly a systematic process of operating, maintaining, upgrading, and disposing of IT assets, cost-effectively. The creation and maintenance of an accurate and detailed inventory of ICT assets and associated devices and software licences, is very important. [21]

7.11   For decades, the MoE has been negligent in the proper management of its ICT assets in the public schools, from procurement to disposal. Nothing much has been done to ensure that the IWBs and associated assets are accounted for, and used as effectively and efficiently as possible. There is minimal historical and detailed records on majority of the IWBs and associated devices, which are not up-to-date and accurate; or unavailable.

7.12   Proper records are important and necessary for the maximization of the ICT devices reliability and availability, in order to support the GoM's public schools educational needs; that is, their upkeep. With regular scheduled maintenance of the ICT devices and renewal of associated software, the typical life expectancy of IWBs is generally ten (10) years. Therefore, when most of the IWBs or associated devices require repair or replacement parts, there are no detailed records of these assets, at hand. The key information of these ICT units (i.e. the purchase

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[21] WGITA – IDI Handbook on IT Audit for Supreme Audit Institutions, February 2014

date, manufacturer information, serial number, etcetera,) is difficult to be verified or obtained, as the units are mounted/bolted on the walls, or at a height.

7.13 **Security of the ICT assets.** All of the schools have indicated that the ICT assets are safely secured before the onset of any inclement weather; that is, the devices are unplugged from electrical outlets, and covered with non-permeable plastic. In some cases, overhead projectors are removed and placed in a safe storage area. Additionally, students do not have access to classrooms with IWBs, unless a teacher is in attendance, and all of the classrooms are locked after regular school hours.

7.14 **Auxiliary generators at the Primary Schools**. The Brades Primary School is not equipped with backup generator in the event of power outages or tropical storms; therefore, classes are disrupted and teachers have to resort to traditional teaching methods of blackboards and whiteboards.

7.15 There is a generator at the Lookout Primary School, but it is not setup for automatic switch over during power outages; therefore, it has to be manually started.

Recommendations

7.16 **ICT in CSEC Sciences.** The Ministry of Communications and Works ICT Grant Funding provided MSS with EC$44,171.00 for the procurement of IWBs and associated ICT devices for the *ICT in CSEC Sciences* project (i.e. heavy-duty printers and laptops). However, it was noted that the devices were either never installed, or are no longer operational. Therefore, we recommend that MoE act on the following:

(a) **All-in-one printers.** The Montserrat Secondary School needs to give an account to the MoE about the locations and the operational status of the four All-in-one printers. If they are in working order and are not being used, they should be installed in the Science Labs and classroom with the fully functioning IWBs, for the original purpose they were purchased for with the awarded NICT grant funding.

(b) **Refurbished laptops.** The three refurbished laptops that have stop functioning, should be replaced, and installed with the IWBs software.

7.17 **Creation of an annual ICT budget.** We recommend that the critical areas and the prescribed critical actions identified by the BNTF Project consultant for "…*the institutional support for ICT integration*…" be considered. That is, to create an annual ICT budget to have the financial resources for procurement, maintenance, and upkeep of the IWBs when they develop issues, or when part(s) malfunction and require replacement. This also includes the required annual payment of the software and server licenses for the daily operations of the assets.

Create annual ICT budget	Designated available resources for, purchase of proprietary software licenses e.g. SmartBoard Notebook software maintenance and rapid repair of ICT equipment; replacement of damaged, outdated or obsolete textbooks or ICT equipment; on-going capacity building training for educational and technical staff; support for an ICT teacher recognition system;

7.18   Upgrade, upkeep or disposal of ICT assets. The majority of the Interactive Whiteboards currently in use at the Government schools are no longer in production. Hence, the MoE should consider repairing the existing ICT assets; and if they are irreparable then seek to have the items replaced with newer models. Other measures that can be employed include recycling of compatible parts from the obsolete IWBs, or use them as display boards or traditional whiteboards. If all else fails, the ICT assets should be disposed of as per GoM's PFMAA.

7.19   Provision of a backup generator for Brades Primary School. The Brades Primary School is the only Government-run educational institution that does not have a backup generator. Therefore, we are recommending that the MoE to make a formal request to MoFEM for the provision of a generator and a recurring budget for fuel purchase and regular maintenance of the generator.

CHAPTER 8   AUDIT CONCLUSION

8.1   The Office of the Auditor General has determined that the Ministry of Education and the other stakeholders involved in the various GoM initiatives to introduce the use of IWBs into the island's public schools, were compliant with *CAP 17.07 Public Finance (Management and Accountability) Act* and the *Public Finance (Management and Accountability) (Procurement) Regulations, 2019.* Over the past decade, the Interactive Whiteboards have proven to be useful teaching tools in the GoM run schools. From various reports, the ICT devices have improved the quality of teaching and enhanced the learning experiences of both teachers and students in alignment with most of the anticipated benefits and impacts of Montserrat's Sustainable Development Plan, and NICT Plan policy and strategies, including the Education Development Plan objectives, for the modernisation of Learning.

8.2   A strong regulatory framework is in place; but, in practice, the Ministry of Education and the Montserrat Secondary School is not in compliance in all material respects with relevant laws, regulations, and policies, that is, *Part 25 Sections 119, 120* and *123* of the *CAP 17.07 Public Finance (Management and Accountability) Act.* They have failed to meet the necessary requirements of writing off, disposal, registration, and maintenance for the Interactive Whiteboards and related devices.

8.3   Our findings also show that two of the IWB implementation projects were not very cost-effective; i.e. the Lookout Primary School Expansion project, and the incomplete BNTF funded ICT in Schools project. In addition, no consideration was given for the provision of a recurring budget towards the maintenance of the IWBs and the associated devices, or ensuring that there is a trained professional readily available within the MoE or on island, to perform the maintenance service. Consequently, practically brand-new, obsolete, and/or inoperable ICT devices, remain mounted and useless in the classrooms, which is not good value for money.

CHAPTER 9   MANAGEMENT RESPONSE

9.1   The Ministry of Education, Youth and Sports acknowledges the before detailed audit from the Office of the Auditor General and agrees with the majority of findings. The implementation of ICT projects requires both project and recurrent financial commitments to ensure implementation and effectiveness. The management response outlined subsequently requires a centralized approach to staff, software and hardware to ensure sustainable approaches to services and support.

9.2   Subsequent efforts by both the Ministry and Government of Montserrat indicate a cultural shift in approach and a steer to sustainable digital transformation. With the pending deadline from the Caribbean Examination Council for 100% digital administration of external exams in July 2023, the Ministry must deliver on the conversion with noted and needed impact on the emerging labour force. The ministry continues to be committed to developing the ideal Montserrat citizen and ensuring these resources are adequately used to improve the student and teacher experience.

9.3   **Findings 1:** Interactive smartboards improve the classroom experience for students but are often hindered by disruption in electricity and internet.

Pending Action/Recommendation

- Installation of additional devices to ensure equity of classroom teaching and learning standards for all schools
- Procurement and installation of a generator for Brades Primary School
- Improve asset management of all equipment in the GoM asset management software.
- MoE must provide continuous capacity-building training for GoM public school teachers.

Management Response

9.4   The Ministry agrees with the findings and recommendations of the audit. Subsequent events to the period of the assessment indicate that all assets are currently entered in the GoM software. Board of Condemnation proceedings shall be conducted during Summer 2022 to ensure dilapidated items are removed from school compounds for site safety.

9.5   Teacher training has been ongoing but inconsistent, training has been completed as recently as 2019. However, remote instruction and ICT in instruction has become a priority as a result of COVID-19. The use of ICT in the classroom will become an annual professional development area in the Schools' Professional Development Plans.

9.6   The procurement of additional devices and the generator will be subject to the availability of funds but this will be prioritized in the financial aid mission for 2022/2023.

9.7   Findings 2: The draft ICT Policy is not recognized and implemented.

Pending Action/Recommendation

• MoE to review, update and officially endorse and ICT policy.

Management Response

9.8   Funding has been secured to procure a technical consultant to review, update and finalize the Ministry of Education, Education Technology Policy. This grant was an element of the final MoE EU project, contract pending. The policy should outline procedures for asset management, repairs/removal of devices, software management and user usage.

9.9   Core to the process will be the re-integration of ICT operation in MoE with DITES. All future hardware and software advice will require their no objection. The objective is to support a centralized approach to operation and supervisor. MoE will strive to transfer the education technician post into the portfolio to increase support and succession planning. This will also increase desktop support and timely response to the needs of the sector.

9.10   Findings 3: Annual ICT Budget and Staffing

Pending Action/Recommendation

• Create an annual ICT budget to have financial resources for the procurement, maintenance and upkeep of IWBs.

Management Response

9.11   MoE supports this recommendation within financial constraints. Core to increasing efficiency will be the joint procurement of software and hardware in collaboration with DITES. Throughout FY 22/23, MoE is committed to discussing the development of a detailed budget for IWBs and all ICT needs. The sourcing of ICT needs has been heavily dependent on capital projects and an evident need requires an increase in recurrent budget.

Permanent Secretary (Ag)
Ministry of Education, Youth Affairs, and Sports
28 June 2022

APPENDICES

HUMAN DEVELOPMENT MEDIUM-TERM OBJECTIVE 2:
Increase access to and improve quality of formal and informal education

TARGETS:
75% or more of students sitting the CXC CSEC examinations passing four or more subjects at the general and technical levels
25% and 50% increase in the number of persons participating in courses offered by the Montserrat Community College by September 2010 and September 2012 (2008 as base year)

	STRATEGIC ACTIONS	TARGETS
2.2.1	Improve education infrastructure to respond to growing student population, changes to curriculum and developmental needs	• St John's Day Care buildings extended by December 2009 • Salem Early Childhood Centre constructed by December 2008 • DFID-funded Look Out and Brades Primary school plant expansion completed by 2011 • BNTF-funded Brades Primary School plant expansion completed by August 2010 • ICT infrastructure upgraded, EMIS installed and teachers trained in the use of electronic management information systems by December 2010
2.2.2	Expand Guidance and Counselling System, as well as Pupil Support Services to pupils with learning and behavioural problems	• Pupil Support Services Unit fully established and operational by March 2009
2.2.3	Award inaugural island scholarship and grants	• Initial awards made in September 2010
2.2.4	Employ appropriate measures to recruit and retain sufficient numbers of qualified teachers in the profession: • Develop and maintain standards for teaching • Ensure compensation comparable to other occupations with similar qualifications and professional requirements • Facilitate diverse career pathways	• Major compensation issues addressed by 2010 • Teacher Education programme offered at MCC by 2010
2.2.5	Determine and increase the range and number of courses offered through the MCC and UWI Open Campus to meet national training and capacity development needs and to facilitate life-long learning	• Key courses to be offered to meet national development needs identified by June 2008 • Programme to assist prospective students to meet course entry requirements implemented • New courses offered by September 2009 • Adult and computer literacy and language skills programmes implemented by 2009
2.2.6	Construct a National Library and Archives	• Contract for construction awarded by December 2011
2.2.7	Conduct a review of the primary education system and implement the recommendations.	• Implementation of the recommendations for the primary education system commenced by March 2010
2.2.8	Review curriculum at the secondary level to improve its relevance and appropriateness (Civics, technical, and vocational programmes, performing arts and sports, religious education)	• Review and upgrading of the secondary level curriculum completed by September 2011
2.2.9	Improve quality of teaching and assessment at the primary and secondary levels	• Improvement in reading comprehension skills in all disciplines, computational skills and research skills by July 2010
		• Improvement in test scores of students by July 2010
2.2.10	Produce a Master Plan for the Montserrat Secondary School at the alternate site in the north of Montserrat	• Land purchased by December 2010
2.2.11	Undertake an overall evaluation of the current education development plan and the preparation of the next medium-term sector plan (2010 – 2012/14)	• 2010- 2012/14 Education Development Plan prepared by July 2011
2.2.12	Establish partnerships with investors desirous of establishing tertiary educational institutions in Montserrat	• Two accredited tertiary institutions established and operationalized by December 2011

Learning

STRATEGIC THRUSTS	KEY PROGRAMMES	SDP Goal	KEY PROGRAMME ELEMENTS
1. Enhance the education experience and its effectiveness through formal and informal channels	ICT in Education	SG 2	Training of teachers and administrative staff in the use of ICT for education enrichment (e.g. in English, Mathematics, Sciences) Training of students in ICT-facilitated learning (research, assignments, interactive study) Integrate ICTs into the curriculum (ICT as a subject) Training of "private" teachers/educators in the use of ICTs for education
	ICT Awareness & Impact	SG 2	Establish an annual "National ICT Week" to coincide with a major, on-island ICT events or workshop. Activities for the "National ICT Week" can include a school competition in ICT innovation culminating in a prize at the end of the week; free public lectures on ICT-related issues; ICT features aired on national broadcast channels; demonstrations / exhibitions of ICT equipment (e.g. video-conferencing, 3-D television, etc.); application of ICT in relevant sectors (e.g. agriculture, fishing, tourism, health, education, manufacturing) Partner with MICA and relevant industry players to sensitise the public about personal safety in using the Internet.
	EMIS (Education Management Information System)	SG 2 SG 4	Enhance school administration by establishing school networks and an integrated portal for connecting Ministry of Education personnel, principals, teachers, parents and students)
	The ICT Channel	SG 2	Establish a multimedia communication channel with online and offline access that provides relevant ICT information packaged in an attractive and understandable way.

STRATEGIC THRUSTS	KEY PROGRAMMES	SDP Goal	KEY PROGRAMME ELEMENTS
			The ICT Channel will: • Inform and educate the public on ICT issues that affect their daily lives; • Raise public awareness and appreciation of the benefits and risks of ICTs; and • Provide a public forum to discuss ICT issues. • Feature citizen-produced appropriate content
2. Develop on-island ICT capability and talent, with a propensity for ICT-based innovation and creativity	ICT Manpower Development	SG 2	Partner with the relevant institutions (local and foreign) to ensure the availability of certified ICT training courses in relevant technologies (e.g. Internet technologies, databases, networks, information security, open source technologies).
	ICT Incubation	SG 1 SG 2	Develop policies and programmes to encourage ICT innovation. This may require access to grant or concessionary funding and / or business incubator facilities for micro entrepreneurs.

3.4.2. Learning

The focus area, '*Learning*' sought to enhance the education experience through the effective incorporation of ICT in schools and the development of the on-island ICT human resource pool. Within the wider context of ICT in education, there has been marked progress in the following areas.

➢ The administration of education services has been improved through partial implementation of the Education Management Information System (EMIS) in all secondary schools.

➢ Laptops were distributed in phases to secondary school students between 2013 to 2015 and teachers have been receiving training in the areas of computer usage and curriculum development. The rollout has since been halted partly on account of concerns over the quality of some of the laptops supplied.

➢ A "Tablets for Students" programme is being discussed as a means for advancing the education agenda. At the same time, there is an interest in exploring the possible use of smart phones as teaching/learning tools in schools.

➢ Computer labs and Internet access have been provided in all public primary and secondary schools. There are, however persistent complaints about the reliability of the service.

➢ Applications such as Edmodo[1] are being used in the private education system for enhancing teacher-student engagement and collaboration.

➢ Efforts are being made to transition from the use of printed textbooks to electronic learning platforms.

➢ Montserrat's public education has recently benefitted from the Caribbean Development Bank's (CDB) Basic Needs Trust Fund (BNTF[2]), whereby thirty-two (32) primary school teachers received training in the use of Interactive White Boards.

➢ Montserrat's National ICT Week is now an annual event designed to raise public awareness, interest and literacy in ICT and ICT-related developments. Notably,

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[1] Edmodo is an educational technology offering communication, collaboration, and coaching tools to schools and teachers. The Edmodo network enables teachers to share content, distribute quizzes, assignments, and manage communication with students, colleagues and parents.

[2] The Basic Needs Trust Fund (BNTF) is a Caribbean Development Bank (CDB) grant-funded programme targeted at improving living conditions in poor communities in 10 participating countries, including Montserrat.

4. FINANCIAL INFORMATION

4.1 BUDGET

Table 1 showing Budget for MSS Science ICT Project

No.	Items	Grant request	Other source	Total XCD $	Notes
1.	Interactive Smart Whiteboard with projector and interactive tablet	Yes		14884.13	See Appendix** A I
2.	All-in-one printer	Yes		1625.84	A II
3.	Surround sound speakers	Yes		1138.04	A III
4.	Internet/Wi-Fi router	Yes		812.84	A IV
5.	Shipping and Handling	Yes		4065.00	
	Total			22525.85*	

* Total calculated using $2.71XCD = $1USD

** Item websites

Table 6

Road map for sustained ICT integration in Montserrat primary schools

Critical area for improvement	Critical actions	Projected outcomes
ICT infrastructure	• Provide one operational laptop/ desktop computer in every classroom for teacher use (BNTF action in place)	ICT-supported teaching in every public primary school classroom
	• Install one operational interactive whiteboard in every classroom and in the school's ICT lab (BNTF action in place)	ICT-supported teaching *and learning* in every public primary school classroom
	• Provide operational computer desktops in ICT lab for student use (BNTF action in place)	Development of improved ICT skills among public primary school students (Limited contact opportunities)
	• Produce an annual ICT infrastructure maintenance and repair plan	100% operational up-time for primary schools ICT infrastructural equipment
	• Develop a rapid response process for responding to breakdown of ICT infrastructural equipment	Short turnaround time for repair of non-operational ICT infrastructural equipment Minimum downtime periods for non-operational ICT infrastructural equipment
	• Develop a replacement plan and timetable for out-dated and/or obsolete ICT infrastructure	Maintenance of currency in ICT skills among teachers and students Reduced infrastructure repair costs
	• Provide networked laptops/ Chromebooks or tablet devices for students' in-class use	Development/improvement of students ICT skills Extended student access to and contact time with online learning activity resources

Table 6 cont'd

Road map for sustained ICT integration in Montserrat primary schools

Critical area for improvement	Critical actions	Projected outcomes
Network Infrastructure	• Establish reliable *high bandwidth* internet service in each school (BNTF action in place)	School staff provided reliable access to online resources for instructional activity and educational management
	• Provide 1 reliable hard wired internet connection in each primary classroom (BNTF action in place)	Teachers' reliable access to online resources to facilitate ICT-integrated teaching
	• Provide hard wired connections to every device in ICT labs (BNTF action in place)	Teachers' and students' reliable access to online teaching and learning resources to facilitate ICT-integrated teaching and learning (limited contact opportunities)
	• Provide reliable *high bandwidth* wifi service in every primary school classroom	Infrastructural environment which supports the use of multiple networked devices for ICT-integrated teaching and learning
ICT software applications	• Develop a formal, system-wide policy for the acquisition and use of educational software applications	Signals an organizational impetus for educational software use and establishes conditions for use in Montserrat primary schools.
	• Identify and collect a list of high quality/recommended open source educational software applications which can be used by teachers, students and educational leaders	Students will have increased opportunities for interaction with ICT integrated learning activities

Teachers will have increased opportunities to develop skills in using educational software in pedagogically appropriate ways;

School leaders will be able to promote the use of ICT in their school by modeling the use of educational software in their roles |

Table 6 cont'd

Road map for sustained ICT integration in Montserrat primary schools

Critical area for improvement	Critical actions	Projected outcomes
Institutional expectations for ICT integration	• Introduce an annual award system to recognize teachers' exemplary ICT integration practices	Teachers perceive a greater value-added proposition to the practice of integrating ICT into teaching and learning Teachers increase the use of ICT in their teaching
	• Revise MOE primary lesson plan template information to include guidelines on producing ICT integrated lesson plans	Teachers who use the MOE lesson plan template, internalize the requirement to incorporate ICT elements into their lesson planning activity
	• Introducing educational policy guidelines which require a specific number of ICT training hours per year for teachers and educational leaders	Educators will fulfill the requirement to engage in continuing ICT integration training
	Introduce a policy of paperless document management and communication	Teachers and educational leaders will shift to the use of electronic document management and electronic communication

Table 6 cont'd

Road map for sustained ICT integration in Montserrat primary schools

Critical area for improvement	Critical actions	Projected outcomes
ICT capacity-building	• Provide on-going interactive whiteboard training for teachers (BNTF provided initial training)	Teachers increased skill level in utilizing IWB for teaching and learning
	• Provide ongoing teacher training in ICT-integrated teaching strategies	Teachers' increased knowledge and skill levels in a variety of ICT integrated instructional strategies
	• Provide ongoing professional development training in ICT leadership for school heads and education officers	Educational leaders increased knowledge and skills in utilizing ICT for educational management Educational leaders increased knowledge and skills in supporting and promoting ICT integration activity among their teachers and in their school eco-system
	• Provide ongoing training for technology support personnel at the Ministry of Education	Improved ability to diagnose and resolve issues with ICT equipment Improved ability to execute successful ICT equipment maintenance and repair plans

APPENDIX VII – STATEMENTS IN MOE's DRAFT ICT POLICY IN ALIGNMENT WITH THE SDP, NICT

INTERNAL CONTROLS	TRACKING ASSETS	MAINTENANCE AND UPGRADING OF ASSETS	TRAINING
Statement No. 16 - The Ministry of Education will work in collaboration with the Government's Computer Unit and stakeholder groups to develop strategies to deal with licensing, intellectual property rights, use of software, disposal of used computer equipment, security and information dissemination associated with ICT in the Education System.	**Statement No. 26** - Principals/Head Teachers of educational institutions will be responsible for all ICT resources on the premises of their institutions and will keep a record of all software and software upgrades acquired by their institutions. The Ministry of Education and the Government Information Systems Unit will ensure that the appropriate licenses have been acquired for the use of such software.	**Statement No. 25** - The Ministry of Education, through its nominee on the OECS ICT education Committee will periodically review hardware and general software standards and recommend changes/upgrades as needed.	**Statement No. 10** - The Ministry of Education will ensure that training of teachers in computer literacy and the educational uses of ICT will precede the introduction of equipment into the classroom.
Statement No. 20 - The Ministry of Education will work with stakeholder groups to establish procurement guidelines and procedures for the acquisition and security of ICT equipment, peripherals and accessories.		**Statement No 27** - The Ministry of Education will make recommendations for and seek the necessary budgetary provisions associated with the capital and operational costs of sustaining ICT systems within the education system.	**Statement No. 11** - The Ministry of Education will provide in-service training in ICT to all teachers.
Statement No. 21 - The Ministry of Education in collaboration with the Government Computer Unit and other recognized bodies will ensure the establishment of protocols for the identification, evaluation and selection of appropriate software for use in computers at all levels of the Education system.			**Statement No 22** - The Ministry of Education will ensure that before instructional software is deployed in the classroom it is evaluated and approved by the competent authority and teachers are trained in the use of the software.
Statement No. 33 - The Ministry of Education will explore all possible			

options of procuring computer systems giving due consideration to the upgrading, maintenance and eventual replacement of these systems.			
Statement No 34 - The Ministry of Education acknowledges that there are recurrent costs to support ICT in the Education System and will seek the necessary annual budgetary allocation to meet these costs.			
Statement No. 35 - The Ministry of Education will adopt a partnership approach to the financing of ICT in the education sector.			