



REPUBLIC OF MAURITIUS

NATIONAL AUDIT OFFICE

PERFORMANCE AUDIT REPORT

USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN ENHANCING TEACHING AND LEARNING

**Ministry of Education, Tertiary Education,
Science and Technology**

JUNE 2022

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FOREWORD

Section 16 (1A) of the Finance and Audit Act requires the Director of Audit to carry out performance audit and report on the extent to which a Ministry, Department or Division is applying its resources and carrying out its operations economically, efficiently and effectively.

I am pleased to submit to the Minister of Finance, Economic Planning and Development, and through him to the National Assembly, this Performance Audit Report entitled “Use of Information and Communication Technology in Enhancing Teaching and Learning”. The significant investment to use ICT in schools and public higher education institutions motivated the selection of this subject matter.

The objective of this performance audit was to assess whether the measures taken by the Ministry of Education, Tertiary Education, Science and Technology were adequate in promoting and using ICT to enhance teaching and learning at primary, secondary and tertiary levels. It covered the period January 2017 to December 2021 and where applicable, updated information is included in the report.

The Ministry was given the opportunity to comment on the content of the Report, which also includes recommendations for improvement. A follow-up audit will be carried out in due course to evaluate the adequacy, effectiveness, and timeliness of actions taken by the Ministry on reported findings and recommendations.

I would like to take this opportunity to thank the Senior Chief Executive and the staff of the Ministry, as well as officials of Higher Education Institutions and the Mauritius Institute of Education for their cooperation and collaboration. I also wish to thank my staff who were engaged in the conduct of this audit.



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30 June 2022

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LIST OF ACRONYMS

ADDIE	Analyse, Design, Develop, Implement and Evaluate
CMS	Classroom Management System
CODL	Centre for Open and Distance Learning
COL	Commonwealth of Learning
DHM	Deputy Head Master
EDLP	Early Digital Learning Programme
GOC	Government Online Centre
HEC	Higher Education Commission
HEI	Higher Education Institution
HM	Head Master
ICT	Information and Communication Technologies
ICTSO	ICT Support Officer
KM	Kréol Morisien
LMS	Learning Management System
MGI	Mahatma Gandhi Institute
MIE	Mauritius Institute of Education
MITCI	Ministry of Information Technology, Communication and Innovation
MoETEST	Ministry of Education, Tertiary Education, Science and Technology
NAO	National Audit Office
NCF	National Curriculum Framework
NYCBE	Nine Years Continuous Basic Education
OER	Open Educational Resources
OU	Open University of Mauritius
QAA	Quality Assurance Authority
QAID	Quality Assurance and Inspection Division
SDG	Sustainable Development Goal

LIST OF ACRONYMS *(Continued)*

SRM	Social Register Mauritius
SSP	Student Support Programme
TD	Tertiary Directorate
UdM	Université des Mascareignes
UoM	University of Mauritius
UTM	University of Technology Mauritius
Wi-Fi	Wireless Network Technology

EXECUTIVE SUMMARY

Digital media and the internet have become ingrained in our daily lives. One area experiencing a tremendous change is education. Information and Communication Technology (ICT) is a powerful and pervasive medium that can supplement traditional teaching methods, both inside and outside school, by enhancing educational processes.

Since the introduction of ICT as a subject in schools in the mid-1990s, the Ministry has undertaken numerous projects which make use of technology with a view to enhancing teaching and learning. During the period 2017 to 2021, over a billion rupees were spent on these projects. The COVID-19 pandemic acted as a catalyst to integrate ICT into the education system in Mauritius. This audit assessed whether the measures taken by the Ministry were adequate in using ICT to enhance teaching and learning in the primary, secondary and tertiary education sectors during the last five years.

Key findings

A. *ICT Policy and Strategy*

The policy statements for applying ICT in education are stated in the Ministry's Nine Years Continuous Basic Education reform document: *Inspiring every Child* issued in 2016. However, it covers the primary education cycle and the first three years of secondary schooling, that is, up to Grade 9 only. There was no clarity on the use of ICT in teaching and learning for grades at the upper secondary level and in the tertiary education sector.

A draft ICT in Education Strategy 2019-2021 for Mauritius was formulated in 2018 by the Ministry, but as of December 2021 it had not yet been finalised and approved.

In the absence of an approved ICT strategy, Higher Education Institutions (HEIs) took their own initiatives to implement ICT-related projects to improve teaching and learning. However, this approach led to random adoption of different systems and standards which might result in unnecessary duplication of effort and loss of potential synergies. As of December 2021, the Ministry did not carry out a review of these initiatives to identify shortcomings.

B. *Primary Education Sector*

The Early Digital Learning Programme (EDLP) implemented in Grades 1 to 4 had several shortcomings that impacted the effective use of ICT in enhancing teaching and learning.

- There were no guidelines on the number of hours tablets should be used in primary school classes.
- Except for widgets, audio and videos, all other materials pre-loaded on the tablets were a replication of printed textbooks materials. There were not enough new activities on the devices that can help to develop competencies or skills like critical or creative thinking in the child. The Ministry did not specify the requirements and characteristics for the digital content to be prepared for the EDLP.

- The supervision and monitoring activities focused mostly on the logistics deployed, their usage, maintenance and repairs. Pedagogical issues were not sufficiently discussed with teachers and also, feedback from learners were not gathered and analysed to assess whether teaching and learning were being improved.
- Proper evaluation of the EDLP was not carried out.
- Neither the Ministry nor the Mauritius Institute of Education assessed whether the training given to educators was effective in enhancing teaching and learning.

C. Secondary Education Sector

Although secondary schools have been constantly upgrading their ICT facilities, the following key issues were noted:

- The Ministry undertook several projects in the past to create the necessary environment to allow teaching and learning using ICT at classroom level, but these were not successfully implemented. Thus, students and teachers were deprived of the benefits of using ICT in secondary schools.
- The Student Support Programme (SSP) is the only ICT based facility offered to secondary school students, more specifically those of Grades 7 to 9, to consolidate their learning. However, the SSP was not evaluated to determine whether it has enhanced the learning experience of students.
- The tools used by the Quality Assurance and Inspectorate Division to assess quality of education did not cover teaching and learning through ICT use.

D. Tertiary Education Sector

The use of ICT has become an integral part of the teaching and learning process in HEIs. However, the following shortcomings in the ICT infrastructure and training hampered the delivery of courses through the online and blended modes.

- Most HEIs were using open source Learning Management Systems which were not customised to meet their requirements. They were thus faced with their limitations.
- Adequate bandwidth was required for the effective delivery of online courses. However, the level of connectivity varied at the different HEIs. This impacted on the proper delivery of online courses.
- A gap analysis on training needs to conduct online courses was not carried out to identify the new skills and knowledge required for effective online teaching by academics. This exercise would have allowed HEIs to organise targeted training and enable them to align pedagogy and technology for the benefit of their learners.
- As of December 2021, a national Open Educational Resources Policy had still not been developed for the harmonisation, ease of access and to provide quality teaching and learning.

E. Education during the COVID -19 Pandemic Situations

The Ministry took several initiatives, where ICT was extensively used, to ensure continuity of classes during the COVID-19 pandemic. However, several weaknesses were observed. These are described below:

- No survey among students, parents and teachers was carried out by the Ministry to assess the availability of ICT facilities at both the dispensing and receiving ends, and the extent of education continuity through the different modes of learning proposed.
- Lessons followed on TV or on the SSP portal deprived students and educators of any interaction. During the past two years and up to December 2021, the Ministry did not sufficiently explore ways to make teaching and learning via TV more interactive. It, also, neither provided technical and socio-emotional support to students, educators and parents nor enabled two-way communication and feedback that can help to make educational TV programmes impactful.
- The Ministry did not provide sufficient guidance to teachers and learners on how to manage screen time to prevent adverse impacts on their health.
- With distance education, the role of parents became more important and challenging. The Ministry did not formulate guidelines to ensure for the continued and effective learning of their children through the online mode.

Conclusion

The Ministry has taken several initiatives to invest in ICT projects with the objective to enhance teaching and learning at primary, secondary and tertiary levels. However, these initiatives have not been adequate to meet their intended objectives. Several issues identified in their implementation indicate that the Ministry has not derived full benefit. This is mainly due to absence of an ICT strategic plan for education, absence of guidelines on the usage of digital devices and no harmonisation in the use of ICT at the tertiary level, amongst others. Besides, the Ministry has not carried out a review of the different initiatives to identify shortcomings.

The Ministry has taken several measures to ensure continuity in education with the intensive use of ICT during the COVID-19 pandemic. However, it has not carried out any evaluation to determine the extent to which these measures have been effective in enhancing teaching and learning.

Key Recommendations

ICT Policy and Strategy

- The Ministry should improve its ICT for education policy to cover the whole spectrum in education and develop an appropriate ICT for education strategy to drive its projects at all levels.

- The Ministry should set up a mechanism that fosters cooperation and mutual collaboration among HEIs with the objective to avoid duplication of efforts by offering incentives for shared activities with respect to the use of ICT to enhance teaching and learning.

Primary Education Sector

- Minimum and maximum durations for using EDLP devices for teaching and learning in the classroom need to be worked out by the Ministry in consultation with pedagogical and health experts.
- The Ministry needs to carefully plan and set the characteristics for the type of digital learning resources it requires for teaching and learning through ICT tools. The digital learning resources need to be adequately designed, tested and evaluated before their use.
- A proper evaluation of the EDLP is recommended to detect any problem or shortcoming at an early stage that will have to be promptly addressed for the successful implementation of the programme.
- There should be continuous evaluation of digital contents made available for the EDLP.
- For effective supervision and monitoring of the EDLP, school management and the inspectorate cadre need to be trained on how to measure and evaluate the impact of digital technology on teaching and learning.

Secondary Education Sector

- The SSP needs to be evaluated to determine whether it is effectively enhancing teaching and learning.
- The quality assurance framework and handbook need to be revised to include education through ICT. Training needs be provided to school personnel and quality assurance officers to enable them to carry out the quality evaluation exercises.

Tertiary Education Sector

- Consideration could be given for the development of a national platform supporting online learning to cater for large number of users and support a range of technologies.
- A gap analysis on training needs has to be carried out to identify the skills and knowledge required by academics to teach online. Continuous professional development should be provided to academics to enable them to adapt and keep pace with the new mode of teaching.
- Internet bandwidth should be broadened to facilitate access to institutional resources as well as digital resources on the web.
- A National Open Educational Resources Policy should be developed to promote the development and sharing of quality content.

Education during COVID -19 pandemic situations

- To improve the effectiveness of educational TV programmes, the Ministry needs to:
 - Consider the possibilities to make TV education more interactive;
 - Put in place mechanisms for communication between teachers, students and their parents and for sending feedback on this mode of teaching and learning; and
 - Provide necessary support to all the parties.
- The Ministry needs to develop a proper methodology to harness ICT facilities for online classes at the primary school level.
- The Ministry needs to prepare guidelines for the good health and overall wellbeing of students and their teachers when they continue learning and teaching outside of the classroom.
- The Ministry should set appropriate guidelines for parents for the effective learning and overall wellbeing of their wards when distance education is provided.

Summary of Ministry's Response

- The Draft ICT Strategy 2019-2021 was not released due to the rapidly changing nature of ICT and to adapt to the new strategies of teaching and learning in 2020 due to school closures.
- The Ministry is currently looking at means for a harmonised integration of ICT into education services.
- Usage time of EDLP in classrooms is being determined by teachers and headmasters at the level of schools, depending on the ability and learning pace of students and the existing curriculum.
- Improvements in content development are being made gradually since the implementation of Phase I of the EDLP in 2018, with a view to enhancing learning experience. The Mauritius Institute of Education (MIE) and Mahatma Gandhi Institute are developing more interactive contents for Grade 5.
- The MIE will be requested to organise regular visits and provide real time assistance to teachers.
- Appropriate training of teaching personnel and Quality Assurance officers would be planned after a duly carried out Training Needs Analysis in respect of external assurance on teaching and learning through ICT use.
- The Ministry is coming up with a common teaching and learning Management Information System for HEIs to share resources and improve the quality of their online teaching and learning.

- Higher Education Commission has signed an agreement with the Commonwealth of Learning (COL) for the latter to provide technical assistance to develop a Technology Enabled Learning Strategy for HEIs.
- The Ministry is developing a National OER Policy in collaboration with the COL, which is expected to be finalised by July 2022. Each HEI will be requested to align their institutional strategic directions with the National OER policy.
- The Ministry has taken note of the various approaches recommended by the National Audit Office to make teaching and learning via the TV more interactive.
- The E-Education and Health and Wellness Directorates will collaborate to come up with a set of guidelines for screen time and usage of tablets.
- An e-brochure will be designed to guide parents.

CHAPTER ONE

INTRODUCTION

This Chapter provides a background of the subject matter examined and describes the approach used in carrying out the audit.

1.1 Background

Teaching and learning are pedagogy-led, and can be supported by appropriate and judicious use of technology. According to UNESCO, “Information and Communications Technologies or ICTs are a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information”. Advances in ICT and the rapid expansion of internet connectivity have rendered knowledge of ICT essential for everyone. The Qingdao Declaration 2015¹ recommended that “ICT must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more efficient service provision in order to achieve the Sustainable Development Goal (SDG) 4 of inclusive and equitable quality education and lifelong learning by 2030”.

The Ministry recognised that the education system needed to develop a generation of young adults equipped with the right knowledge, skills, attitude and values and with the following core competencies: critical thinking skills, adaptability and creativity, ability to work collaboratively, good communications skills and ICT savviness. Over the years, the Ministry has been undertaking several projects relating to the use of ICT in enhancing teaching and learning, but it has been facing several challenges in driving and managing them.

1.2 Audit Motivation

The role of ICT is widely accepted, and its presence has basically transformed the practices and procedures within the education sector. Several issues regarding the procurement of tablets for secondary schools’ students in the past have prompted debates in the National Assembly and were also reported in the media.

My previous audit reports highlighted several weaknesses in the procurement and usage of the Tablet PC project and the Early Digital Learning Programme (EDLP) in the Secondary and Primary education sector respectively. The Ministry spent over Rs 1 billion during the period January 2017 to December 2021 to promote the use of ICT to enhance teaching and learning in education.

It is against this background that the National Audit Office carried out this Performance Audit on the use of ICT to enhance teaching and learning.

1.3 Audit Objective

This performance audit assessed whether the measures taken by the Ministry were adequate in promoting and using ICT to enhance teaching and learning in primary, secondary and tertiary education.

¹ The Qingdao Declaration was the key output of the International Conference on ICT and post 2015 education, that provided UN members with policy recommendations for harnessing the power of ICT to address current educational challenges, and to ensure equitable quality education and lifelong opportunities for all. The declaration was endorsed by Ministers of Education, high-level government officials, of UN member states and representatives of UN agencies.

1.4 Audit Design

The audit was designed by formulating three audit questions and the answers to these supported the conclusion against the audit objective. The audit questions were as follows:

- Did the Ministry have an adequate ICT policy, strategy and plan for education?
- How well was ICT integrated in teaching and learning?
- Did the Ministry adequately monitor the use and evaluate the impact of ICT in enhancing teaching and learning?

These questions were further expanded into sub-questions. Details are at Appendix I.

1.5 Audit Scope

The focus of this report is on the usage of ICT technologies in enhancing teaching and learning. The activities examined included processes and practices in the systems relating to employment of ICT tools, training, development of pedagogical resources and impact on teaching and learning. Technicalities relating to pedagogy and ICT were not covered.

The report did not cover the pre-primary sector and technical and vocational training centres operated by the Ministry. The period under review spanned from January 2017 to December 2021. To get an insight of the latest development in use of ICT in education, information up to March 2022 has been included in the report.

1.6 Audit Approach and Methodology

The audit was conducted in accordance with International Standards of Supreme Audit Institutions². Different methodologies were used to understand the audit area, along with obtaining sufficient, relevant and reliable audit evidence that support the conclusions and recommendations.

1.7 Methods Used for Gathering and Analysing Data

In order to carry out the audit, data was collected through interviews and document reviews. Site visits were also carried out to understand the systems and mechanisms put in place, note their functioning through observation of activities and to confirm information obtained through interviews and from files.

1.7.1 Documents Reviewed/Consulted

Information relating to policies, strategies, programmes, systems, mechanisms, procedures and practices was collected through review of files and documents at the Ministry. The data was used to confirm information obtained from interviews, comprehend how the measures were implemented and understand how the systems were working.

1.7.2 Personnel Interviewed

Interviews were carried out with key personnel of the Ministry and Zone Directorate, management teams and educators in schools visited and Higher Education Institutions (HEIs).

² These standards are developed and issued by the International Organisation of Supreme Audit Institutions, the professional body of Supreme Audit Institutions in countries that belong to the UN or affiliated to its specialised agencies. The NAO is the Supreme Audit Institutions for Mauritius and is a member of International Organisation of Supreme Audit Institutions.

Discussions and meetings were also held with key staff of several stakeholders that contribute to enhance teaching and learning through the use of ICT in public schools controlled by the Ministry or the educational organisations for which they are responsible.

The interviews helped to confirm information obtained from the records reviewed and for providing more explanations where information was not available in the files.

1.7.3 Site Visits

A few selected primary and secondary schools were visited. These allowed a deeper understanding of how ICT was being used in teaching and learning, the difficulties encountered and the impact of digital technology on education.

1.8 Assessment Criteria

Criteria are the standards that were used as a basis for evaluating the evidence collected, developing audit findings and reaching conclusions on the audit objective. To assess whether ICT was used and helped in enhancing teaching and learning, criteria were drawn from various sources, such as:

- Legislations like the Education Act and COVID-19 Miscellaneous Provisions Act 2020;
- Guidelines on the use of ICT tools and remote learning developed locally and abroad; and
- Government procedures and guidelines that regulate administrative operations within the Ministry and its interaction with other government bodies.

Other more specific assessment criteria used are mentioned in the relevant paragraphs in Chapters Two and Three.

1.9 Data Validation

The audit criteria, findings and recommendations were presented and discussed with the management of the Ministry, and HEIs to confirm their suitability, relevance and accuracy.

1.10 Structure of the Report

The remaining part of the report covers the following:

- Chapter Two describes the audit area, the roles and responsibilities of the Ministry and key stakeholders involved in enhancing teaching and learning through the use of ICT in education;
- Chapter Three presents, the audit findings on the primary, secondary and tertiary education sectors, based on the audit questions;
- Chapter Four provides the audit conclusion; and
- Chapter Five outlines the recommendations based on the audit findings and conclusion.

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CHAPTER TWO

DESCRIPTION OF THE AUDIT AREA

This Chapter describes the audit area, the roles and responsibilities of the Ministry and other key players involved in enhancing teaching and learning through the use of ICT. It also describes the system for managing ICT in education.

2.1 Introduction

Information and Communications Technology (ICT) is the infrastructure and components that enable modern computing. Digital media and the internet have become ingrained in our daily lives. One area experiencing a tremendous change is how ICT plays its role in education. Education enables an individual to acquire knowledge, values, thinking skills, and practice human skills required for leading a meaningful life. ICT is a powerful and pervasive medium that can supplement traditional teaching methods. It has the potential to support teachers and learners in their work and widen opportunities for access to learning resources, both inside and outside school. The COVID-19 pandemic has heightened the speed at which ICT has integrated the education systems around the world and in Mauritius.

2.2 Ministry's Vision and Policy for ICT in Education

The overall vision and policy for ICT in education of the Ministry of Education, Tertiary Education, Science and Technology (MoETEST) are stated in the 2016 Nine Years of Continuous Basic Education (NYCBE) reform document, *Inspiring Every Child*.³ It highlights the following:

- Vision statements: “... to prepare our youth for a society increasingly dominated by an accelerated pace of technology-inspired change, ...”; and “... IT-mediated learning will increasingly become the enabler for heightened learner curiosity and enhanced independent learning.”
- Policy statements: “*Integration of ICT across curriculum*”; and “*Provide all teachers with adequate technological skills to manage ICT and social networks, to adopt ICT-mediated learning.*”

To realise and give effect to the above vision and policy, the Ministry focusses on four thematic and cross-cutting areas which are:

- *Technology*. This involves equipping schools with appropriate ICT infrastructure.
- *Internet connectivity*. Adequate connectivity allows the deployment of technology, and supports digital teaching and learning, within and outside of the school premises. Robust,

³ The NYCBE reform, effective since 2017, focusses on a sound foundation for learning and self-development, with a strong emphasis on the holistic development of the child. Its objectives are to ensure that all children complete nine years of basic education and achieve relevant learning outcomes and successfully complete the lower secondary education cycle, through the general or technical pathways.

reliable, secure and high-speed connectivity at schools is deemed urgent in the current COVID-19 pandemic period and for the post pandemic era as the traditional method of in-presence or face-to-face teaching and learning is being revisited or altered.

- *Preparation and production of digital pedagogical contents* in line with the National Curriculum Framework (NCF)⁴ that can be accessed in and out of schools, and at any time, by teachers and students for teaching and learning, and/or to consolidate same.
- *Training of all staff.* This involves continuous training and empowering key players in ICT for education and includes heads and management teams of schools, administrators and teachers.

2.3 Tertiary Education and Scientific Research Division

The Tertiary Education Division (TD) of MoETEST is responsible for the implementation of strategies in tertiary education and in designing related educational policies, strategies including ICT projects and reforms in line with Government Programmes. It is also responsible for the effective and efficient planning, organisation, supervision, coordination, implementation and evaluation of policies in tertiary education. Budget allocation for HEIs is also determined and prioritised by TD which ensures that the decisions taken by HEIs are in line with Government programmes and policies of the Ministry. HEIs report to TD on the implementation of their plans and policies regularly.

In March 2018, TD prepared a Higher Education Strategic Vision 2018-2021 document for the higher education sector. In the document, it proposed the creation of an enabling environment in the public higher education institutions with regard to improved learning spaces and infrastructure, high speed connectivity and IT-supported decision-making processes, amongst others.

2.4 Learning Modes Using ICT within the Education System

At the primary education level, the face-to-face approach is applied. Teachers and students use ICT facilities – tablets, laptops, PC's, projectors and internet connectivity – alongside printed textbooks for teaching and learning in their respective classroom. ICT facilities are used for all subjects taught. An early culture of IT usage and practice that serve as a tool to enhance primary education is encouraged. During school closures owing to the COVID-19 pandemic educational lessons were shown on the national television. Educational videos were also made available on the Ministry's website and its Student Support Programme (SSP) portal.

At the secondary level, the face-to-face mode is also applied at school. PC's and internet connection available in computer laboratories are used to teach mainly ICT, as a subject. Students and teachers are encouraged to visit the SSP where educational contents can be accessed to consolidate their learning and improve their teaching respectively. These educational resources are accessed outside of school hours using their personal ICT facilities. Necessary school closures during the last two years due to the pandemic prompted the Ministry

⁴ The NCF represents the body of knowledge to be engaged with in and out of school, as well as skills, attitudes and values to be developed by all students.

to arrange for online classes using various platforms for the upper secondary grades. Lessons were made available on the SSP and shown on the national TV for the lower secondary.

The COVID-19 pandemic is pressing the Ministry to evolve towards the blended mode of teaching and learning in the secondary sector and to be prepared for any unprecedented event. Blended learning (also known as hybrid learning) is a method of teaching that integrates technology and digital media with traditional instructor-led classroom activities. Under this model, some learning takes place online in a format where the student has control over the path and pace at which they engage with the contents and some learning happens in a teacher-led classroom. Online and in-person learning are complementary and create an integrated learning environment.

To support the blended mode of teaching and learning at the secondary level, students, teachers and other school personnel need access to devices and robust, reliable, secure and high-speed connectivity at schools and at home. A number of initiatives have already been taken to this end.

At the tertiary level, ICT has become firmly established as a necessary tool for the smooth running of any tertiary institution's core business processes of teaching and learning. Courses are delivered in a face-to-face mode using projectors, laptops, videos and power point presentations as well as other devices, to enhance teaching and learning at public HEIs. Free Wireless Network Technology (Wi-Fi) facilities are also available on the campus. ICT is intensively used for the delivery of courses at institutions where distance learning courses are offered such as the University of Mauritius (UoM) and the Open University (OU). With the pandemic, course delivery at the tertiary level has been altered leading HEIs to shift to the online and blended mode of teaching and learning to adapt to the new normal.

2.5 Implementation of ICT Projects

To execute ICT projects, the Ministry has within its organisation structure the E-Education Directorate under which the e-Government unit operates. The unit is responsible for driving ICT projects and carrying out ICT related activities.

ICT is dealt with by practically all the sections at the Ministry. Thus, different directorates and officials are called upon to provide their inputs for the execution of ICT projects or activities.

2.6 Major Stakeholders for ICT in Education

ICT is multi-dimensional involving various stakeholders. Their roles and responsibilities are further described.

2.6.1 Ministry of Information Technology, Communication and Innovation

The Ministry of Information Technology, Communication and Innovation (MITCI) undertakes major ICT projects of Ministries and Government Departments. On successful completion of a project it is handed over to the commissioning Ministry/Department for operation and maintenance. The Central Informatics Bureau (CIB) is a department of MITCI whose main functions are to plan and coordinate computerisation within the public service.

MoETEST with the collaboration of CIB worked out specifications for ICT devices procured under the EDLP for the primary education sector.

2.6.2 Mauritius Institute of Education

The Mauritius Institute of Education (MIE) shoulders the responsibility for the development of all teaching and learning resources, which includes textbooks, interactive digital materials and documents for the implementation of the NYCBE reforms in education. Teacher education is the core activity of MIE. Teachers are crucial to the adoption and usage of digital technology as a teaching and learning tool.

MIE operates the Centre for Open and Distance Learning (CODL) which is responsible for the digitisation of textbooks and the development of new digital interactive materials for the core and non-core subjects for primary schools in line with the EDLP. The materials are developed to meet the learning and instructional needs specified in the NCF and other curriculum documents, such as students' textbooks and teacher's guides. The *e-learning* resources created are meant to engage students in the learning process, and enhance and extend their learning with a view to developing independent learning skills and 21st century skills mentioned in the NCF. They are conceptualised, designed and developed to cater for the three domains of learning namely cognitive, affective and psychomotor. Using the same approach, CODL develops digital education content for secondary students on the mainstream and extended programmes of the NYCBE. These contents are made available on the Ministry's Student Support Programme portal.

The ADDIE model is used for the creation of learning resources. ADDIE is an acronym for *Analyse, Design, Develop, Implement, and Evaluate*. The model provides a structured framework that helps to ensure one can create a learning product that transfers knowledge from a subject matter expert. It helps to identify the learning needs in a structured way, offer an integrated approach to learning and measure and determine learning effectiveness as the required knowledge and skills are clearly defined in the ADDIE framework. The different phases of the model are explained and the steps followed by CODL are described in Appendix II.

2.6.3 Mahatma Gandhi Institute

The Mahatma Gandhi Institute (MGI) is responsible for developing textbooks and multimedia materials in Asian languages for the NYCBE mainstream and extended programmes. It produces interactive e-books in Asian languages for the EDLP and provides training to educators in their use.

2.7 Higher Education Institutions

In the tertiary sector, there are four main public HEIs that provide higher education namely, the University of Mauritius (UoM), the University of Technology Mauritius (UTM), Open University of Mauritius (OU) and the Université des Mascareignes (UdM). The Higher Education Commission (HEC) is the Regulatory Body for tertiary education.

2.7.1 Higher Education Commission

The Higher Education Commission has the responsibility for allocating public funds and fostering, planning and coordinating the development of post-secondary education and training. HEC promotes the development of higher education, academic research and training facilities through equity of access, high-quality learning and research outcomes, the efficient use of national resources and innovation.

HEC prepared a framework for building resilience in HEIs in May 2021, following the post-COVID-19 lockdown, with the aim to provide guidelines and recommendations to public and private HEIs in case of disruption in education due to pandemics and other crisis in the future leading to a more resilient higher education system.

2.7.2 Quality Assurance Authority

The Quality Assurance Authority (QAA) was established in January 2020 with the objective to promote, maintain and enhance quality assurance of higher education in line with international high-quality standards in higher education through appropriate mechanisms. Among its functions, QAA ensures that standards for qualifications in every HEI are met. It also carries out regular quality audits of HEIs and monitors the delivery of online and inter-institutional programmes.

2.7.3 The University of Mauritius

The University of Mauritius started to promote the use of ICT in teaching and learning from 2002 onwards. The Virtual Centre for Innovative Learning Technologies was established to promote the use of ICT in teaching and learning and to modernize the distance education concept through the provision of high-quality online learning courses. In 2014, the Centre for Innovative and Lifelong Learning (CILL) was established to provide and develop short courses to full-fledged programmes using e-learning and blended learning. UoM also promotes blended learning for its mainstream undergraduate and postgraduate programme.

2.7.4 University des Mascareignes

The Université des Mascareignes established in September 2012 offers an innovative approach to higher education and learning. It embarked on online teaching and learning with training provided to 16 staff by the DU INES (Université de Caen) prior to the outbreak of COVID-19 pandemic (January-June 2020). Lecturers at UdM are using different learning platforms to dispense online courses.

2.7.5 University of Technology Mauritius

The University of Technology Mauritius ensures that students have a fulfilling and intellectually stimulating experience that prepare them for opportunities worldwide. UTM, in its strategic plan 2019-2023, intended to expand its teaching and research capacity and provide greater service. This required bringing about adequate infrastructural, financial and resource development to enable provision of high-quality multi-level tertiary education. In order to ensure continuity of services and prepare students to prepare for a more digitalized world of learning and work, UTM followed a blended learning approach after the first lockdown.

2.7.6 Open University Mauritius

The Open University of Mauritius, established in July 2012, fosters open and distance learning to enable access to both local and international students. It invested judiciously to provide adequate technology to support learners and enhance their journey at OU. The e-Learning platform is accessible anywhere and anytime using mobile/tablet and provides a wide range of services that allow learners to interact with their peers, tutors and programme managers.

2.8 Supervision, Monitoring and Evaluation of ICT Projects

Monitoring of ICT projects occurs at various levels. At the Ministry's level, meetings/discussions are held between management, the appointed consultant for the project and the stakeholders involved. Activities and results are measured against contractual terms and timeframes set. Necessary corrective actions are decided and communicated to all the parties for application.

Evaluation is carried out internally by the e-Government unit that focus on the ICT infrastructure put in place. Zone offices, through its inspectorate section, and school management teams look into the adequacy of the logistics deployed at their schools, the number of trained teachers and also into the pedagogical achievements made through the use of ICT. Heads of schools are also the pedagogical heads of their institutions and it is their responsibility to ensure that the required level of pedagogy is provided. The evaluation is carried out by visiting classrooms and discussing with the educators. These visits also include an element of supervision.

For the secondary sector, the Quality Assurance and Inspection Division (QAID) has the responsibility to ensure quality of the educational service. It evaluates teaching and learning, and student attainment. Necessary assistance is provided to schools to prepare improvement plans.

For the tertiary sector, QAA promotes, maintains and enhances quality assurance of higher education.

2.9 21st Century skills, Education and Training System and ICT

A modern global economy changing beyond recognition, digital transformation of nearly all spheres of human activities, labour markets getting increasingly tech-centric, artificial intelligence, challenges posed by climate change; and cultural diversity, among many other challenges, call for a new generation of individuals who can act in a more holistic way. They are expected to be able to determine the relevance of information, distinguish between fact and opinion, identify unstated assumptions, detect bias, suggest reasonable and plausible solutions, predict possible consequences, and finally, within this complicated realm, make relatively quick and informed decisions. These abilities that encompass respect to diversity, emotional skills to critical and creative thinking, ingenuity, problem solving and 'thinking outside the box' are commonly referred to as 21st Century skills.

These skills cannot be acquired and mastered unless the education and training system provides the possibility to inculcate, nurture and develop them in youngsters. With the reform started with the NYCBE and related NCF, the Mauritian education and training system aspires to enable young people acquire and develop the necessary competences to successfully navigate their lives in a complex, highly technological and information-based economy, and uncertain world. The use of ICT is central to the NCF. It stresses the need for both teachers and learners to become ICT-savvy. It promotes the use of ICT tools to enhance teaching and learning, and makes provision for the development of ICT skills across all learning areas. The curriculum also emphasises Education for Sustainable Development, by incorporating key themes such as poverty alleviation, human rights, health, environmental protection, and climate change. It also recognises the importance of imparting life-skills to young people and to consolidate personal and social skills of all learners.

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CHAPTER THREE

FINDINGS

This Chapter presents the audit findings on the adequacy of the measures taken by the Ministry in promoting and using ICT to enhance teaching and learning at the primary, secondary and tertiary levels.

3.1 Introduction

ICT plays an important role in education. The Ministry has been undertaking several initiatives to integrate ICT in education to support the achievement of its mission and objectives and to align to Sustainable Development Goal 4 – “Quality Education”. Numerous measures were taken to use ICT in enhancing teaching and learning at the primary, secondary and tertiary education levels.

Several of these measures were examined and the findings thereon are organised into focus areas and presented as follows:

SECTION	FOCUS AREAS
A	Policy, Strategy and Plan for ICT for Education.
B	ICT for education in Primary Schools.
C	ICT for education in Secondary Schools.
D	ICT in Higher Education.
E	Use of ICT for Education during COVID -19 pandemic situations.

SECTION A

POLICY, STRATEGY AND PLAN FOR ICT FOR EDUCATION

A.1 Introduction

Integrating ICT in education is a complex task due to its dynamic nature. Formulating an adequate policy that outlines how the Ministry plans to handle ICT for education followed by proper planning is important to realise the full potential of using ICT for teaching and learning. An ICT strategic plan provides a roadmap for the integration of ICT in education. It includes a long-term strategic vision for high-quality, inclusive and accessible digital education, an ICT infrastructure and a competency plan.

This section examined the Ministry's policy and strategic plan for ICT in education.

A.2 ICT Policy, Strategy and Plan for ICT in Education

Integrating ICT into education is a difficult process. Success can be achieved when an adequate ICT for education policy is set followed by proper planning to give effect to the policy statements. The Ministry has an ICT policy, but it was not comprehensive and well-defined. No strategic plan was available for applying ICT for education.

A.2.1 ICT Policy

A good policy is one that is clearly expressed and concise. It serves to communicate an organisation's intentions. It explains the rule to be applied over the whole area of activity or sector in question progressing within a consistent logical framework. It includes what it expects from its employees, what the community can expect from the organisation and vice-versa.

The Ministry referred to the 2016 NYCBE reform document: *Inspiring every Child* wherein its policy for ICT in education is spelt out. The document underlines the following:

- (i) Integration of ICT across the curriculum; and
- (ii) Provide all teachers with adequate technological skills to manage ICT and social networks, and to adopt ICT-mediated learning.

These statements indicate the actions the Ministry intends to take with respect to applying ICT in education. However, the NYCBE relates to nine years of schooling starting from age five (Grade 1) and progressing up to age 14 or 15 (Grade 9 or 9⁺), in primary and secondary schools. There was no clarity using ICT as a medium for teaching and learning for grades at the upper Secondary and Tertiary levels.

A.2.2 Strategic Plan for ICT in Education

The Ministry has a *Draft ICT in Education Strategy for Mauritius 2019-2021* prepared in 2018 by a World Bank consultant. It covered the following clusters:

- Developing cross-cutting proficiencies and competencies in ICT in education;

- Developing ICT connectivity and infrastructure in schools and Ministry divisions;
- Enhancing teaching and learning through ICT;
- Improving educational management and governance through the use of ICT;
- Optimising the software infrastructure at the Ministry including the use of open licensing platforms;
- Building the capacity of staff and educators in using ICT for enhanced education service delivery;
- Developing research in ICT in education; and
- Encouraging provision of budgets for project implementation and monitoring.

The Ministry started implementing some of the measures described in these clusters and the draft was updated in January 2019. As of December 2021, the Ministry had not finalised and approved the strategy.

The Ministry is currently driving ICT projects such as EDLP, that involves a significant amount of funds without an ICT strategy for education. There is a potential risk that projects may be seriously affected and may require more time and entail further costs for remedying same.

The absence of a strategic plan may prevent the Ministry from benefitting from its advantages which primarily include applying proactive measures and addressing issues with a more long-term view and enhanced communication between management and staff, and other stakeholders.

The Ministry explained that the Draft ICT Strategy 2019-2021 was not released due to the rapidly changing nature of ICT and to adapt to the new strategies of teaching and learning in 2020 due to school closures. Several recommendations from the draft strategy were, however, implemented.

A.2.3 ICT Strategic Plan for the Tertiary Education Sector

The Ministry through its TD is responsible to implement strategies in tertiary education and in designing related educational policies. The Ministry did not have an approved ICT strategic plan for the tertiary sector that would integrate key strategic themes such as the information systems at HEIs, an ecosystem of teaching and learning technologies, services and facilities to support the learning modes and teaching methods, setting the direction for information technology planning.

In the document entitled, “Higher Education Sector Strategic Vision 2018-2021” prepared by TD, some measures were proposed to create an enabling environment in public HEIs with regard to improved learning spaces and infrastructure, high-speed connectivity and IT-supported decision-making processes. However, these measures were not implemented as of December 2021. According to TD, though the document was approved by management, it has remained a reference document for future planning.

ICT for education development at the higher education level will have a limited impact unless proper ICT policies and strategies are developed to facilitate and support the efficient use of ICT. The Ministry did not have a shared vision on how technology can best meet the needs of all learners and a plan that translates the vision into action.

A.2.4 ICT strategic plan at Tertiary Education Level

Good practice recommends that information and communications technology services are delivered across tertiary institutions as part of a defined ICT Strategy that is aligned with the institutional strategy. A proper ICT ecosystem⁵ encompassing the policies, strategies, processes, information, technologies, applications, and stakeholders that work together to build a technology-enabled environment for HEIs is required to improve the quality of teaching and learning. The four main HEIs, namely UoM, UTM, UdM and OU, did not have an ICT strategic plan. Their institutional strategic plan included a component/strategy on the use of ICT in improving teaching and learning. However, the component/strategy was limited and did not include key aspects of the use of ICT in teaching and learning such as infrastructure, capacity building and professional development, teaching and learning resources and risk management in case of a pandemic. Examples of the components included in the four HEIs' Strategic Plans are shown in the Table 1:

Table 1 Examples of Components of Strategies included in Strategic Plan of HEIs

Higher Education Institutions	Component of ICT in the Institutional Strategic Plan
University of Mauritius	Strategic Plan 2015-2020: <ul style="list-style-type: none"> ▪ Creating an enabling environment ▪ Extend provision for open and online education ▪ To inculcate a lifelong learning culture in graduates ▪ To enhance the quality of teaching and learning
University of Technology	Strategic Plan 2019-2023 <ul style="list-style-type: none"> ▪ Promote knowledge creation and dissemination and achieve excellence in technology, innovation, research and development
Université des Mascareignes	Strategic Plan 2021-2022: Engage in e-learning and improve the use of ICT in its educational strategies by implementing two strategies: <ul style="list-style-type: none"> ▪ Train and improve its academic staff in the use of ICT in pedagogy; and ▪ Equip them and certain premises with ICT tools and computer equipment. Integrated Learning Strategy prepared in July 2020 with the objective to include ICT in teaching and learning in view of building up a knowledgeable society
Open University of Mauritius	Strategic plan 2017-2025: <ul style="list-style-type: none"> ▪ To provide the best ICT facilities and develop a state-of-the-art ICT infrastructure for delivery of the courses and online tutorials ▪ Ensuring that course materials and tutorials were available in different formats ▪ Provide the best ICT support to all staff and develop the building infrastructure.

Source: HEI's Strategic Plans

⁵ Good Practice in Information and Communication Technology for Education – Asian Development Bank, 2009

In June 2020, in response to the COVID-19 pandemic, only UOM prepared a Digital Learning and Transformation Strategy (DLST) with a view to modernise its system, by embracing a blended learning model with the use of technology to ensure quality was maintained and make learning meaningful. The DLST addressed the issues encountered during the pandemic regarding the ICT in teaching and learning and included recommendations on the measures, among others, to be implemented to facilitate the provision of blended learning at the University.

HEIs took their own initiatives to implement ICT-related projects to improve teaching and learning. However, this approach led to random adoption of different systems and standards which might result in unnecessary duplication of effort and loss of potential synergies. The level of integration of ICT also varied at the different HEIs.

As of December 2021, the Ministry did not carry out a review of the initiatives taken by the different HEIs with respect to the integration of ICT in teaching and learning to identify inefficiencies and ineffectiveness.

In its reply, the Ministry stated that it is currently looking at means for a harmonised integration of ICT into education services whereby ongoing and new elements such as common admission platform, common digital platform for online education, technology enabled learning, training to academics and adoption of an Open Educational Resources (OER) Policy for availing of online resources, including teaching materials would be considered.

SECTION B

ICT FOR EDUCATION IN PRIMARY SCHOOLS

B.1 Introduction

The Ministry had implemented various ICT projects in schools such as the Sankoré project from Grade 4 to 6 with the installation of digital interactive projectors in classes as early as 2011. As from 2018, the Early Digital Learning Programme (EDLP) was implemented.

This section examined how well ICT was integrated in teaching and learning with the implementation of these ventures.

B.2 The Early Digital Learning Programme

The Early Digital Learning Programme (EDLP) is a project that aims to encourage an early culture of IT usage and practice to enhance primary education. The project was part of the NYCBE reform. It started in March 2017 with completion scheduled by March 2022. The initial project cost was estimated at US \$ 22.4 million comprising a foreign grant of US \$ 14 million and a matching grant of US \$ 8.4 million. It has been carried out phase-wise.

B.2.2 Issues in the Implementation of EDLP

The different aspects of the EDLP were examined to determine how well ICT was integrated into teaching and learning. Issues relating to the usage of tablets, training of educators, monitoring and evaluation were noted.

B.2.2.1 Usage of Tablets for Teaching and Learning

(i) Absence of guidelines on the usage of Tablets

Devices provided to pupils and teachers when used, help to enhance teaching and learning. However, there were no guidelines on the number of hours tablets should be used in class. In almost all schools, they were used at least twice weekly, and on average one to two hours were spent on each subject, every week. In some schools, the devices were put to use on a daily basis and up to four hours or more were spent every week on each subject taught. Lesser times were spent on the tablets for Asian languages, Arabic and Kréol Morisien (KM) as not all classrooms, where these were taught, were equipped with projectors.

During meetings with school personnel, it was explained that following advice from the Health and Safety Directorate, educators and students should not employ the tablets for more than one hour at a stretch so that the eyesight and hearing of users are not affected. Documentary evidence in the form of health and safety standards and good practice to support this advice but could not be produced for audit examination.

Health and safety of users of ICT devices are very important. ICT for education helps students to develop self-learning which in turn fosters and nurtures different competencies or skills like

creativity, critical thinking, adaptability, ability to work collaboratively and good communications skills, among others. To derive these benefits, devices must be used but not to the detriment of the health of users. By setting minimum and maximum times for ICT use in the classroom, a balance between the benefits of ICT usage and health can be maintained. However, as of December 2021, the Ministry did not formally instruct school personnel on the number of hours devices should be employed as a tool for teaching and learning in each subject on any school day.

The Ministry informed NAO that usage time of EDLP in classrooms is being determined by Teachers and Headmasters at the level of schools, depending on the ability and learning pace of students and the existing curriculum. It also informed that consultations are being held with the Director of Health and Wellness to work out a policy with a view to standardise the usage time. The Ministry further added that the E-education and Health and Wellness Directorates will collaborate to come up with a set of guidelines usage of tablets.

(ii) Distribution, collection and charging of Tablets

Tablets need to be charged and distributed before each day's use. Zones reported that classes with fewer students tended to use the tablets more than those with a larger number of pupils. A lesser number of kids implied less time to remove devices from rack/cart chargers for distribution at the start of the day and for collection, for connection to the chargers at the end of the day.

During school visits, the cyclical collection, charging and distribution of devices was described as time-consuming and represented a challenge to managing time effectively. This impacted on the use of tablets. Practical measures suggested by the Ministry during meetings with school personnel to resolve this issue with the help of ICT Support Officers (ICTSO) were not followed.

In its reply, the Ministry stated that the recommendation of the NAO to use the collaboration of Support Teachers for the distribution of tablets will be considered.

B.2.2.2 Replicated Textbooks Materials

Zone directorates and educators reported that except for widgets, audio and videos, all other materials pre-loaded on the tablets were a replication of printed textbooks materials. They explained that although the widgets and audio and videos made lessons more interesting, there were not enough new activities on the devices that can help develop other competencies or skills like critical or creative thinking in the child. According to the methodology used by MIE for the preparation of digital content, the videos and widgets that opened up interactive learning resources, audio files and picture galleries were *embedded into the MIE textbooks*. Thus, the e-books uploaded on the tablets were mainly textbook materials, but enhanced with newly prepared digital resources.

Quality digital pedagogical contents help to develop creativity and cultivate new skills as they spark students' engagement with new ways to learn, flex their imaginations, prod them to create, analyse and evaluate, and encourage them to solve problems. However, the replication of the textbooks materials on the digital medium was not satisfactory as they did not help to cultivate new skills as reported by zone directorates and educators. The Ministry did not specify the requirements and qualities for the digital content to be prepared for the EDLP.

Criteria (shown in italics, below) for quality digital learning resources can be categorised under four domains (shown in bold).

- **Instruction** should be *focused, engaging, and informative*;
- **Content** presented should be *accurate, adequate, and appropriate*;
- **Technology** features should be *purposeful, reliable, and accessible*; and
- **Design** of the resource should be *motivating, clear, and user-friendly*.

Details on these criteria are provided Appendix III.

The MIE applied the ADDIE model for the creation of digital learning resources. As from the development phase of this framework, testing and evaluation of the resources created need to be carried out. Instructional designers hand their materials to the educators and train them on how to use the course materials, guide them on the learning outcome, and familiarise them with the process. Educators and students, future users of the materials need to be included in these procedures that serve to assess how well the curriculum works for them and to ensure that the course meets the learning objectives. Testing and evaluation carried out by MIE were not complete as both educators and students were excluded during these important steps. They were carried out internally between MIE development teams and academics only. Thus, the digital contents were not thoroughly tested and evaluated before being finalised, published and submitted for uploading on digital media. The MIE explained that it had to work on tight deadlines and with limited human resources. It was thus, impossible to test and evaluate newly created learning resources with educators and learners.

A key ingredient in the quality of digital educational content is the level of media material (audio, video, animations and simulations) involved. Educators reported that the media material on the EDLP tablets was not sufficient. MIE explained that it faced several constraints in the preparation of quality digital learning resources like high staff turnover; too few staff working for the EDLP project borrowed from the Ministry (on secondment), and hardware and software issues – equipment used was not high-end. MIE, further, added that the impact on learners depended on how teachers had deployed the digital resources during their class lessons. Hence, evaluation of both digital content and the use of ICT in education programme or project as a whole are essential. These are elaborated in paragraph B 2.2.3.

In this reply, the Ministry that improvements in content development are being made gradually since the implementation of Phase I of the EDLP in 2018, with a view to enhancing learning experience. The MIE and MGI are developing more interactive contents for Grade 5.

B.2.2.3 Supervision, Monitoring and Evaluation

It is important to supervise, monitor and evaluate the use of ICT at the school level to ensure whether it is effectively enhancing teaching and learning. The supervision and monitoring of EDLP-related activities were carried out by school management and zone inspectors mainly through visits to classrooms and discussions with educators. The supervision and monitoring activities were however limited as they focused mostly on the logistics deployed, their usage, maintenance and repairs. Issues relating to electrification, internet connectivity, tablets (e.g. shortage/excess, movement/transfer, periods being utilised and for what subjects taught), rack chargers and projectors were noted and reported to the concerned parties for remedial action when needed. They also looked at the different levels of interventions made (by ICTSO, ICT

technicians and the Internet Service Provider) to resolve any technical problem, follow-up of repairs reported to the service centres and maintenance of the equipment. The number of trained educators for teaching at the school was also monitored.

Digital technology brings a new dimension to teaching and learning. Technology advocates describe a range of potential impacts that ICT can have when applied to education. These include:

- *Student outcomes* such as increased knowledge of school subjects, improved attitudes about learning, promotion of critical thinking, communication, collaboration, and/or creativity, and the acquisition of other skills needed for a developing economy. Beyond learning outcomes, ICT may help close the gender gap and help students with special needs.
- *Teacher and classroom outcomes* such as the development of teachers' technology skills and knowledge of new pedagogical approaches, as well as improved mastery of content and attitudes toward teaching.
- *Other outcomes* such as increased innovativeness in schools.

Value for money is obtained in ICT for education endeavours when the aforementioned are realised. Proper monitoring and supervision in the use of ICT help to assess whether the outcomes have been realised. However, school management teams and zone inspectorate did not sufficiently and deeply discuss pedagogical issues with the teachers and did not gather and analyse feedback from learners during their visits to classrooms. This monitoring cannot help to bring an enhanced teaching and learning, which is the main purpose of using technology for education under the EDLP. More importantly, an evaluation of the EDLP was not done.

The MIE, in mid-2021, took the initiative to carry an evaluation of how EDLP had impacted on teaching and learning of numeracy and literacy at classroom level by probing the personal experiences of Grades 2 and 3 teachers and students in 24 selected primary schools in Mauritius. The exercise undertaken by CODL, estimated at Rs 1.3 million, started in August 2021. Its objectives were to study how technology was harnessed in terms of learning experiences for enhancing the academic performance of these students by focussing on:

- Classroom dynamics in EDLP classrooms;
- Examining students' performances in EDLP classes; and
- Reporting on opportunities and challenges in EDLP classes.

As of December 2021, the exercise was hampered by the COVID-19 pandemic that brought intermittent school closures. The CODL intends to resume same in 2022 when the required resources are made available to the research team. No such exercise had ever been carried out by the MIE before.

There was no indication when the evaluation exercise would be completed.

The Ministry informed that the MIE initiated evaluation of the EDLP would be carried out once funds are secured for the activity and the recruitment of a research assistant.

B.2.2.4 Continuous Evaluation of Digital Contents

It is important to continuously evaluate the digital content to ascertain its effective use and for amending/replacing any content that is not impacting student learning. By identifying, collecting and analysing specific data relating to criteria for quality content under their four domains: Instructions, Content, Technology and Design as described in paragraph B.2.2.2, Educators, School Management and Inspectors can assist with the evaluation of the following:

- *Teacher use.* Are teachers using the digital content? Are they satisfied with their quality? Are they able to implement them into their instruction? Do they have the proper training to use digital content effectively?
- *Student perceptions.* Do students find the contents useful, interesting, engaging and valuable? Is the content package meeting the learning needs of each student?
- *Implementation.* If the content includes recommended pedagogical approaches, are those approaches being implemented with fidelity? Are there any barriers that are preventing application with conformity?
- *Outcomes:* Is the content package meeting outcomes that were initially identified?

However, school administrators, the inspectorate cadre and educators did not carry out the continuous evaluation of digital content.

B.2.2.5 Training and Follow Up

Educators were required to undertake formal training to ensure they were proficient in the use of ICT and were able to use it effectively within the classroom setting to improve the development of pupils' ICT capability. The Ministry provided one-off training to educators in 2017 on the use of tablets for the grades they would be teaching. On movement of each teacher from one grade to another, he/she was trained again for the next grade. From 2017 through 2021, MIE and MGI conducted training for school personnel as detailed in Table 2.

Table 2 Training on the Use of Tablets for School Personnel from 2017 to 2021

Year	Grade	Inspector cadre	HM/DHM	Educator	Arabic	KM	HEP	Support teacher	ICTSO
2017		72	270	597		226			148
2018	1,2	5	48	1,253	91		14	12	11
2019	1,2,3			466	98				
2020	1, 2, 3			415					
2021	4			450					
Total		77	318	3,181	189	226	14	12	159

Source: Ministry/MIE Records

The teachers were empowered to use the different hardware components and software, especially the functionalities of the Class Management System (CMS)⁶. The main aim of the training was to help integrate the CMS into teachers' daily teaching and learning routine. A refresher course was conducted in August 2021.

However, the following issues were noted:

- As of December 2021, all educators of Grades 1 to 4 were trained.
- The CMS is an important component of the EDLP in Grade 4. However, HM/DHMs and school inspectors were not trained on the use of this software. The involvement of these officers in the process is imperative for effective teaching and learning at this grade.

It is necessary to gauge the effectiveness of the training given to ensure that the knowledge gathered and know-how developed during the training sessions were applied in classroom situations. It is a practice for the MIE to support educators in real-life situations through follow-up school visits following requests received from HMs or educators, or MIE's requests to schools to allow and organise such visits. However, this activity was not carried out during the last two years due to insufficient manpower at the MIE. Hence, the effectiveness of the training dispensed to educators could not be assessed.

The Ministry informed that in the years 2017 and 2018, all HM/DHM and School Inspectors were trained on the monitoring and use of EDLP at schools. It is also planning to carry out trainings for newly appointed HM/DHM and School Inspectors and a refresher session for all HM/DHM and School Inspectors in post this year.

The Ministry is working on a project to build capacity within the proposed education hub to encourage peer learning and development of a community of good practice across schools. The MIE is also constantly improving training offers and has designed micro-learning modules targeted for the inspectors which will be implemented shortly. It will also be requested to organise regular visits and provide real time assistance to teachers.

B. 2.2.6 ICT for Education in Special Education Needs Institutions

Special Education Needs (SEN) students were not in the scope of the EDLP project. However, SEN institutions were provided with numerous ICT facilities that included PCs, laptop, tablets, interactive whiteboards, projectors and audio-visual materials. The Ministry explained that tablets were used as assisting devices on which academic games, songs and short stories were downloaded. They helped to develop eye-hand coordination, fine motor skills and observational skills. They were useful in personalising learning for pupils through various applications. Learners with different needs were catered for through the use of appropriate and selective pedagogical tools available.

⁶ The CMS allows the possibility of file sharing and local repository of files and resources; pushing of assessment on learner's device; providing feedback for learners; providing analytics on teacher's console about learners' progress; providing analytics on usage of both pupils and educators; a high-level monitoring at zone and Ministry levels through analytics via centralised reports; and students to access the CMS from home on any device on which they can do their homework. The CMS works with Wi-Fi connectivity. As in Agalega no Wi-Fi is available in classrooms, Grade 4 educators and pupils are deprived of the above features. They can only use the digital contents loaded on their devices.

The Ministry informed that is considering to digitalise teaching and learning for blind learners and learners with print disability.

B.3 Digitalisation at Upper Primary

As from the year 2020, the EDLP was extended to Grade 4 classrooms. This grade benefitted from the use of digital technology under the Sankoré Project prior to the introduction of the EDLP.

The Sankoré Project consisted of the digitisation of classrooms with the introduction and use of low-cost technological equipment such as laptops and interactive projectors. Along with the hardware received as donations, schools were provided with CDs holding e-learning materials produced by the MIE. From the period 2011 to 2018, some Rs 67.4 million were invested by the Ministry for the acquisition of hardware and their maintenance, preparation of digital content and training. With the implementation of EDLP in Grade 4, equipment acquired under the Sankoré Project that was still functioning were transferred to Grades 5 and 6 classrooms.⁷

The following weaknesses associated with the Sankoré project were noted from visits to selected primary schools in Zone 1.

- No records were kept on the use of Sankoré equipment.
- Some projectors were used to display the e-books only as their interactive feature was not functional. In some schools, equipment was not being used at all.
- A recent survey carried out in May 2021 in Zone 1 revealed 35 faulty Sankoré equipment at 23 schools.

The weaknesses indicated that there was no proper follow-up to ensure the effective use of these equipment for teaching and learning.

⁷ A policy decision was taken in 2019 to phase out the Sankoré Project in Grade 4 classes as over 75 percent of projectors dated from more than five years and were reaching end of life. A replacement policy was in place for projectors having reached their lifetime until June 2020. Sankoré equipment were still in use in Grades 5 and 6.

SECTION C

ICT FOR EDUCATION IN SECONDARY SCHOOLS

C.1 Introduction

ICT at the secondary education level dates back to the mid-1990s when ICT was introduced as a subject of study. Since then, secondary schools have been constantly upgrading their ICT facilities. This section examined measures taken in secondary schools with respect to the use of ICT in enhancing teaching and learning.

C.2 ICT for Education at Secondary School Level

To support the use of technology as a medium for teaching and learning in secondary schools, an appropriate ICT infrastructure is necessary. The Ministry undertook several projects to this end as early as 2013, like the Tablet PC and School Net II Projects. However, these projects were not successfully implemented and/or completed. These endeavours have been the subject of criticism in my previous audit reports. As of December 2021, the required infrastructure mentioned above was still not available. This is not satisfactory as both educators and students have been deprived of the advantages of using digital technologies for teaching and learning for some eight years.⁸ Depriving both educators and students of these opportunities and facilities is not correct. The more so, upper secondary stage (Grades 10 to 13) serves as a preparatory ground for the higher tertiary level where ICT is extensively used.

However, the Ministry just started to undertake or envisage a few projects to create an environment conducive to the mode of teaching and learning where educators and students can use individual mobile devices on school wireless networks in any public secondary school classroom. These are briefly described below:

- *High-Speed Internet Connectivity (HSIC) project.* The Ministry in collaboration with MITCI was working on the deployment of a wide area network (WAN) for its secondary schools. The WAN will connect all state secondary schools including Mahatma Gandhi Secondary Schools, Private Secondary Education Authority- approved secondary schools in Mauritius and Rodrigues, MIE and six public libraries to the Government Online Centre (GOC). Wi-Fi access points will be installed so that users can access the internet throughout the whole school, e-learning platforms or repositories hosted either at the GOC or on external clouds locally and abroad. Funds have been secured for this important project and tender procedures have already been launched.
- *Technology-Enhanced Online Pedagogy (TOP) pilot project.* This is an experimental project to be carried out by the MIE in selected schools on the use of digital technologies coupled with innovative pedagogical approaches to enhance teaching and learning in the

⁸ ICT plays a key role in the transformation of education by enabling educators and students to move away from traditional approaches. It allows a shift from teacher-centred, task-orientated and memory-based education to an inclusive and integrated practice. Teachers can shift from teaching content to supporting and mentoring students who can work in increasingly diverse and flexible ways. Learners can study at their own pace, work collaboratively, develop shared practices, engage in meaningful contexts, and develop creative thinking and problem-solving skills. Refer to para. 2.9 also.

secondary school sector. The main objective of this project is to develop an online digital pedagogy model that can be applied in secondary schools.

- *Learning Management System (LMS)*. This system will support the blended mode of learning in all secondary schools by providing two-way interaction between teachers and students and consolidating the above pilot project.

These projects are all commendable.

The Ministry informed that bids for the HSIC project were under evaluation at the Central Procurement Board. It also stated that execution of the TOP and LMS projects depended on the provision of funds.

C.3 Student Support Programme

As from 2018, the only ICT-based facility offered to students of the secondary sector, more specifically those of Grades 7 to 9, has been the SSP. The SSP portal (<https://ssp.moemu.org>) provides additional pedagogical resources in terms of audios and videos, supplementary notes, self-assessment questions and links to relevant websites to students to empower them to consolidate their learning. During the 2020 lockdown period, resources for Grades 10 and 11 were also prepared and uploaded on the portal. By using a student-centred approach, the facility helps students to become autonomous self-learners.

As of December 2021, the Ministry spent some Rs 39.3 million to operate the portal. However, there was no information available at the Ministry on whether the materials available on the website have enriched the learning experience of students or if the platform has enhanced their studies. The portal allows the possibility for visitors to send their feedback but these could not be made available to audit. There was also no evidence of any evaluation carried out by the QAID of the Ministry or by MIE on the quality and effectiveness of materials posted on the portal.

C.4 Quality Assurance on Teaching and Learning through ICT

The Ministry has a Quality Assurance and Inspectorate Division which is responsible to provide external assurance on the quality of education in secondary schools. The division uses a quality assurance framework complemented by a handbook for quality assurance exercises to carry out its functions. These materials were also made available to schools to carry their self- evaluations.

The evaluation tools used by QAID did not cover teaching and learning through ICT use. Instead, they provided performance indicators relating to the effective use of appropriate technological tools to manage and manipulate instructional and administrative information. Hence, there were no procedures for school self-evaluation and for external evaluation by the division on the use of ICT for teaching and learning.

The Ministry informed that appropriate training of teaching personnel and Quality Assurance officers would be planned after a duly carried out Training Needs Analysis in respect of external assurance on teaching and learning through ICT use.

SECTION D

ICT FOR HIGHER EDUCATION

D.1 Introduction

The use of ICT has become an integral part of the teaching and learning process at Higher Education Institutions (HEIs). Over the years HEIs have taken numerous initiatives to integrate ICT in education to enhance teaching and learning. The level of integration of ICT in education at HEIs ranged from low to high and impacted the educational processes in different ways.

In this section, the audit focused on the online/blended mode of teaching and learning in HEIs due to the intensive use of ICT tools in the delivery of online programmes.

D.2 Shift from Face to Face to Online Mode of Teaching

Out of some 22,000 students who were enrolled in the four main public HEIs, namely UoM, UdM, UTM and OU, some 10,000 were following courses on a distance learning mode at UoM and OU only. Both universities built an ICT ecosystem to support the proper delivery of distance learning courses. The remaining 53 per cent of students followed full-time and part-time courses which were traditionally held in a face-to-face mode using ICT tools such as PowerPoint presentations, videos and projectors as an aid to enhance teaching and learning.

For distance learning courses, students also needed to be equipped with adequate ICT facilities to access all materials uploaded on the online learning platform.

With the outbreak of the pandemic and to ensure continuity in education in the year 2020/2021, some 13,000 students that were previously following courses on a face to face mode had to shift to the online mode of learning. Shifting to the online mode of teaching and learning requires the extensive use of ICT tools. At OU and to a lesser extent UoM, the shift continued without major interruption as they already had an ICT ecosystem to support online courses. At UdM and UTM however, they faced several challenges to conduct courses online as they did not have an appropriate ICT ecosystem to support academics and students in this new mode of teaching and learning.

The effectiveness of online teaching and learning strategies was conditioned by the readiness of technology, continuous training for academics and students to use the Learning Management Systems (LMS), adequate connectivity and suitable monitoring of the quality of online courses delivered. These aspects were examined and the issues noted are described in paragraphs D.2.1 to D.2.5.

D. 2.1 Learning Management Systems

A Learning Management System (LMS) is a software application for the administration, documentation, tracking, reporting, automation, and delivery of educational courses, training programs, or learning and development programs to assist in the teaching-learning process and helps in the effective delivery of instruction and training. LMS facilitates instructors, learners and administrators by providing an environment for learning and teaching without the

restriction of time and distance in the teaching and learning process. HEIs have had recourse to free open-source learning platforms to ensure continuity in the delivery of lectures. They used cloud-based LMS and other collaborative platforms that support live-video communication, amongst others, for the conduct of online classes. The LMS used by HEIs were not customised to meet their requirements.

Licensed LMS offered customer support and reliability for users. HEIs were faced with the limitations of the open LMS such as no formal support systems in case of a problem arising, incompatibility with third-party plug-ins offered by external developers, the quality issues of user interface, and low levels of analytics. For example, at UTM, one major challenge when using the LMS was how to simulate the usage of markers on whiteboards which required a special tablet/digital plate to write on, for it to be projected. LMS also reduced the level of interaction between academics and students. Student-teacher interaction greatly influences the student's skill to perform well at university and connect with peers. Academics needed to ensure that students understood what was delivered through proper feedback mechanisms such as forums, chat services, online assessment, and video conferences. For example, UoM identified the need for interactive teaching with videos, presenting 3D objects and documents, minimising disturbance, improving clarity, writing mathematical formulae and solving equations that were not available with the open LMS.

The Ministry informed that it is coming up with a common teaching and learning MIS for HEIs to share resources and improve the quality of their online teaching and learning. The common platform will enable sharing of lecture materials and will be beneficial to students too, while being an extension of the online teaching platforms already existing at primary and secondary levels.

D.2.2 Training to Academics

Full participation of academics in adopting new technologies to enhance education required HEIs to commit to quality education and ongoing professional development for academics. Significant changes in the mode of teaching and learning due to the COVID-19 pandemic prompted academics to use online platforms for the continuity of classes. E-learning included delivery of online educational materials as well as all the pedagogical aspect in the preparation and delivery of materials. It also implied well-formed and trained academics since doing a course in distant/online mode is completely different from classroom teaching. To conduct successful online teaching, academics required essential new skills such as interaction, management, instructional design, technology and content knowledge and support skills. A survey carried out by UNESCO⁹ in April 2021 revealed that there was a significant need to help academics to adjust to new virtual modes of teaching, specifically the need for academic training in online and distance learning.

Different types of training were dispensed to academics at the different HEIs to support online teaching. However, they still faced challenges in conducting online courses.

⁹ COVID-19: reopening and reimagining universities, survey on higher education through the UNESCO National Commissions. The report attempts to assess the impact of the pandemic on the higher education system in terms of access to education, equity and quality of teaching and learning, university operations, national challenges, emerging issues and strategic responses. The purpose of the survey was to provide an evidence-based overview of the current situation of the higher education system at the national and global levels by analysing the impact of COVID-19 on the different actors and stakeholders in the education sector. The survey was distributed to 193 UNESCO Member States and 11 Associate Members, of which Mauritius is a member, and was available online between 15 December 2020 and 12 February 2021.

For example, academics at UoM requested continuous training in the pedagogies used in online teaching and on the tools to be used for effective management and delivery of online teachings such as training to adapt teaching materials, better comprehension of the use of video communication software and strategies or methods for making online classes more interactive¹⁰.

At UTM, on the other hand, academics reported that they faced difficulties in adjusting to the new ways of working, received insufficient support both at the institutional and IT level and also have had to balance their teaching preferences with the available technology.

A gap analysis on training needs to conduct online courses was not carried out to identify the new skills and knowledge required for effective online teaching by academics that would allow HEIs to organise targeted training for academics, enabling them to align pedagogy and technology to the benefit of their learners.

The Ministry explained that HEC has signed an agreement with the Commonwealth of Learning (COL) for the latter to provide technical assistance to develop a Technology Enabled Learning Strategy for HEIs. Several aspects, including capacity building, will be considered.

D.2.3 Connectivity Challenges

Connectivity is crucial for educators to integrate technological advancements into teaching methods. Internet access has become more than just a useful resource. From online live lectures and webinars to e-Books and other online resources, the Internet has become a powerful teaching tool in education. Students and academics cannot take advantage of the opportunities to connect and engage globally or leverage high-quality learning resources without consistent and reliable access to the Internet¹¹.

In the National Education and Human Resources Strategy Plan 2008 – 2020, it was mentioned that HEIs and their campuses would be transformed into Wi-Fi zones to support teaching and learning as well as research. The National Broadband Policy 2012-2020 also proposed policy measures in the education sector where broadband could improve the flow of educational information, allowing academics, parents and organizations to make better decisions tied to each student's needs and abilities. In its Strategic Vision 2018-2021, the Ministry highlighted that it was essential for students to have access to high-speed internet connectivity everywhere on campus and not only in specific areas.

With the increasing implementation of the blended mode of teaching, students were expected to be able to connect to their education resources anytime, anywhere. Adequate bandwidth was required for the effective delivery of online courses at HEIs. However, the level of connectivity varied at the different HEIs. They could not avail of the same connectivity facilities. For example, at UoM a bandwidth of 780 Mbps was available, while at OU and UdM 100 Mbps was available. Six lines of 30 Mbps each were available at UTM. The latter reported that it was unable to maintain the network infrastructure (Wi-Fi, Wired, etc.) regularly due to financial constraints. Academics also complained of inadequate internet

¹⁰ Assessing the Technology- Enabled Methods of Teaching and Learning at the University of Mauritius. Academic and Student Surveys Report 2020. University of Mauritius Quality Assurance Office.

¹¹ National Education Technology Plan, Infrastructure - Office of Educational Technology, US Department of Education, January 2017

connectivity on the campus during and post the pandemic¹². Bandwidth/ internet connectivity at UdM was also insufficient to dispense online courses.

As of December 2021, inadequate internet connection still remained a major challenge for HEIs to carry out online teaching.

The Ministry stated that HEIs required significant investment for improving connectivity. HEIs need to prioritise their projects accordingly to focus on connectivity problems.

D.2.4 Support to Students

HEIs should ensure that students are provided with orientation, training and continuous support to effectively use the online learning systems and to develop self-directed learning skills in engaging in an online learning environment.¹³

The four main HEIs carried out surveys to capture the learning experience of academics and students with the implementation of online learning during the first lock-down period in 2020. The main findings in the surveys were as follows:

- Students taking exams had issues with the scanning and uploading of their scripts due to limited IT facilities;
- Limited internet access;
- Sharing of laptops with family members at the same time of class lessons;
- Students requested IT facilities and software related to their courses;
- Limited interaction with academics.

HEIs started to initiate actions to address the shortcomings noted in the survey. At UoM for example, it was envisaged to develop a Learner Support Strategy for online learning and partnership with IT suppliers to provide students with several IT Equipment at a more affordable price. (For example, Webcam, Microphone, Headset).

As from April 2021, UTM adopted a “Bring Your Own Device (BYOD)” approach whereby students were required to bring their own ICT devices to facilitate the blended mode of teaching and learning.

D.2.5 Digital Divide

Shifting online might give way to digital divide¹⁴, that is, the gap between students who had access to the Internet and devices at HEIs and home and those who did not. Adequate facilities and resources were not available at HEIs to minimise the digital divide. Following a survey carried out by the Higher Education Commission in 2021, one in five HEIs reported that not all of their students had access to online learning, lectures and other support. The digital divide

¹² Report of the Evaluation of the Effectiveness of Blended Learning Experiences at University of Technology, Mauritius in the Lockdown/Post-Lockdown Period of COVID-19, December 2020. Dr K. R. Thomas, Dr H. Chitto, Dr P. Ramseook-Munhurrun, Dr V. Armoogum, Dr S. Sunhaloo

¹³ COL (2020). Guidelines on Distance Education during COVID – 19. Burnaby: COL.

¹⁴ Digital divide referred to the gap between students who had access to the Internet and devices at school and home and those who did not. National Education Technology Plan, Infrastructure - Office of Educational Technology, US Department of Education.

considerably hindered efforts by HEIs to shift to online teaching and learning mode¹⁵. The digital divide would be minimised when all students and staff have access to the same basic facilities such as laptops and high-speed Wi-Fi.

The Ministry informed that appropriate remedial actions will be recommended for any discrepancies noted, including digital divide.

D.3 Open Educational Resources

Open Educational Resources are digital learning resources offered online freely to academics, educators, students, and independent learners in order to be used, shared, combined, adapted, and expanded in teaching, learning and research. OER includes learning content, software tools to develop, use and distribute content, and implementation resources such as open licences which contribute to widening access, improving cost efficiency and the quality of teaching and learning outcomes. It also has the capacity to combat inequality in education in line with SDG 4 and encouraged sharing, cooperation and collaboration between learners and academics across the world.

Since 2012, the need to set up a common platform for OER in Mauritius, for harmonisation, ease of access and to provide quality teaching and learning for all¹⁶ was highlighted in the African regional consultation report to develop policies around OER. Within Commonwealth Africa, national OER policies had been developed in South Africa and Seychelles for example. Also, institutional OER policies were already in place in many institutions in Africa including the University of South Africa, the National Open University of Nigeria and the Open University of Tanzania. However, as of December 2021, a national OER policy had still not been developed. Additionally, more than 65 per cent of HEIs (public and private) acknowledged that they did not have an OER policy at the level of their institution¹⁷. HEIs were thus faced with the challenge of providing interactive and motivating educational experiences following the closure of their institutions.

The Ministry explained that it is developing a National OER Policy in collaboration with the COL which is expected to be finalised by July 2022. Thereafter, each HEI will be requested to align their institutional strategic directions with the National OER policy.

¹⁵ Framework for building Resilience in HEIs, May 2021. Higher Education Commission. (Accessed Online: Higher Education Commission (hec.mu).

¹⁶ Extract from the African regional consultation report to develop policies around Open Educational Resources with the help of COL and UNESCO. The theme of the regional consultation was “OER for Inclusive and Equitable Quality Education: From Commitment to Action. March 2017.

¹⁷ Extract from the Framework for building Resilience in HEIs developed by the HEC based on online surveys carried out to assess the effects of the pandemic on the higher education sector in May 2021.

SECTION E

USE OF ICT FOR EDUCATION UNDER COVID-19 PANDEMIC CONDITIONS

E.1 Introduction

Due to the COVID-19 pandemic in early 2020, the education sector was severely affected. Schools were closed due to lockdown measures. Parents were worried about their children missing out on education. The COVID-19 crisis changed the way schools and classes worked.

In Mauritius, Government responded by taking several measures focussing on the use of ICT to ensure continuity in education. The COVID-19 Miscellaneous Provisions Act 2020 was enacted and brought into effect the expanded and mandatory use of digital online and offline technologies to ensure uninterrupted learning for students in the context of any situation of the extended closure of schools. Different modes for teaching and learning were used for primary and secondary schools' students, for example, TV broadcasts, online platforms, in-presence, staggered classes and a blend of these different approaches.

The initiatives taken for the continuity of classes by the Ministry were commendable. When the pandemic hit in 2020, the Ministry, teachers, students and parents had very little time to prepare for distance learning. The home became the 'classroom' and all struggled to adjust to the 'new normal'.

In this section, the measures taken by the Ministry to use ICT to support teaching and learning during the pandemic are examined.

E.2 Primary Sector

During the pandemic the Ministry took the following initiatives for the primary sector:

- Broadcast of educational videos on the national television for students of Grades 1 to 6;
- Educational videos for Grades 1 to 6 uploaded onto the Ministry's website and SSP portal, in 2021; and
- Distribution of learning packs prepared by educators to Grades 1 – 6 students as from January 2022.

In the year 2020, 98.4 per cent of households had a television set; 17.1 per cent had more than one TV set.¹⁸ Hence, television was an important media channel on which primary school (and also Grades 7 – 9) students could follow educational broadcasts. However, there are many factors that can affect or influence attending 'classes' in front of the TV screen: power cuts, availability of a functional TV set, non-interest due to fatigue and competition between family

¹⁸ Statistics Mauritius (SM) Continuous Multi-Purpose Household Survey, 2020. This survey is held every two years. With the outbreak of the COVID-19 pandemic, in March 2020, data collection was discontinued as from April 2020. Therefore, the 2020 estimates were based on responses from 2,815 households only (compared to 5,640 in 2018), but according to SM can be relied upon based on sampling variability measures.

members for viewing TV programmes especially when only one set is available at home, among others.

It was noted that, as of December 2021, a survey among school children, parents and teachers was not carried out by the Ministry to understand the extent of education continuity among school children and why some children did not engage in any learning during the school closures using this mode of learning.

Lessons followed on TV or on the SSP portal also deprived students and educators of any interaction. This contact is an essential aspect of education and needs to be present whatever the teaching and learning mode.

During the past two years and up to December 2021, the Ministry did not sufficiently explore ways to make teaching and learning via TV more interactive. It, also, neither provided support to students, parents/caregivers and educators nor enabled two-way communication and feedback that could help to make TV programmes impactful. According to the World Bank, several countries followed different approaches to improve interactions when using educational television programmes to respond to the COVID-19 pandemic.

A few of these methods are briefly described:

- *Live broadcasts.* These involved recording an educator teaching a live lesson in a staged classroom setting and broadcasting the recorded lesson on television (e.g. Morocco, Spain, and South Africa). The live lessons were made more interactive by the teacher answering questions that were collected by phone calls, text messages, email or social media. Another way to make programming interactive was to have teachers ask questions during lessons requiring students to respond in real-time. A Short Message Service short code was set up to provide automated responses to students in real time.
- *Technical support* was provided through a toll-free helpline, email and/or chatbots¹⁹. For *pedagogical support*, teachers were leveraged to support students (e.g. China).
- *Socio-emotional support:* Learning through educational television is difficult for students, educators and parents/caregivers. Providing socio-emotional support is important. In Jamaica, helplines were dedicated to support them.
- *Feedback.* To understand effectiveness in real-time as well as continuously improve the effectiveness of educational TV programming and increase its uptake, it is important to enable two-way communication and receive continuous feedback and insights from users (For example, China, Russia).

There was no evidence that such practices, experiences and pragmatic insights from these countries had been considered by the Ministry.

The Ministry has taken note of the various approaches recommended by the NAO to make teaching and learning via the TV more interactive.

¹⁹ A chatbot or chatterbot is a software application used to conduct an online chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent.

E.3 Secondary Sector

For the secondary sector, the following initiatives were taken by the Ministry:

➤ *Lower secondary (Grades 7 – 9)*

- The SSP portal was available.
- SSP contents were aired on the national television channels, especially for students not having internet facilities and/or devices at home to access the SSP portal.

➤ *Upper secondary (Grades 10 – 13)*

- During the 2020 lockdown period (mid-March 2020 till the end of May 2020), resources for Grades 10 and 11 were prepared and offered on the SSP portal. SSP contents for these grades were also available in 2021.
- Online classes were held. The Ministry recommended the use of Microsoft Teams²⁰ following an existing collaboration with Microsoft. Credentials were created for educators and students, and had to sign in to Office 365²¹;
- The Ministry renewed and upgraded Microsoft licenses to provide more features and value by moving to Cloud with some 100,000 full licenses that could be installed on student devices. Logins were used by all educators to connect online with their respective students. In the first model, no logins were used. The upgraded model permitted full and secure collaboration;
- Educators were trained in the use of Microsoft Teams and were provided with online and offline tutorials;
- Videos for students to focus on specific issues encountered were prepared and posted on the Ministry’s website;
- Teachers were allowed to use any other video conferencing or content sharing tool of their choice, provided teaching and learning took place;
- Guides, “Do’s and Don’ts” including tips for both teachers and learners were posted on the Ministry’s website; and

²⁰ Microsoft Teams is a videoconferencing and full collaboration platform. It allows secure communication (including supervised chat for students), makes learning engaging (using Microsoft Office and other apps, websites, and content, engaging assignments can be created and learning experiences customised), supports all types of learning (through insights the teacher can make connections to support each student with built-in tools that help connect student wellbeing to day-to-day class activities), learning from anywhere (it is available on any device and has features designed to make students feel included), recording of classes so students can revisit content at their own pace and supports student progress by tracking individual student and class progress with built-in insights that help the educator to proactively identify at-risk students and take action to improve outcomes (extracted and adapted from microsoft.com).

²¹ Office 365 Education is a free suite of hosted Microsoft services and applications that is intended for educational needs. The program provides teachers and learners with a set of hosted collaboration services, communication tools, and mobile, desktop, and web-based applications, as well as data storage capabilities. Forming part of Microsoft Education Solutions, the suite includes several Microsoft applications for collaboration.

- Students whose parents were on the Social Register Mauritius (SRM) were provided with tablets and free internet broadband. As of 30 June 2021, 533 tablets were distributed to students in Grades 10 to 13 for families on the existing SRM.

The Ministry also made available on its website a compilation of online platforms and organisations (with respective links) that offered educational resources to complement teaching and learning. The platforms listed provided resources for all age groups, from the primary to tertiary levels, including Technical and Vocational Education and Training and for Special Educational Needs students. A few provided information for parents also. Students and educators were invited to visit the pages and use the resources that were the most relevant and adapted to their class grades and their respective learner needs and approaches.

Availability of ICT Facilities: Online classes do allow a certain level of student-teacher interaction which is better than having none while watching the TV screen or connecting to the SSP portal. Online classes are dependent on the availability of ICT facilities – digital devices and internet connection – for both students and educators. The Ministry did not carry out a survey exercise to measure this availability at both ends and/or explore the possibility to run online classes for primary school students.

Absence of Statistics: As of December 2021, the number of students who could not follow educational TV broadcasts or access the SSP portal was not known. The number of educators and students who could not teach and learn through the online mode was also not known. The Ministry did not carry out a survey exercise to gauge these situations.

Training on the use of tablets to families on SRM: Students whose families were on the SRM had been provided with tablets and internet connection to follow online classes, in 2021. However, neither these students nor their parents had been trained on the use of the ICT devices.

E.4 Schools' Website not Updated

Every secondary school had its own website which is a useful medium for sharing educational materials. However, the websites were not used to good effect during school closure periods. An analysis of a sample of websites showed that the majority had not been updated since they were developed; a few were updated until 2018 only. When adequately developed, they can be used for running online classes for their educators and students, and can be used to track whether teaching and learning have taken place.

The Ministry explained that due to connectivity problems in secondary schools, websites were not updated. A project for revamping of websites is being considered at the level of GOC.

E. 5 Absence of Guidelines on Screen Time, Health and Wellness

The Ministry did not provide guidance to teachers and learners on screen time, health and wellbeing so that education can be pursued in the best possible manner.

For many students, during the time of the COVID-19 pandemic, distance learning was the new normal. Their classes were conducted on virtual-meeting platforms, or on their TV screens.

Indeed, screens were the only way for many young people to continue their education. Remote learning meant lots of screen time.

The main concern with screens is that people usually sit still while they watch or interact with them. A research study showed that kids who spend a lot of time on screens were more likely to have eye problems, weight problems and obesity, diabetes, heart disease and trouble with reading and language.²² They also were more likely to show a range of other mental health issues like depression. Another more recent study on screen time for learners²³ revealed that schools found that adopting a face-the-video approach in every lesson was tiring and repetitive for both educators and students. They reported physical difficulties including headaches, dry eyes and tiredness, as well as lower motivation for students.

Experts warn that time online should never get in the way of exercise and sleep time.²⁴ For proper learning, good health and general wellbeing, students need to tweak their study skills, manage not only when it's time to focus intently, but also when it's time to connect with others.

With the enduring pandemic, students in Mauritius faced and experienced different formats for learning – in-person classes, with rules for spacing and masks; online classes; and staggered classes, with students attending school on a part-time basis. The Ministry did not provide guidance to students and teachers on matters mentioned above when they study and teach outside of their classrooms.

The Ministry stated that the E-education and Health and Wellness Directorates will collaborate to come up with a set of guidelines for screen time.

E. 6 Absence of Guidelines for Parents

The Ministry did not formulate and offer guidelines to parents for the continued and effective learning of their children.

With distance education, especially during the COVID-19 crisis, the role of parents became more important and challenging than ever before. They were called to figure out and deal with the new normal by making adjustments for the whole family so that the learning of their wards could go on.

Parents were required to become learning facilitators for their children while at the same time providing psychological and other support. However, they were not provided with the necessary guidance on how to assist their children to follow the broadcast videos. They were

²² M.D. Guerrero, et al. "Canadian children's and youth's adherence to the 24-h movement guidelines during the COVID-19 pandemic: A decision tree analysis." *Journal of Sport and Health Science*. Vol. 9, July 2020.

Myopia (when distant objects look blurry) have been linked to screen time. Spending too much time looking at things close-up (e.g. a screen), human eyes do not get practice focusing on distant objects. Eye experts recommend looking away from a screen every 20 minutes to something at least 6 meters away. If one cannot get outside that often, looking out a window regularly should help. L. Yang et al. Trends in sedentary behaviour among the US population, 2001 – 2016. *Journal of the American Medical Association*. Vol. 321, April 2019.

²³ Screen time for learners: Making sense of the evidence and applying it in the classroom Cambridge Assessment International Education, UCLES December 2020.

²⁴ Guidelines for screen time by the WHO, released in 2019, targeted very young children aged four and less. The American Academy of Paediatrics (AAP) changed its screen time guidelines, in 2015, setting no limits, but recommended that screen time does not substitute for any sleep or active time. A summary of the AAP guidelines can be read at Appendix IV.

also not instructed on how to support their wards to follow lessons from the TV screen to their textbooks. Sitting for long periods in front of the TV set for educational lessons implied lengthy screen times.

With the internet making participation in school from home possible, another concern for some families could be getting access to this digital facility and computers or other devices. This can be exacerbated when the latter has to be shared between family members. These can be stressful for the whole family.

Within this context, parents needed to be properly informed and guided so that their children could continue their education in the best possible manner. The Ministry did not offer any guidelines for parents to this end.

The Ministry informed that an e-brochure will be designed to guide parents.

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CHAPTER FOUR

CONCLUSION

This Chapter concludes against the audit objective based on the analysis and findings supported by audit evidence as elaborated in the previous Chapter.

The COVID-19 pandemic has emphasised the importance of ICT in supporting teaching and learning to ensure continuity in education. Effective integration of ICT in education needs strategic planning. The Ministry took a laudable initiative in preparing a draft ICT strategic plan for ICT in education, but could not secure its approval. However, the Ministry has made much efforts to employ ICT for teaching and learning in the different education sectors. The primary level has benefitted the most in a very short period with the implementation of the EDLP, since 2018. In contrast, for nearly a decade, very few investments in ICT facilities have been made at the secondary level. This may be attributed to an inadequate ICT for education policy and the absence of strategic and other plans to drive ICT-related projects. Policy statements are limited; they do not even cover the full secondary cycle.

Whether teaching and learning have been enhanced through ICT usage is not known. Proper monitoring and evaluation exercises of ICT programmes and projects have not been conducted. The adequacy of ICT tools, training dispensed to educators, digital content developed and pedagogical practices have yet to be measured and assessed. Monitoring activities tend to focus on the technology instead of the applications of the technology for pedagogical achievements.

Measures taken by the Ministry during school closures were well-intentioned. While higher grade students could follow classes online that allowed a certain degree of interaction, lower grades pupils had to content with a one-way teaching mode in front of their TV and other ICT device screens. No attempt was made for the latter to have more interaction with their teachers using the EDLP facilities, from schools. This was not even explored.

Important guidelines for students studying at home and for their parents so that education can be pursued in the best possible manner were also not provided.

With the shift to online/blended mode of teaching and learning, HEIs have been using ICT intensively for the continuity of classes. Some HEIs have been facing challenges to use ICT to support online teaching and learning as they did not have a proper ICT ecosystem. The absence of an ICT strategic plan for the tertiary sector has led to the random adoption of ICT systems and standards by HEI. This may have resulted in a potential loss of synergies.

As COVID-19 conditions have lingered on, few improvements have been noted to distance education reflecting insufficient preparedness for the use of ICT to support teaching and learning and ensure continuity in education in all educational sectors.

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CHAPTER FIVE

RECOMMENDATIONS

This Chapter presents the recommendations based on the findings and conclusion.

5.1 Policy, Strategy and Plan for ICT for Education

- (i) The Ministry should improve its ICT policy to include all educational sectors.
- (ii) It is essential for the Ministry to develop an appropriate strategic plan for ICT for education to drive its education-related projects at all levels.

5.1.1 ICT Strategy for HEIs

- (i) The ICT strategic plan should include a strategy for HEIs to provide a framework for the development of ICT-related projects to support teaching and learning.
- (ii) The Ministry should encourage cooperation among HEIs through the establishment of a mechanism that fosters mutual collaboration among them and avoids duplication of efforts by offering incentives for shared activities.

5.2 ICT for Education in Primary Schools

5.2.1 Usage of tablets for teaching and learning

- (i) Minimum and maximum durations for using EDLP devices for teaching and learning in the classroom need to be worked out and set by the Ministry with the help of pedagogical and health experts. These parameters would ensure developing important skills and keeping good health.
- (ii) Provision could be made for a classroom equipped with a projector dedicated to lessons in the different languages. Time slots could then be allocated to groups of students and educators for the teaching and learning of their respective languages.
- (iii) The assistance of the ICTSO can be solicited for Grade 1 classes for the collection, connection for charging, disconnection and distribution of the tablets. These should facilitate the educators' tasks in all grades and be less time consuming.

5.2.2 Digital Content

- (i) The Ministry needs to carefully plan and set the characteristics for the type of digital learning resources it requires for teaching and learning through ICT tools.
- (ii) Digital learning resources need to be adequately designed, tested and evaluated before their use.

- (iii) There should be continuous evaluation of digital content made available for the EDLP by educators and competent school personnel. Feedback to content developers after each exercise will help to improve teaching and learning using technology.

5.2.3 Supervision, monitoring and evaluation

A proper evaluation of the EDLP is recommended. This will help to point to any problems or shortcomings at an early stage that will have to be addressed for the successful implementation of the programme.

5.2.4 Training

For effective supervision and monitoring of the EDLP, school management and the inspectorate cadre need to be trained on how to measure and evaluate the impact of digital technology on teaching and learning. These, together with their own experience in teaching and learning, will help to ensure that the training received is applied in the classroom and measure its effectiveness, and teachers' performance. They would also be able to make any necessary recommendations for the overall enhancement of teaching and learning through the use of digital technology.

5.3 Digitisation at Upper Primary

The remaining Sankoré equipment should be put to good effect during the period they will be used in primary schools or during their remaining lifetimes.

5.4 Use of ICT in Secondary Schools

Student Support Programme:- The SSP needs to be evaluated to determine whether it is adding to the learning experience of students and enriching their studies. The exercise will help to identify issues that may have to be corrected and ensure that value for money invested in the endeavour is obtained.

5.5 Quality Assurance on Teaching and Learning through ICT

The quality assurance framework and handbook for quality assurance need to be revised to include education through ICT and, necessary training dispensed to school personnel and quality assurance officers to assess the quality of education provided with the use of ICT in secondary schools.

5.6 Use of ICT in Higher Education Institutions

- (i) **Learning Management System** - A national platform supporting online learning could be developed to cater for a large number of users and support a range of technologies. Specific guidance on the operational aspects of online learning platform including provision for hardware, accessibility, participation in collaborative activities should be provided to students.

(ii) **Training to Academics** - A training needs gap analysis needs to be undertaken to identify the skills and knowledge required by academics to teach online. Continuous professional development should be provided to academics to enable them to adapt and keep pace with the new mode of teaching. Academics could work in teams and develop practices to avoid duplication of effort and share best practice.

(iii) **Connectivity** - Internet bandwidth should be strengthened to provide access to institutional resources as well as digital resources on the web.

(iv) **Support to students**

- HEIs should ensure proper mechanisms are in place for students to acquire the digital skills required to engage effectively in their learning process which include training and access to academic software. They need to ensure students have appropriate materials, coaching and training in order to achieve equity and fairness in education, hence minimising the digital divide.
- Government could provide financial support schemes for students to access technologies for personal use. It could negotiate with internet and mobile service providers to provide free access to educational platforms.

5.7 Open Educational Resources

A National Open Educational Resources policy should be developed to promote the development and sharing of quality content. HEIs could develop shared course content through an institutional OER repository to facilitate the access by anyone, anywhere and anytime.

5.8 Education under COVID-19 Pandemic Conditions

- (i) To ensure that educational TV programmes are more effective, the Ministry needs to:
- Consider the possibilities to make TV education more interactive;
 - Put in place mechanisms for communication between teachers and students (and their parents) and for sending feedback from parties on this mode of teaching and learning; and
 - Provide necessary support to all the parties.
- (ii) Necessary surveys need to be done to measure the proportion of students who miss out on education as a result of not having access to ICT facilities. This is important for future planning and line of action.
- (iii) A proper methodology to harness ICT facilities for online classes at the primary school level need to be developed. The design needs to include adequate student-teacher interaction for academic success and the overall development of students.

5.9 Screen time, Health and Wellness

The Ministry needs to consider preparing guidelines for the overall well-being of students when they continue their education outside of the classroom.

5.10 Guidelines for Parents

The Ministry should consider setting appropriate guidelines for parents for the effective learning and overall wellbeing of their wards.

Appendix I

Audit Questions

1.0 Did the Ministry have an adequate ICT policy, strategy and plan for education?

1.1 Did the ICT policy for education cover all education sectors?

1.2 Did the Ministry properly plan to build up an ICT eco system for teaching and learning?

1.3 Was the Ministry sufficiently prepared to ensure the smooth continuity of education through alternative modes of teaching and learning using ICT in response to emergency situations?

2.0 How well was ICT integrated in teaching and learning?

2.1 Did the Ministry ensure that educational institutions have adequate infrastructure to promote and use ICT in enhancing teaching and learning?

2.2 Were teachers adequately supported through training to use ICT for teaching?

2.3 Did the Ministry provide appropriate support and guidance on the best use of ICT in and out of the classroom?

3.0 Did the Ministry adequately monitor the use and evaluate the impact of ICT in enhancing teaching and learning?

3.1 Did the Ministry adequately monitor the use of ICT to ensure students have equitable access to technology, software and hardware, and internet connectivity that support learning?

3.2 Did the Ministry adequately monitor the effective use of ICT to enhance student learning?

3.3 Did the Ministry evaluate whether students' abilities or skills were improved through the use of ICT?

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Appendix II

ADDIE Model for the Creation of E-Learning Resources

Phase	Explanation	Steps followed by CODL
Analyse	<p>Good planning leads to successful actions. One needs to:</p> <ul style="list-style-type: none"> • know who are the learners (target audience); • know their knowledge, skills and proficiency with technology; and • identify performance gaps: skill needs and deficiencies. <p>Based on the performance gaps, learning objectives are set. Delivery options are considered, and timeline and budget are also taken into account.</p>	<p>a. Knowing the participants and logistics required. This include learner and tasks analyses.</p> <p>b. Resource developer scans the contents in textbooks and decides on the best types of resources to address the objectives of the lesson.</p>
Design	<p>E-learning solutions require creating customised content adjusted to the media to be used. Instructional, technical, and visual aspects require a design strategy. The goal is to create the structure of the learning materials/course which can range from a simple storyboard to a detailed plan.</p> <p>Tasks involved in this stage include:</p> <ul style="list-style-type: none"> • Documenting the instructional, technical, and visual strategy. • Creating storyboards. • Designing the user interface. • Creating the prototype. • Applying visual design. 	<p>a. Resource developer identifies resources on tablets [in collaboration with subject matter expert (SME)] and integrates instructional design model in the digitisation of resources.</p> <p>b. Resource types used are: widget, audio, video and gallery.</p> <p>c. A blueprint (the instructional design document) that guides the development of resources is created.</p> <p>d. A storyboard illustrating the scenes is developed and vetted by the SME.</p> <p>e. A first prototype of the digitised resource is developed</p> <p>f. SME vets prototype and provides feedback.</p> <p>g. SME and resource developer agree on what to develop.</p>
Develop	<p>In this phase, developers create and assemble content assets from the design phase. It includes the following activities:</p> <ul style="list-style-type: none"> • creating the actual content on the delivery platform; • building the assessments and other materials that will aid learning • planning and building the technological programmes; and • testing it out. 	<p>a. Outline learning resources' characteristics in storyboards and develop prototypes from these.</p> <p>b. Prototypes turned into full-fledged learning resources.</p> <p>c. Development includes:</p> <ul style="list-style-type: none"> ✓ recording of audio and videos; ✓ capturing images; ✓ coding; ✓ selecting and editing of images/audio/video; ✓ designing interface of a widget; and ✓ mounting contents on e-book and sharing of digital contents.
Implement	<p>In this phase, the focus is on developing procedures for the learners and the educators. Instructional designers hand their materials to the educators and train them on how to use the course materials, guide them on the learning outcome, and familiarise them with the process. This phase is an opportunity to gauge how learners learn. Basically, this phase offers a chance to evaluate how well the curriculum works for both the learners and the teachers.</p>	<p>a. Mounted e-books tested in several phases:</p> <ol style="list-style-type: none"> inter-team testing among resource developer 1st level of testing among academics regarding the human computer interactions 2nd level testing among academics based on feedback from previous levels <p>b. Resources finalised, published and submitted for uploading on digital media</p>
Evaluate	<p>Evaluation is not limited to this phase. It is ongoing throughout the design process. The aim is to ensure that the course meets the learning objectives.</p>	

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Appendix III

Quality Review Checklist for Digital Learning Resources

Domain	Criteria/ Key indicator	Evaluation
Instruction	<i>Focused</i>	Is the instructional purpose ²⁵ and alignment with curricular standards explicitly stated or easily inferred?
	<i>Engaging</i>	Are students engaged in an activity ²⁶ that promotes critical thinking, communication, collaboration, and/or creativity?
	<i>Informative</i>	Is there an instructional record ²⁷ or student product to help gauge the resource's effectiveness?
Content	<i>Accurate</i>	Is the content presented free of errors, bias, or outdated material that could confuse or mislead students?
	<i>Adequate</i>	Is the content provided adequate to address stated or implied learning goals?
	<i>Appropriate</i>	Are vocabulary and concepts at an appropriate level for the target learners?
Technology	<i>Purposeful</i>	Do technology features (e.g. interactivity, animation, embedded media, interactive charts, automated feedback, adaptive content, etc.) enhance content and instruction?
	<i>Reliable</i>	Do technology features work reliably and as intended in the environment (e.g. devices, wireless connectivity, etc.) where the resource will be used?
	<i>Accessible</i>	Does technology support accommodations ²⁸ for learners with cognitive, developmental, or physical disabilities?
Design	<i>User-friendly</i>	Is the resource easy to understand and use for teachers and targeted learners?
	<i>Clear</i>	Do visual and auditory elements (e.g. font, size, and legibility of text; video or sound quality; headings; graphics and visual cues) support, rather than distract from, content and activities?
	<i>Motivating</i>	Does the resource contain motivational elements (e.g. choice, multimedia, interactivity, real-life examples/activities, feedback, drama, humour, or game-based components.) likely to sustain the interest of students?

Source: (Adapted from) Friday Institute for Educational Innovation²⁹/North Carolina's Digital Learning Initiative.

²⁵ Instructional purpose refers to the resource's intent to provide instruction, practice, and/or assessment with respect to subject specific knowledge and skills.

²⁶ Activities (instructional tasks) may include reading, writing, discussion, or problem solving that promote critical thinking, collaboration, communication, and/or creativity.

²⁷ Instructional record may include written works, student performance, resource analytics, quizzes, etc.

²⁸ Accommodations may include accessibility features (i.e. ability to resize text or visual content; change contrast, colour, volume, or rate of speech, video speed, etc.), adaptive reading levels or instructional tasks, etc.

²⁹ The William and Ida Friday Institute for Educational Innovation advances kids under 12 education through innovation in teaching, learning and leadership, by bringing together students, teachers, researchers, policy-makers and educational professionals to foster collaborations that improve education for all learners. It amplifies teaching and learning through innovative technologies and strategies. (<https://www.fi.ncsu.edu>).

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Appendix IV

Guidelines for Screen Time from the American Academy of Paediatrics

Prior to 2015, the American Academy of Paediatrics discouraged screen time for children under age two and recommended limiting it to two hours a day for those aged two and above. The old guidelines were drafted before the explosion of devices and apps aimed at youngsters. With the ubiquity of screens and their prominence in our everyday life those recommendations have been relaxed now with no limit set. The group does recommend, however, making sure that screen time does not substitute for any sleep or active time. Important points from the current guidelines are:

- a. **Get involved with media.** Parents should continue to engage their children in both their real and virtual environments. Play with the kids and set limits. Kids thrive with boundaries and limits.
- b. **Be a good role model.** Parents need to limit their own media use, and model this behaviour for their children. Attentive parenting requires spending quality time with kids away from screens.
- c. **Language is critical for development.** Neuroscience research shows that very young children learn best via two-way communication. Talking to the child is critical for their language development. Passive video presentations do not lead to language learning in infants and young toddlers. Educational media opportunities begin after age two, when media may play a role in bridging the learning achievement gap.
- d. **Content matters.** The quality of content is more important than the platform or time spent with media. Prioritise how the child spends his time rather than just setting a timer.
- e. **Research the apps.** An educational and interactive app requires more than swiping to teach a child. Look to organisations that review age appropriate apps, games and programmes (e.g. [Common Sense Media](#)).
- f. **Co-engagement is important.** Create family time and get the whole family involved in media together to facilitate social interactions and learning.
- g. **Playtime is important.** Unstructured playtime stimulates creativity. Parents to make sure they schedule in media-less playtime, especially for the very young.
- h. **Set limits.** Set limits on the amount of media use in the home. Ask whether the child's technology use help or hinder participation in other activities – homework, physical exercise, socialisation or sleep?
- i. **Let teenagers go online.** Research shows that cultivating online relationships can have both a positive and negative impact on adolescent development.³⁰ Social media can support identity formation, but teenagers should be taught appropriate behaviours for online and in-person relationships. Parents need to ask their teens to show what they are doing online and be open to learning from them.
- j. **Create media-free times and areas at home.** It is important to preserve family time. Make meals or bedtime routine media-free. These limits encourage family time, healthier eating habits and healthier sleep.
- k. **Kids can make mistakes.** As the child learns about media, they are bound to make mistakes. Use these mistakes as teachable moments, handled with empathy instead of times for punishment. If the child is engaged in risky behaviour, such as posting self-harm images, this is a signal that something else is wrong and he/she may need professional help.

³⁰ Igor Pantic. Online Social Networking and Mental Health. Cyber psychology, Behaviour, and Social Networking Vol. 17, No. 10, 2014.

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