

# Policy on ICT in Education Malaysia



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## Preamble

Since the inception of the MSC initiative, the ICT sector has grown to contribute about RM 7.35 billion to the GDP in 2009 and its indirect contribution grew to about RM 2.48 billion the same year. The sector employed more than 200, 000 people over all and this is expected to rise to about 300, 000 people by 2013. Considering the importance of the ICT industry, the government launched seven (7) Flagship Applications that would facilitate the adoption of ICT sector among the masses as well as provide a growth platform for the industry as a whole.

The Ministry of Education (MOE) Malaysia is the lead agency of the Smart School Flagship, one of the original seven (7) Flagship Applications of the MSC Malaysia launched in 1997. From 1997 to 2002, working in collaboration with Multimedia Development Corporation (MDeC), other government agencies and even the private sector, MOE has undertaken planning, implementation and monitoring of the Smart School Pilot Project. As the lead agency of a Flagship Application, the Ministry is a member of the MSC Malaysia Flagship Coordination Committee (FCC) and the MSC Malaysia Implementation Council (ICM) which oversee planning and implementation of Flagship Applications and other initiatives relating to the MSC Malaysia. In addition, the Minister of Education attends the MSC Malaysia International Advisory Panel (IAP) which meets periodically. The Ministry is also a member of several committees, which deal with specific matters relating to the use of ICT.

Since the Smart School initiative was launched in July 1997 as one of the seven (7) flagships of the MSC Malaysia, there has been much accomplishment in integrating ICT in education, and this began with piloting the 88 Smart Schools. The 88 Smart Schools were given the 'role' to act as the nucleus for the reference of Smart School concepts, materials, skills and technologies developed by the MOE. In April 2006, the National IT

Council chaired by the Prime Minister endorsed MOE's proposal that MDeC undertakes a systematic transformation of the selected '88 Smart Schools' into model schools. This included promoting best practices in technology-enabled teaching, learning and school management.

In order to encourage active interest and participating of schools, a measured and graded benchmark of ICT utilization of the Smart Schools was created and this is known as the Smart School Qualification Standards (SSQS). The 'Star Ranking' system was used to appraise each school in terms of Utilisation (40%), Human Capital (40%), Applications (10%) and Technology Infrastructure (10%). To qualify as a Smart School, the 10,000 schools must achieve the minimum conditions of 3-star specified for each Key Performance Indicator (KPI) within the four (4) areas specified. The performance indicators were meant to show how ICT should be used not only as a basic operational tool but also as a critical enabler for education which promotes the development of creativity, collaborative learning, critical thinking and problem-solving.

Entering the last wave of the Smart School Flagship Application Roadmap i.e. Wave 4 which is the 'Consolidate and Stabilize' phase, Malaysia is gradually moving away from the Smart School initiative to a larger and more pervasive '**ICT in Education**' concept. The 'ICT in Education' concept is a broader notion and it operates in a grander scheme as compared to the initially-conceptualized terminology – the '**Smart School**' initiative. The broader concept includes amalgamating multi-lateral efforts from all stakeholders, from the MOE level to the school and educational institution level, and especially the Community of Practice (COP) which consists of experienced teachers, industry practitioners, alumni, parents and students who can provide constructive feedback on user requirements and areas of improvement to solidify the approach of integrating ICT in education. While there is a clearer picture for the teacher and students, the involvement

of parents and the community at large is less palpable and therefore needs to be addressed in the policy.

Findings from previous studies conducted by MDeC and MOE between 2003 and 2009 clearly showed that there is a critical need to conduct an architecture review of the smart school initiative to align it with the changes coming from the dynamics of internal needs and external environment that has a major impact on the next wave of ICT in education. Hence, an Architecture Review study was completed in May 2010 to provide concrete findings on areas of improvement in the structural design of the initiative and the manner ICT initiatives are implemented. Findings and strategic recommendations from the Architecture Review need to be acted upon and this spurred the development of a Policy on ICT in Education.

A section in the policy is dedicated to analyze the global trend and practices relating to integration of ICT in education as covered under the 'International Best Practices'. Generally, there is always a gap between the desired and actual level of effectiveness of integrating ICT in education. Consequently, educational policy makers around the world have developed a specific policy on 'ICT in Education' to guide the full realization of benefits and potential in education using ICT as a critical enabler. In the context of Malaysia, the gap has been highlighted by the study on Architecture Review of the Smart School initiative. This is also a reason underlying the development of the '**Policy on ICT in Education**' in Malaysia.

Following that, there have been several impetuses to the development of a policy on ICT in education in Malaysia. Firstly, at the 30<sup>th</sup> FCC meeting on 6<sup>th</sup> April 2010 co-chaired by the Chief Secretary to the Government and Chief Executive Officer (CEO) of MDeC, the Committee agreed to look at strengthening the policy on ICT in education to align all ICT projects and further emphasize on the role of ICT towards maximizing the impact on

student outcomes. Secondly, as the directive from Deputy Prime Minister's office to the Secretary General of MOE dated 16 April 2010, Deputy Prime Minister has requested for MOE to consider the development of National ICT in Education Policy in collaboration with MDeC.

The policy begins with the overview of national goals and national policies such as the Government Transformation Programme (GTP), New Economic Model (NEM), Economic Transformation Programme (ETP), the 10<sup>th</sup> Malaysia Plan (RMK10) and mapping of the strategic direction and aspiration of the nation with the goals and requirements of the 'Policy on ICT in Education'. This is followed by identification of prerequisites for a sustainable ICT in Education execution in Malaysia given the unique characteristics of our education system and bold aspiration of our nation.

The broader scheme of 'ICT in Education' covered in the policy encompasses all the current ICT initiatives that have been rolled out i.e. SchoolNet, Computer Lab, EduWebTV, Teaching of Mathematics and Science in English (PPSMI) and Access Centre and all future ICT initiatives under a common set of objectives instead of allowing each ICT initiative being implemented independently. Secondly, the policy seeks to standardize and enhance the implementation and post-implementation stage of 'ICT in Education' initiatives. Thirdly, the policy seeks to generate greater commitment and acceptance from stakeholders by being transparent with procedures and guidelines relating to the implementation of 'ICT in Education' initiatives.

In essence, there are four major pillars of delivery covered in the 'Policy on ICT in Education', namely Human Capital, Budget, Digital Learning Resources and Infrastructure. Underneath the four pillars of delivery, eight (8) key focus areas are covered, namely Structure (Roles and Responsibilities of Stakeholders), Competency and Professional Development, Technology and Infrastructure, Maintenance and Support, Budget and

Total Cost of Ownership (TCO), Teaching and Learning, Community Involvement and Education Management System. ICT for Special Groups such as juveniles, aborigines and students with special needs, technical and vocational education is also addressed by the policy.

The 'Policy on ICT in Education' was built on the back of consultative approach with all relevant stakeholders through many rounds of brainstorming and focus-group discussion (FGD). Various workshops with officers from relevant divisions in MOE and other stakeholders, for example, Malaysia Administrative Modernization and Management Planning Unit (MAMPU), Economic Planning Unit (EPU), Prime Minister's Department, Ministry of Science, Technology and Information (MOSTI), Ministry of Finance (MOF), Malaysian Communications and Multimedia Commission (MCMC) and focused-group discussions (FGDs) with school and education institutions' stakeholders, including the heads of schools / deputy, school administrators, teachers and students, and the community including parents have been conducted to gather their input and feedback for the formulation of the policy for ICT in education. It has also been subjected to robust methodologies and strategic evaluation and validation tools including the Gap Analysis and Strategic Option Grid. The Gap Analysis drew upon distinct differences between the current scenario and the desired scenario in order to recommend and implement the right solutions to bridge the gap. The Strategic Option Grid was used to assess the policy statements in terms of multi-faced criteria such as Strategic Attractiveness (sustainability, inclusiveness and potential to generate knowledge-based economy and high income through ICT-enabled education), Financial Attractiveness, Ease of Implementation, Uncertainty and Risk and Acceptability to Stakeholders.

On top of that, a governance mechanism is infused into the policy framework to address all pertinent issues relating to ICT in education. The governance mechanism points out to

stakeholders, the critical areas to take action and address pertinent issues in a transparent manner.

A specific section on implementing and managing the policy is also included in the policy to focus on strategies and measures to ensure the policy is implemented and communicated effectively to relevant stakeholders. Among the pertinent areas covered under the policy management are the development and monitoring of KPI and the development of recognition and reward programmes linked to KPI. Very often, managing the change process is the most challenging part of implementing any policy. Hence, elements of change management, Business Process Re-engineering (BPR), risk management and crisis management are also suggested as part of the policy measures to enhance the integration of ICT in Education in Malaysia. Finally, the policy is equipped with review mechanism for future incorporation of recommended additions and modifications.

**Table of Content**

1. Introduction	10
2. Mapping of ICT in Education with National Goals	14
3. Issues Giving Rise to Policy Consideration	18
4. Tangible Outcomes for the 4 Pillars of Delivery Supporting the Policy on ICT in Education	23
5. Prerequisites for Sustainable ICT in Education	24
6. International Best Practices on ‘ICT in Education’	27
7. Objectives of Policy on ICT in Education	31
8. Pillars of Delivery for Policy on ICT in Education	34
I. Human Capital	34
a. Roles & Responsibilities of Stakeholders relating to ICT in Education	34
b. Capacity Building and Professional Development	48
II. Budget	52
a. Budgetary Consideration for Procurement of ICT in Education initiatives related expenditure	52
b. Total Cost of Ownership	54
c. Public Private Partnership	54
III. Digital Learning Resources	55
a. Process Standards and Lifecycle Approach for the Development of Teaching and Learning Materials	55
b. Teaching and Learning in Educational Institutions	57
IV. Infrastructure	58
a. ICT Infrastructure	58
b. Enabling Infrastructure	62
c. Maintenance and Support Services	62
9. ICT for Special Groups	63

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I. ICT for Special Education (including juveniles, aborigines and students with special needs)	63
II. ICT for Technical and Vocational Education	64
10. Education Management and Administration System	65
11. Community Involvement (Parents, Alumni, Private Sector)	66
12. Implementing and Managing the Policy	67
I. Governance Mechanism and Central Programme Management (CPM)	68
II. Importance of Monitoring Key Performance Indicators (KPIs)	69
III. Recognition and Reward Programmes Linked to KPIs	70
IV. Policy Review	71
13. Glossary	72
14. Appendix	80
I. International Best Practices	80

## 1. Introduction

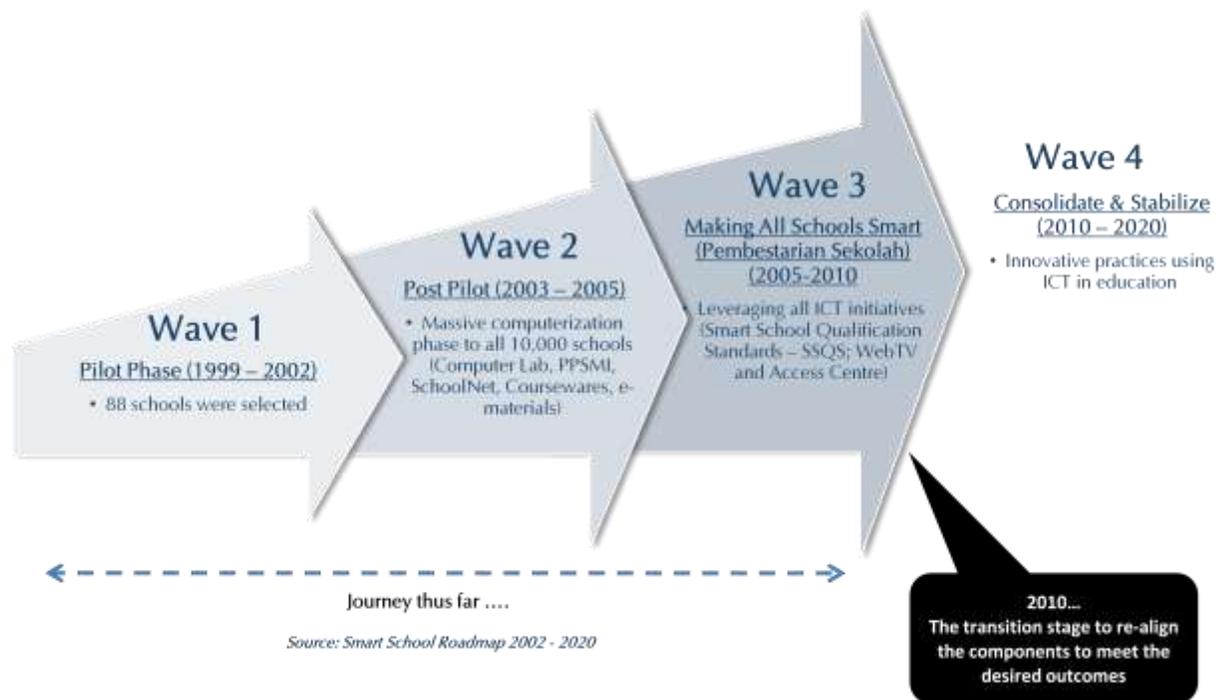
Globalization and rapid changes in technology have created a new economy which is driven by knowledge. In conjunction with this, Information and Communications Technology (ICT) is now undoubtedly the critical enabler of a knowledge-based economy for many nations. Governments across the globe have recognized the positive impact ICT has on the social and economic development of its public. Consequently, many governments have started to invest heavily on ICT to develop the nation's human capital thereby making them capable of addressing the demands of the digital and information age.

Malaysia has launched the Smart School Flagship Application in 1997 under the then Prime Minister, Tun Dr. Mahathir Mohamad with the objective of the Smart School Flagship Application as follows:

*'The Smart School is a learning institution that has been reinvented in terms of teaching and learning methods and school administration system in order to prepare the students for the Information-Based Society. Creativity and better management of information is facilitated through the use of technology where students, teachers, administrators and parents are better prepared for the challenges of the information Age.'*

The Smart School Flagship Application is driven by the Smart Schools Roadmap which is broken into four major stages of development known as "Waves" with key milestones identified for each stage. Under Wave 1 (1999 – 2002), which is the Pilot Phase, 88 Schools were selected to be developed into Smart Schools. Following that, in the post-pilot Wave 2 (2003 – 2005), the implementation of ICT in education initiatives such as Computer Lab, Teaching of Science and Mathematics in English (PPSMI), SchoolNet, courseware, and e-material was executed. Under Wave 3 (2006 – 2010), the critical milestones of making all schools smart, the introduction of the Smart School Qualification Standards (SSQS),

EduWebTV and Access Centre were established. Finally, under the last Wave i.e. Wave 4 (2010 – 2010), the Smart School Flagship Application enters the “Consolidate & Stabilize” stage where innovative practices of using ICT in Education become pervasive. It is also at this stage, that the Smart School Flagship Application takes the form of a broader ICT in Education concept.



**Figure 1 : Diagram showing the Smart Schools Roadmap with Key Milestones in Wave 1 – Wave 4**

#### The Smart School Milestones under 4 Waves:

- i. **Wave 1 – The Pilot (1999 – 2002)**  
 Implementation on 88 Smart Schools
- ii. **Wave 2 – The Post-Pilot (2002 – 2005)**  
 Lessons learnt from the ‘Pilot Implementation’
- iii. **Wave 3 – Making All Schools Smart (2005 – 2010)**  
 Extending the digital transformation to all

iv. **Wave 4 – Consolidate and Stabilise (2010 – 2020)**

Technology becomes an integral part of the nation’s learning process

Owing to the fact that the Smart School Flagship Application was launched over a decade ago and it is now entering the last phase i.e. Wave 4, there appeared to be a critical need to conduct an architecture review of the smart school initiative to align it with the changes arising from the dynamics of internal needs and external environment that have a major impact on the next wave of ICT in education. Hence, an Architecture Review study was conducted and it was completed in May 2010. Among the findings from the Architecture Review, areas of improvement in the structural design of the initiative and the manner ICT initiatives are implemented were highlighted as shown in the diagram below.

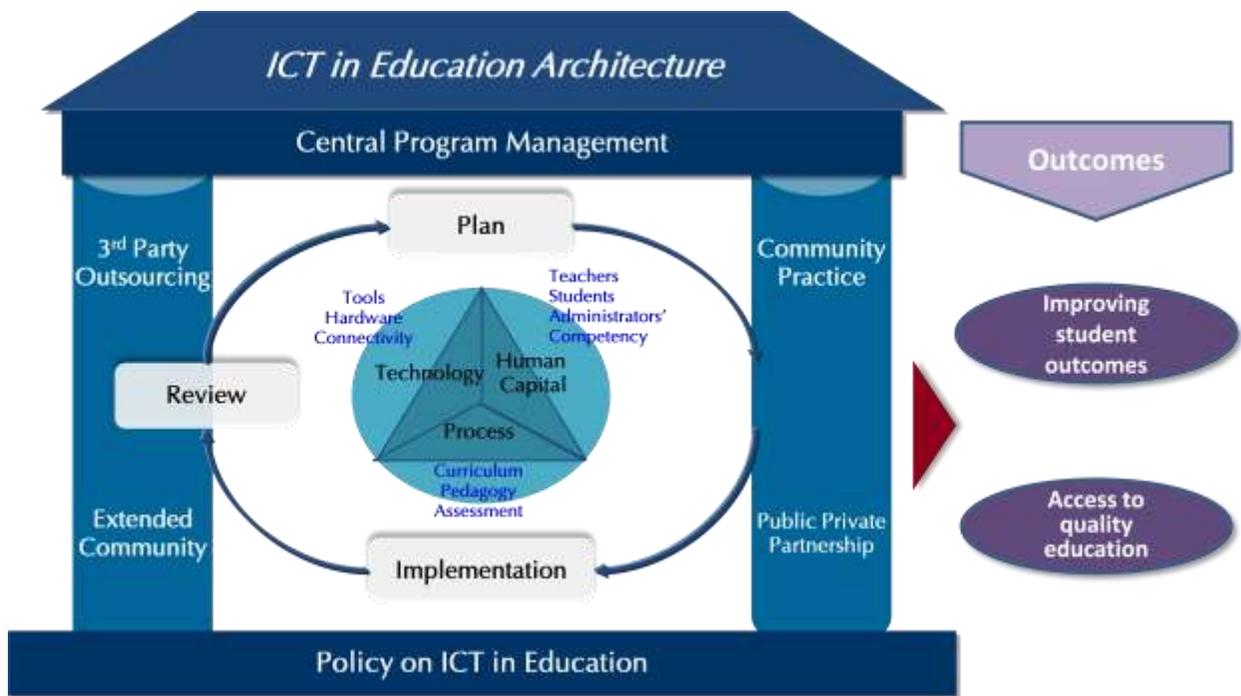


Figure 2 : The Proposed Architecture from the Architecture Review Study Conducted

A Central Programme Management (CPM) was proposed to professionally-manage all the ICT in Education initiatives from planning to detailed design, implementation and review. The CPM was proposed to be a corporatized entity staffed with full-time professionals who are equipped with the relevant skills, experience and knowledge to bring ICT in education into the next leap. The ultimate objective is to ensure that ICT in education delivers 'improved student outcomes' as made explicit in one of the National Key Results Area (NKRAs) in the GTP.

The new information age indeed has a deeper connotation on the nature and purpose of education. Education can no longer be an institution where teachers impart a set of information which students then capture and memorize. With ICT as an enabler, education is totally transformed where teachers act as facilitators of the use of ICT to allow the students to gain unlimited amount of information in order to generate an in-depth understanding of a particular subject or topic. Hence, the quality of students produced will be able to meet the requirements of employers and the demands of the nation's progressive economic development. In essence, ICT has the potential to increase the quality and relevance of education besides providing equal educational opportunities for all sections of the population.

The Ministry of Education (MOE) Malaysia believes that the use of ICT in teaching and learning as well as in schools and educational institutions' administration and management areas is a prerequisite for Malaysia to be a high-income nation. Therefore this Policy is formulated as a guideline to implement ICT in Education and to ensure uniformity and equal opportunity for all.

## 2. Mapping of ICT in Education with National Goals

To remain competitive and to fulfill the bold 'Vision 2020', a fundamental change is required, not just in economic and socio-economic status, but also in the delivery of public goods and services including education that basically underpins the speed of development of the country.

In 1991, Malaysia committed to 'Vision 2020' which is a vision to become a fully-developed nation by 2020. While it has made significant progress in the last two decades, the nation is in danger of losing global competitiveness and falling behind many other progressive nations in terms of economic and socio-economic status. To remain competitive and to fulfill the bold 'Vision 2020', a fundamental change is required, not just in economic and socio-economic status, but also in the delivery of public goods and services including education that basically underpins the speed of development of the country. Underneath all of these pertinent national aspirations, lies the fundamental question – is our education system able to support the first-world manpower requirements?

In today's digitally-connected world, the contribution of ICT in enabling education is indisputable. Decades ago, countries like USA, UK, Ireland and many other have already adopted and integrated ICT in their education system. ICT was not only covered as a subject but it was also used as an enabler to revamp the whole education system in a pervasive manner. Therefore, in the coming years, to transform and revamp the Malaysian education system, more and more integration of ICT into the mainstream education has to take place in order to pave the way to Vision 2020.

To fuel the engine of growth for the country, the government has taken the crucial step by crafting a framework that comprises four pillars to drive national transformation. The first one is the 1Malaysia concept with the emphasis on "People First and Performance Now". To support the 1Malaysia concept, the government has then formulated the Government Transformation Programme (GTP) which constitutes 6 National Key Result Areas (NKRAs), the New Economic Model (NEM) and within the NEM, the Economic Transformation

Programme (ETP). The 10<sup>th</sup> Malaysia Plan (RMK10) has also unleashed 10 main ideas to drive the growth of Malaysia for the period 2011 – 2015 as the nation progresses towards achieving Vision 2020.



**Figure 3: The Policy on ICT in Education is Mapped to the Broader National Goals and Overarching Direction**

This policy has been developed under the over-arching national aspiration and direction outlined in the GTP, NEM, 10<sup>th</sup> Malaysia Plan. Mapping the national goals and direction with the requirements and objectives of the ‘Policy on ICT in Education’, the policy seeks to place the pivotal role of ICT as a key enabler to drive the next generation of education that focuses on fostering ‘creativity and innovation, critical thinking and problem solving abilities’. Along with that, this policy seeks to ensure the proper deployment of ICT as an enabler in allowing seamless connectivity among systems, buildings and institutions. This will fundamentally generate greater coordination among stakeholders, increase ease of

teaching and learning, and improve use of resources which ultimately leads to better student outcomes.

### ***Government Transformation Programme (GTP)***

Out of the six (6) NKRA in the GTP, the third (3<sup>rd</sup>) NKRA relates directly to education – ‘Improving Student Outcomes’. This formed the starting point for a broader and more comprehensive transformation of the education system in Malaysia. Along with many other initiatives such as attracting, developing and retaining the best talent in teachers and school leaders, enhancing and revamping curriculum, and enhancing multilingual instruction, the use of ICT as an enabler to bring education into the next leap is critical. The nation’s aim to become a developed nation must be supported with future generations who are equipped with first-world talent and 21<sup>st</sup> century skills. Hence, ICT is indispensable in education.

### ***New Economic Model (NEM)***

The New Economic Model (NEM) was launched with the main goals of achieving inclusiveness, sustainability and high-income for the nation and the *rakyat*. The NEM is driven by eight (8) Strategic Reform Initiatives (SRIs) which form the basis of the relevant policy measures. Out of these eight (8) SRIs, two (2) SRIs are directly linked to the education sphere where SRI 2 basically states ‘Developing a Quality Workforce and Reducing Dependency on Foreign Labour’ and SRI 6 which states ‘Building the Knowledge Base and Infrastructure’.

These SRIs will be achieved by the following working plans:

- Shifting educational approach from ‘rote learning’ to ‘creative and critical thinking’
- Emphasis on reintroducing technical and vocational training colleges
- Increased autonomy and accountability of educational institutions
- High quality education for all localities

- Roll out of nationwide broadband connectivity
- KPIs for universities based on commercialization

### *10th Malaysian Plan*

During the Tenth (10<sup>th</sup>) Plan period (2011 - 2015), the government will adopt an integrated human capital and talent development framework. This approach will nurture and develop Malaysians across their entire lifecycle, from early childhood education, basic education, and tertiary education and all the way to their adult working lives, specifically by:

- Revamping the education system to significantly raise student outcomes
- Raising the skills of Malaysians to increase employability
- Reforming the labour market to transform Malaysia into a high-income nation

The above mentioned goals will be achieved with the help of following implementation plans.

- Improving teacher training through an enhanced Practicum component
- Lifting quality of current teachers to deliver outstanding education through
  - Competency based progression
  - Continuous professional development
  - New instrument for teacher evaluation and assessment
- Transforming the effectiveness of delivery
  - Delivering service line to support school improvement
  - New curriculum for creativity and innovation
- Trust Schools: Public-private partnerships in education to close the achievement gap
- Streamlining Delivery of Technical Education and Vocational Training

On top of that, the Policy on ICT in Education Malaysia is also mapped and aligned with the direction and objectives of the National Philosophy of Education and the Education Development Plan 2006 - 2010.

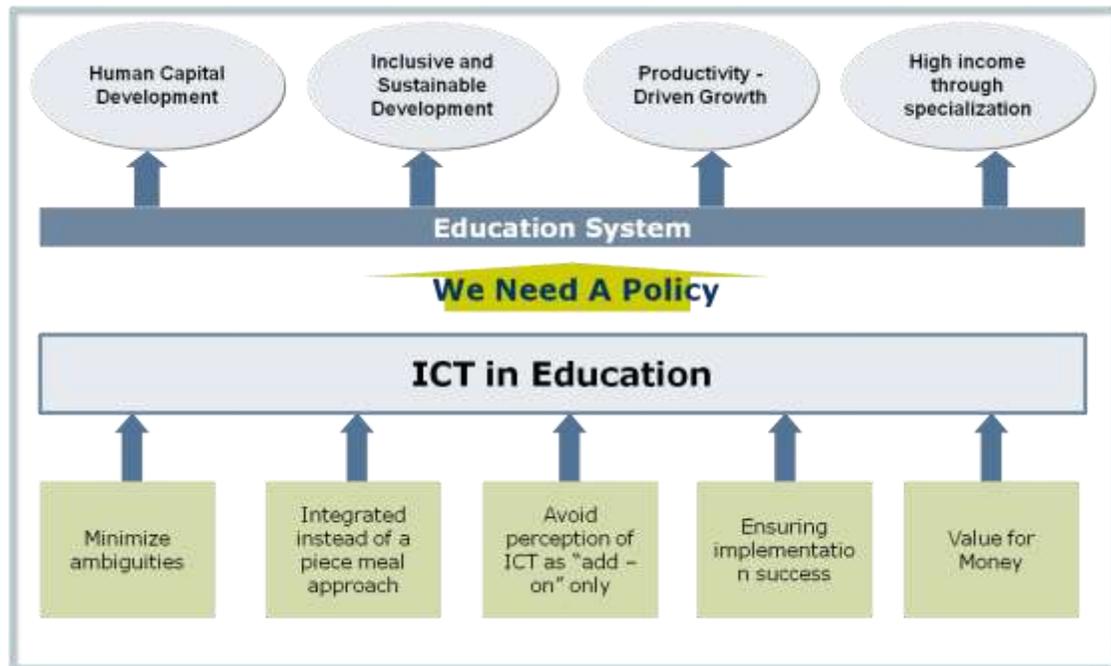
### 3. Issues Giving Rise to Policy Consideration

Recognizing the importance of ICT is not sufficient to ensure the desired outcome of education is achieved. To ensure sustainable practice of integrating ICT in education, a policy must be crafted to form the framework that guides the implementation of ICT initiatives. The comprehensive choice of ICT for holistic development of education can be built only on a sound policy.

ICT has become indispensable in the 21<sup>st</sup> century across all disciplines and industries. ICT is now the key driver of knowledge-based societies. Governments worldwide have recognized the empowerment that ICT can bring along to their countries by investing heavily in the development of knowledge based societies. Recognizing the distinct advantage that ICT can bring to education, many countries have formulated clear strategies on using ICT in the education ecosystem. The integration of ICT in education provides the right exposure to a vast amount of advanced teaching and learning methods and materials. This encourages the students to be more imaginative, creative and innovative thus improving their overall cognitive abilities. It is undeniable that the talent of the future generations forms the basis of the social and economic development of any country.

The initiative of policy for ICT in Education is inspired by the tremendous potential of using ICT for enhancing the depth of education and improving the overall quality of education. However, recognizing the importance of ICT is not sufficient to ensure the desired outcome of education is achieved. To ensure sustainable practice of integrating ICT in education, a policy must be crafted to form the framework that guides the implementation of ICT

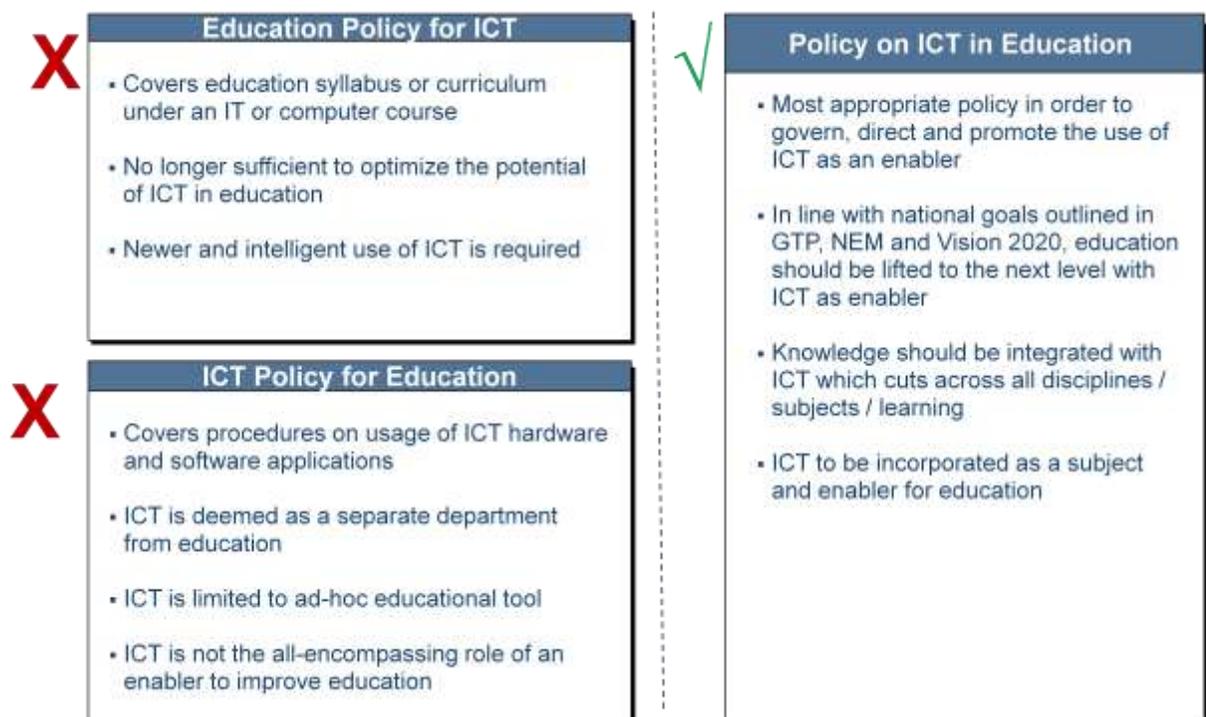
initiatives. The comprehensive choice of ICT for holistic development of education can only be built on a sound policy.



*Figure 4: Diagram Linking the Need for a Policy on ICT in Education*

This policy for ICT in education is based on the Government's recognition of knowledge as a necessary basis for sustainable human capital development. The Policy therefore seeks to define the roles of all parties in the new partnerships of the public, private and community sectors required to drive the far-reaching changes needed to achieve knowledge for all in the new Information and Digital Age. The policy for ICT in Education shall encompass a set of long-term goals, principles, imperatives, modus operandi or procedures to cater for a systematic approach to be taken in ensuring the successful implementation and progress of all ICT initiatives in education. The framework should ultimately deliver the overall direction for the long-term planning and development of integrating ICT in education initiative.

The establishment of a policy basically helps to ensure that ambiguities are minimized, an integrated approach is undertaken, the perception of ICT as add-on is removed, implementation success is achieved and the overall value for money investment is made on ICT in education. With the successful adoption of an ICT in Education policy, the direct benefits to the overall education system are reaped in the forms of human capital development, inclusive and sustainable development of the education system, productivity-driven growth and high-income nation through specialization.



**Figure 5 : Diagram showing the distinction between Education Policy for ICT, ICT Policy for Education and Policy on ICT in Education**

There is a lucid distinction between the different types of policy that involves the domain of ICT and Education. While these different policies may inter-relates, the ‘ICT in Education Policy’ is unambiguously the most appropriate policy that the country needs in order to govern, direct and promote the use of ICT as an enabler in improving education and

student outcomes, in line with national goal outlined in the GTP, NEM and the overall overarching Vision 2020.

In contrast, an 'ICT Policy for Education' will be too narrowly-focused on enforcing certain regulation, rules, operating procedures and such on the use of ICT hardware and software applications in the classrooms or computer lab typically. ICT under this scenario is deemed a separate department from education, mainly functioning as an ad-hoc educational tool and not the all-encompassing role of an enabler to improve education.

An 'Education Policy for ICT' is also a narrow scope of focus where it only defines the education syllabus or curriculum that should be covered under an IT or computer course. In the past, this may prove to be useful as students are exposed to a computer course. However, in the advanced world of teaching and learning, many countries find that this is no longer sufficient to optimize the potential of ICT in education. Hence, the newer and intelligent use of ICT is to amalgamate ICT with education making ICT as the enabler of education. In essence, the most important conclusion is that "ICT knowledge on its own will not produce better students with enhanced creativity, innovation, and education outcomes".

### ***Current State Analysis***

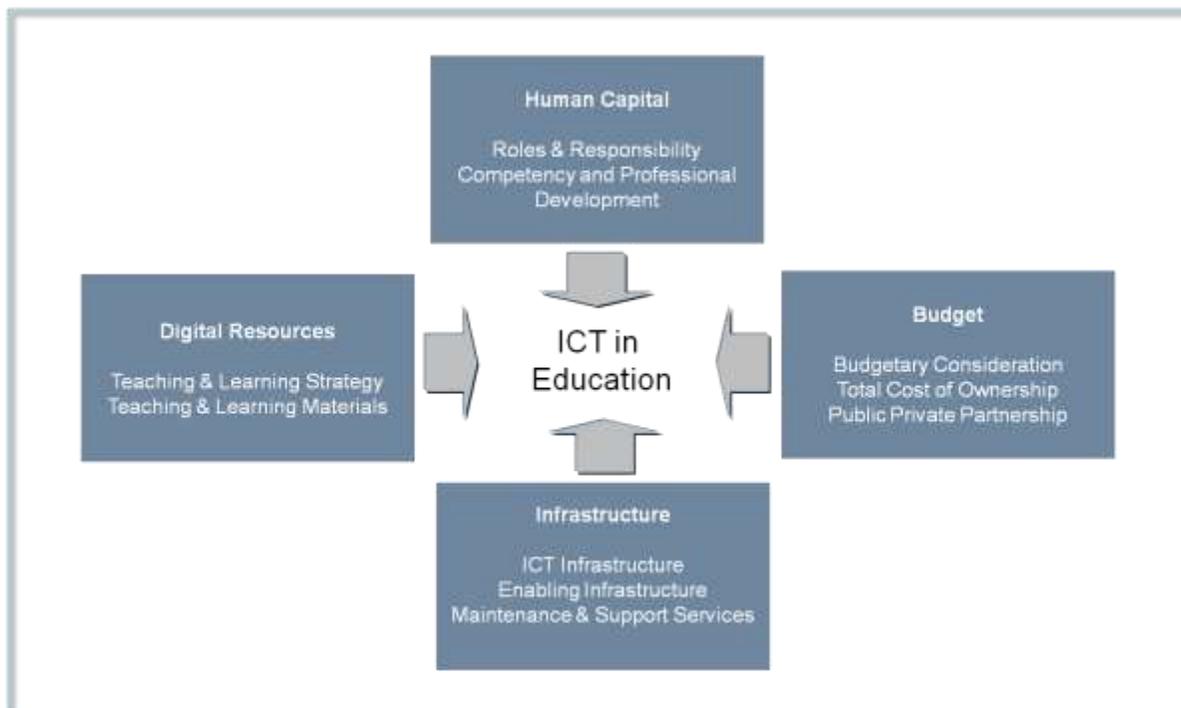
#### ***The Strategic Perspective***

Keeping in mind the national goals expressed in the GTP, NEM and RMK10 to achieve Vision 2020, integration of ICT in the Malaysian education system will be de rigueur. The initiatives expressed in the national economic plans should be executed with the pervasive use of ICT in education. This calls for a comprehensive policy for integrating ICT in education. A single coherent, effective and implementable ICT policy in education is a must to drive and transform the Malaysian education system.

To achieve the national goals contained in the four pillars of transformation supported by the Malaysian government i.e. the 1Malaysia Concept, GTP, ETP in the NEM and the 10<sup>th</sup> Malaysia Plan, Malaysia needs to use ICT in the best possible manner to develop the human capital base to remain competitive in the constantly increasing international competition. Keeping in mind the tremendous potential of ICT in education, Malaysia needs a single cohesive policy to integrate all the ICT initiatives in education to achieve the national objectives.

**Operational Perspective**

Once the national objectives of ICT in education have been established, there must be a set of important operational enablers developed to achieve the intended outcome for education. After a strategic evaluation of the Malaysian ICT in education’s architecture review and other international experiences, it is evident that the objectives laid down can only be achieved through four (4) major delivery pillars.



**Figure 6 : The 4 Key Pillars of Delivery for ICT in Education**

#### 4. Tangible Outcomes for the 4 Pillars of Delivery Supporting the Policy on ICT in Education

The four pillars of delivery for the Policy on ICT in Education:

- i. Human Capital
- ii. Budget
- iii. Digital Learning Resources
- iv. Infrastructure

There must be tangible outcomes that arise out of each of the pillars of delivery supporting the Policy on ICT in Education. The tangible outcomes are characterized as measurable results that contribute to the achievement of the NKRA of 'improving student outcomes' and other relevant national-level goals.

- The tangible outcomes for Human Capital are:
  - i. Improve efficiency and effectiveness in the planning and implementation of ICT in education initiatives with a well-aligned structure for all the stakeholders with clear roles and responsibilities;
  - ii. Improve competency and professional development for all relevant stakeholders in order to effectively and efficiently implement ICT in Education
- The tangible outcomes for Budget are:
  - i. Improve efficiency and effectiveness with regards to the planning and implementation of procurement and budgetary aspect of ICT in education with focus on Return on Investment (ROI)
  - ii. Ensure sustainability of all ICT in education initiatives by considering Total Cost of Ownership (TCO)

- The tangible outcomes for Digital Learning Resources are:
  - i. Improve quality and relevance of Digital Learning Resources by adoption of a life-cycle approach
  - ii. Increase uptake and usage of content and teaching and learning materials by focusing on user requirements in all developmental work
  
- The tangible outcomes for Infrastructure are:
  - i. Improve maintenance and support of infrastructure investment allowing teachers to focus on core deliverables
  - ii. Provide infrastructure readiness for all (no schools left out)
  - iii. Allow schools to take a leap forward in adopting ICT tools and applications

## 5. Prerequisites for Sustainable ICT in Education

For the successful integration of ICT in education and to ensure its sustainability, a solid conceptual framework must be in place to guide the implementation of the policy and the management of the policy. As shown in the illustration above, the effectiveness of the policy implementation hinges upon 4 major pillars of delivery:

- (a) Human Capital
- (b) Budget
- (c) Digital Learning Resources
- (d) Infrastructure

Firstly, human capital readiness is vital to ensure that all the programs and initiatives conceptualized can be implemented by the right people using the right method at the right time with the right cost. Change management will be undertaken to ensure that all

stakeholders, from the MOE level all the way through to the education institution level, are ready for the transformation of education with ICT as a critical enabler.

Secondly, the budget for all ICT in Education initiatives and programs must be focused upon as the predominant consideration during the planning stage of all effort to introduce ICT in education. The due consideration given to financial aspect of a certain program will ensure that any ICT in Education program is implemented and sustained through its desired life cycle, without being abandoned or shedding its real value in the post-implementation stage due to poor maintenance and support services.

Thirdly, digital learning resources is the heart of all the effort and initiatives taken to allow ICT be deployed as a critical enabler to boost students' creativity and innovation, problem-solving skills, analytical skills and other important skills required to build a knowledge-based economy. A life-cycle approach is therefore paramount to support the critical steps taken in the development of digital resources. User requirements must be the core focus of all developmental work undertaken to produce digital content in teaching and learning materials. Therefore, vendor-driven approach must be totally eradicated to allow user-centric content to reign.

Fourthly, infrastructural readiness is the foundation of 'ICT in Education' and this has been covered substantially under the basic infrastructure and ICT infrastructure sections. The infrastructure readiness will provide the platform for all schools and education institutions to take a leap forward in adopting ICT tools and applications wherever suitable in the teaching and learning process.

Following that, there must be a mechanism for program management where important areas such as vendor management, risk management and crisis management of the policy will be managed-professionally to achieve the desired outcome for ICT in education. Another crucial phase of the conceptual framework covers the monitoring and evaluation of all ICT in Education initiatives, including the performance level of crucial functions such as the helpdesk service and linking the measurement with reward and recognition schemes.

The importance of cyber-security must also be emphasized at all times during the course of implementation of any ICT in education initiative, from the MOE level to the education institution and school level. This can be achieved by ensuring that awareness of the proper use of ICT tools and applications is developed for all relevant stakeholders. This is to deliver uninterrupted ICT services to support and enable education in Malaysia to take the next leap forward in support of our national goal of becoming a high-income nation.

Finally, the most important element is to gather users' requirements and feedback from the Community of Practice (COP), for example through the use of important feedback gathering instruments such as a Customer Satisfaction Index (CSI) that measures the satisfaction of users at the schools and education institutions level and for example, a Parents' Satisfaction Index (PSI) that measures the satisfaction of parents with regards to the benefits they can witness and experience directly as a result of integrating ICT in education.

All of the important elements in the conceptual framework guiding the policy implementation with an over-arching direction will ensure the successful implementation of ICT in education.

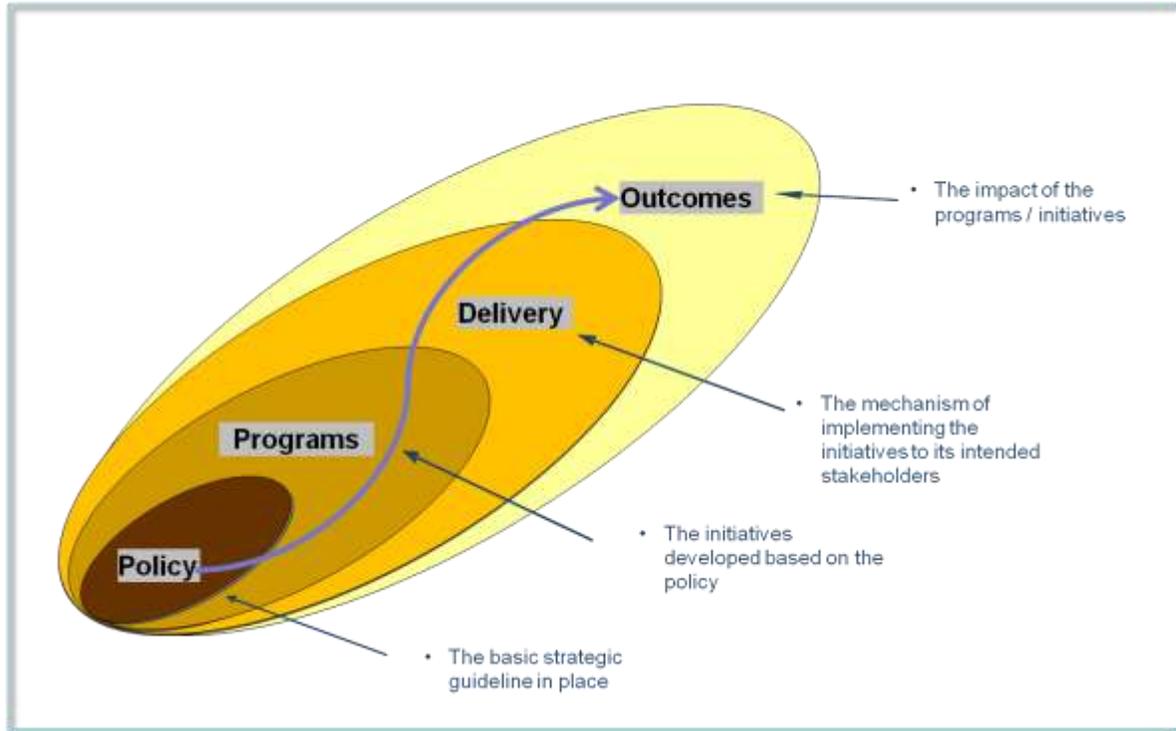


Figure 7 : Diagram illustrating the link between Policy and Outcomes

## 6. International Best Practices on 'ICT in Education'

The increasing importance of ICT in education is recognized by many of the world agencies and countries. The following section highlights the views in ICT in education of few international organizations:

### **World Bank:**

A World Bank (2003) report cites the potential that ICT has to improve the efficient delivery of resources to the poor, to bring markets within reach of rural communities, to improve government services, and to transfer knowledge needed to meet the Millennium Development Goals.

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**Organization of Economic Co – operation and Development (OECD):**

The OECD (2001, 2006) also emphasizes the economic importance and impact of ICT in developed countries and points out the need for these countries to develop a workforce with the skills to use ICT to increase productivity, as well as the need for young people to develop ICT skills in preparation for adult life.

**Group of Eight (G8) Heads of State, 2000:**

The group emphasizes the need to develop human resources capable of responding to the demands of the information age and to nurture ICT literacy and skills through education, training, and lifelong learning.

**African Union:**

The African Heads of State (African Union, 2004) concurred by citing the potential for ICT to promote trade, improve health care, enhance good governance, and make education more available.

**Countries with Policy in Place:**

The critical need for having a policy-led approach to integrate ICT in Education is imperative and the benefits are clearly-articulated in the diagram below.



Figure 8 : Benefits of a Policy

The follow section below highlights a few examples of countries that have developed and adopted an ICT in Education policy.

**UNESCO** "ICT in Education Policy" project aims to promote appropriate policy models and strategies for the integration of ICT in education in the Asia-Pacific region, with special emphasis on developing policies which utilizes ICT to remove barriers to participation in education and enhance the quality of education.

**Ireland's** 'Schools IT 2000 project' aims at ensuring that every pupil at primary and second level education has the opportunity to achieve computer and Internet literacy and be equipped for full participation in the information society.

**Dominica's** policy aims to infuse stakeholders' inputs into the process of defining a Common Vision for the systematic integration of Information and Communications Technology in the education system.

**Australian** Government aims to bring substantial and meaningful change to teaching and learning in Australian schools. ICT will prepare students for further education and training, jobs of the future and to live and work in a digital world.

The aim of **Kingdom of Cambodia's** policy is to improve the effectiveness of education at all levels and to produce the technologically-literate, productive and critically-thinking workforce for the country.

**Trinidad and Tobago's** Ministry of Education recognizes that the use of Information and Communications Technology (ICT) is critical to the transformation of the society to ultimately meet the universal requirements of an ever-changing global environment.

**South Africa's** aim of using ICT in education is to encourage the teaching and learning methodology using ICT and improve creative, analytical and critical thinking.

**India's** ICT Policy in School Education aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socio-economic development of the nation and global competitiveness.

The common goals of the policies of various countries are:

- Enhance employability
- Prepare for knowledge-based economy
- Improve efficiency and effectiveness of educational administration
- Improve and increase access to information
- Allow individualized or self-paced instruction
- Engage the private sector to drive ICT development

## 7. Objectives of Policy on ICT in Education

### Vision

The National Policy on ICT in Education aims at leveraging the use of ICT as an enabler for education in order to create, promote and sustain the development of a knowledgeable, innovative and creative society which ultimately supports the national agenda of attaining a knowledge-based economy.

### Mission

- To continuously develop ICT as an enabler for education
- To cultivate the culture of embracing 21st century skills among all stakeholders in the education ecosystem
- To streamline and optimize the process through which the benefits of ICT in education can be fully-leveraged
- To monitor and provide reward and recognition for outstanding performance in the use of ICT in education
- To promote the creation and sustainability of an environment favourable for invention of new ideas, creations and solutions through the use of ICT as an enabler in education

### Objectives of the Policy on 'ICT in Education'

The objectives of this policy are:

- To align all the current and future ICT initiatives under a common goal for integrating 'ICT in Education'
- To standardize and enhance the implementation of ICT initiatives in Education by encompassing all important aspects of implementation and post-implementation into a regulatory framework
- To generate greater commitment and acceptance by all stakeholders including the policy implementers and the *rakyat*

### Definitive Outcomes of the Policy

In order to promote and to measure the success of the policy on ICT in Education's implementation, definitive outcomes for the policy is clearly spelled-out in this section. Over and above all, the definitive outcomes of the policy on ICT in education is aimed towards supporting the national goals of improving access to quality education as spelled out in the various national transformation program such as the GTP, ETP, and NEM.

The definitive outcomes aimed for the Policy on ICT in Education can be further elaborated as follows:

- ICT-enabled education that leads to first world talent and manpower to support the nation's socio-economic growth in line with national agenda such as GTP and NEM
- Sustainable integration of ICT in education to produce the desirable learning effect which leads to the production of researchers, innovators and even creators of new

inventions and new ideas i.e. “not just using ICT as a tool but use ICT to create more state-of-the-art tools”

- A strong culture of embracing ICT in education inculcated through performance measurement and reward & recognition schemes
- ICT-enabled education that leads to advancement in multi-disciplinary entrepreneurship and technopreneurship
- ICT-enabled education that leads to producing a group of IT-savvy stakeholders who are equipped with 21st century skills from MOE level to school level including the heads of schools and education institutions, teachers, ICT coordinators, ICT technicians and students

### Policy Statements

- The first policy for ICT in education is based on the Government's recognition of knowledge as a necessary basis for sustainable human capital development. The Policy therefore seeks to define the roles of all parties in the new partnerships of the public, private and community sectors required to drive the far-reaching changes needed to achieve knowledge for all in the new Information and Digital Age.
- The second policy for ICT in education focuses on deploying ICT as an enabler for education through four main pillars of delivery – human capital, budget, digital learning resources and infrastructure
- The third policy for ICT in education focuses on the adoption of value-added management tools and advanced concepts from global best practices such as total cost

of ownership, public private partnership, lifecycle approach and central programme management

- The fourth policy for ICT in education focuses on the special education group including juveniles, aborigines, and students with special needs to give them equal opportunity as Malaysia progresses towards a high-income nation

## 8. Pillars of Delivery for Policy on ICT in Education

### I. Human Capital

#### a. Tangible Outcomes

- Improve efficiency and effectiveness in planning and implementation of ICT in education initiatives from a well-aligned structure for all the stakeholders with clear roles and responsibilities
- Improve competency and professional development for all relevant stakeholders in order to effectively and efficiently implement ICT in Education

#### b. Roles & Responsibilities of Stakeholders relating to ICT in Education

- There shall be clear communication of roles and responsibilities of stakeholders at MOE, school and community level in relation to ICT in education
- There shall be clear accountability and full transparency on the roles and responsibilities of stakeholders in relation to ICT in education
- The working guidelines of each department and personnel must be clearly communicated, i.e. it should be made available through the creation of an ICT in

Education portal which is linked to MOE's website, in a formal manner to all stakeholders

- The roles and responsibilities structure should be one that promotes coordination, efficiency and productivity among all the stakeholders
- The roles and responsibilities structure must be aligned to the national agenda and goals identified in GTP, NEM, RMK10 and others and include elements of inclusivity and sustainability

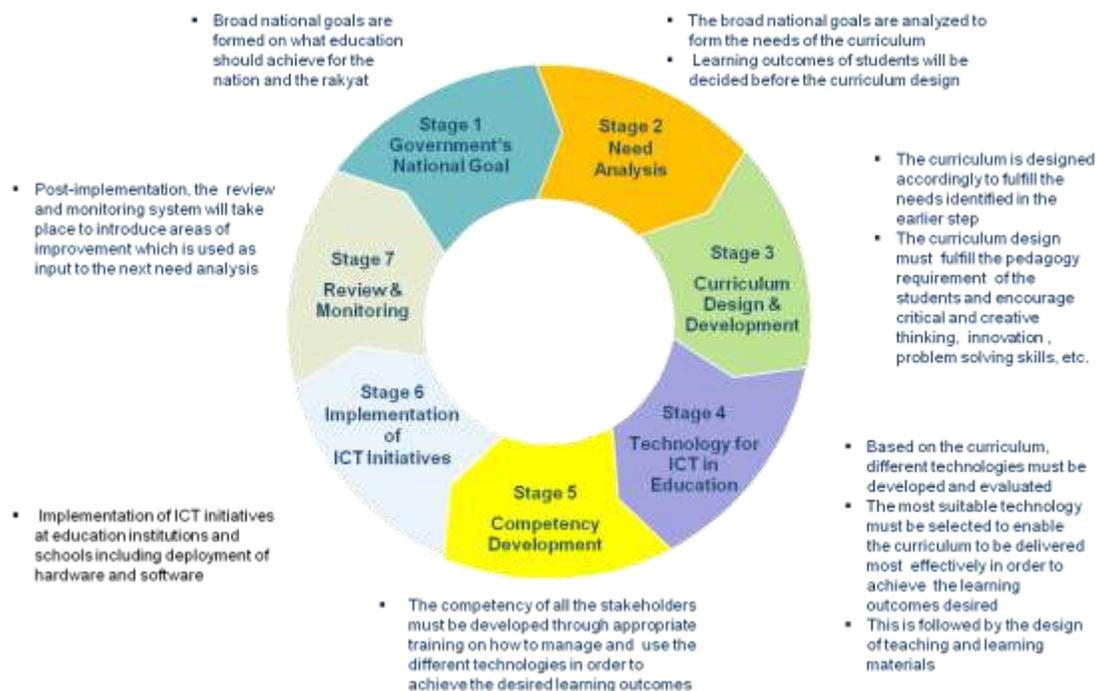


Figure 9 : Process Flow of ICT in Education

## Stage 1: Government's National Goal

### *Roles and Responsibilities of Council of Ministries*

- i. Form broad national goals on what education should achieve for the nation in relation to the National Philosophy of Education, GTP, NEM, RMK10
- ii. Align the aspiration of the nation with the requirements of the rakyat with the emphasis on 1Malaysia concept "People First, Performance Now", and the concept of Sustainability, Inclusiveness and High Income Nation through a knowledge-based economy

## Stage 2: Need Analysis

### *Roles and Responsibilities of MOE*

#### **Roles and Responsibilities of the Education Planning and Research Division (EPRD)**

- i. Analyze broad national goals and policies and map the national aspirations into the need of the curriculum
- ii. Conduct research and strategic evaluation in resolving issues pertaining to integrating ICT in education
- iii. Identify, evaluate and analyze the intervention of ICT in education policies
- iv. Coordinate information related to 'ICT in Education' to aid in Parliamentary affairs and education planning

- v. Ensure the continuity of integration of ICT in education and ensure that it happens in a holistic manner from pre-school to university level by having consultation with the authorities governing institutions of higher learning

#### ***Roles and Responsibilities of COP***

- i. Provide input and share knowledge in free-flowing, creative ways that foster new approaches and can contribute to strategic decisions, accelerate implementation, solve problems, promote the spread of best practices and develop people's skills

### **Stage 3: Curriculum Design**

#### ***Roles and Responsibilities of MOE***

#### **Roles and Responsibilities of the Curriculum Development Division (CDC)**

- i. Develop the curriculum with the integration of ICT as a critical enabler
- ii. Disseminate the curriculum
- iii. Review and revise the curriculum
- iv. Ensure the continuity of integration of ICT in education and ensure that it happens in a holistic manner from pre-school to university level by having consultation with the authorities governing institutions of higher learning

#### **Roles and Responsibilities of the Examination Syndicates (ES)**

- i. Develop the assessment of learning and align it with the curriculum that has included the integration of ICT in education

## ***Roles and Responsibilities of COP***

- i. Provide input and share knowledge in free-flowing, creative ways that foster new approaches and can contribute to strategic decisions, accelerate implementation, solve problems, promote the spread of best practices and develop people's skills

## **Stage 4: Technology for ICT in Education**

### ***Roles and Responsibilities of MOE***

#### **Roles and Responsibilities of the Educational Technology Division (ETD)**

- i. Analyze and define technological and infrastructural requirements based on user requirements and feedback from the COP
- ii. Define the specifications for procurement of technology and infrastructure including ICT hardware, tools and applications
- iii. Plan and strategize with regards to the development of teaching and learning materials in accordance with user requirements
- iv. Disseminate the most-updated teaching and learning materials to all the schools and education institutions, prepare and provide guidelines for teachers on the use of technology
- v. Coordinate and update training agencies with the latest development on the integration of ICT in education

## **Roles and Responsibilities of Institute of Teacher Education (ITE), Teacher Training Division (TTD) and Aminuddin Baki Institute (ABI)**

- i. Provide useful feedback at the development stage for teaching and learning materials based on feedback gathered from trainees during training conducted for teachers and school heads

## ***Roles and Responsibilities of COP***

- i. Provide feedback on choice of technology to suit different user groups' needs from different geographical locations
- ii. Provide feedback on user requirements in terms of teaching and learning materials in view of the use of technology for integration of ICT in education
- iii. Provide feedback on challenges faced with the use of ICT in teaching and learning
- iv. Provide input and share knowledge in free-flowing, creative ways that foster new approaches and can contribute to strategic decisions, accelerate implementation, solve problems, promote the spread of best practices and develop people's skills

## **Roles and Responsibilities of the Information Management Division (IMD)**

- i. Provide an integrated management information system to support MOE including the Educational Technology Division (ETD) and the State Education Departments

- ii. Ensure that education management and administration system implemented at schools can be integrated with MOE
- iii. Plan and strategize with regards to the development of data management system in accordance with user requirements
- iv. Manage the central data centre that contains all the data for MOE, schools and education institutions

## **Stage 5: Competency Development**

### **General Policy**

The various divisions in MOE should communicate, update and align all the trainings in all agencies for competency development of relevant stakeholders.

### ***Roles and Responsibilities of MOE***

### **Roles and Responsibilities of Institute of Teacher Education (ITE)**

- i. Conduct and manage the teacher training for pre-service training program and assist teachers in developing skills to integrate ICT in education to improve student outcomes
- ii. Inculcate the culture of integrating ICT in education as part of the daily teaching and learning process

- iii. Train teachers on how to use ICT to improve students' creativity, innovativeness, analytical skill and problem-solving skill

## **Roles and Responsibilities of Teacher Training Division (TTD)**

- i. Design and implement a comprehensive in-service training programme of continuous development in the integration of ICT in teaching and learning for teachers and IT coordinators
- ii. Incorporate the latest development trends of pedagogical innovation with regards to integration of ICT in teaching and learning
- iii. Facilitate teachers' professional development through the sharing of best practices, learning circles, action research and publications relating to ICT in teaching and learning
- iv. Train MOE officers on topics relating to ICT in education but where the required competency of trainers is not available internally, TTD can appoint external trainers

## **Roles and Responsibilities of Human Resource Management Division (HRMD)**

- i. Train non-teachers in MOE on topics relating to ICT in education but where the required competency of trainers is not available internally, HRMD can appoint external trainers

## **Roles and Responsibilities of Aminuddin Baki Institute (ABI)**

- i. Conduct and manage training for in-service training program and assist heads of schools and education institutions in developing skills to manage an 'ICT in Education' environment
- ii. Train heads of schools and education institutions on how to inculcate the culture of integrating ICT in education among teachers and students as part of the daily teaching and learning process
- iii. Train heads of schools and education institutions on how to encourage teachers to use ICT to improve students' creativity, innovativeness, analytical skill and problem-solving skill

## **Roles and Responsibilities of Institutes of Higher Learning (IHL)**

- i. Conduct and manage training programs for heads of higher learning institutions and lecturers in developing skills to manage an 'ICT in Education' environment
- ii. Inculcate the culture of integrating 'ICT in Education' among lecturers and students in higher-learning education institutions as part of the daily teaching and learning process
- iii. Train heads of higher-learning education institutions on how to encourage lecturers to use ICT to improve students' creativity, innovativeness, analytical skill and problem-solving skill

## Stage 6: Implementing ICT Initiatives

### *Roles and Responsibilities of MOE*

#### **Roles and Responsibilities of the Educational Technology Division (ETD)**

- i. Implement all ICT initiatives at schools and education institutions level
- ii. Deploy hardware and software to schools and education institutions

#### **Roles and Responsibilities of the School Management Division (SMD)**

- i. Ensure that the basic infrastructure including physical facilities are adequate to allow the effective use of ICT for teaching and learning
- ii. The coordination of basic infrastructure for other types of schools and education institutions are managed by the 10 Divisions under the Operation Sector.

## Stage 7: Review and Monitoring

### *Roles and Responsibilities of MOE*

#### **Roles and Responsibilities of the Educational Technology Division (ETD)**

- i. Monitor the effectiveness of the use of ICT in teaching and learning, ensure the optimal use of ICT and also to identify best practices in the integration of ICT in teaching and learning and administration

**Roles and Responsibilities of Inspectorate of Schools (IS)**

- i. Monitor the quality of teaching and learning processes using ICT as an enabler as part of the regular school and education institution's inspection

**Roles and Responsibilities of the State Education Department (SED)**

- i. Monitor the contribution of the integration of ICT in teaching and learning to the total academic performance of schools

Note: Other divisions in MOE will also perform review and monitoring at the school level relevant to their functional roles with regards to ICT in education

***Roles and Responsibilities of Heads of Schools and Education Institutions / Deputy***

- i. Enforce the use of ICT by all teachers
- ii. Liaise with relevant MOE divisions on how to enhance the use of ICT in education through the implementation of ICT initiatives
- iii. Create, manage and organize a conducive environment for ICT in educations
- iv. Monitor the performance of the school administrators, ICT coordinators and ICT technicians and ensure rectification is implemented if performance level drops below KPI level

- v. Evaluate and monitor teachers' utilization rate in relation to using ICT as an enabler for teaching and learning
- vi. Send periodic update to the state level of MOE on the teachers' utilization rate of ICT as an enabler of education
- vii. Participate as part of the committee in measuring teachers' KPI in relation to teachers' performance in the deployment of ICT as an enabler for education

### ***Roles and Responsibilities of School Administrators***

- i. Play a role as a responsible user in terms of using ICT as an enabler for school administration / management with regards to finance and budgeting, school assets inventory, teachers and students' attendance, school activities organization, and others
- ii. Enhance the efficiency level, productivity and coordination with MOE and other authorities through the use of ICT as an enabler

### ***Roles and Responsibilities of Teachers***

- i. On top of being imparters of knowledge, teachers must play the key role of facilitator who will recommend and guide the students in using ICT as an enabler of education in order to reach a wider source of information and gather more knowledge, according to pedagogical requirements
- ii. Play the role of knowledge managers and store the knowledge in forms that can be accessed through the use of ICT tools and applications by students

- iii. Develop teaching and learning strategies that will deploy ICT as an enabler
- iv. Play the role of a facilitator of innovative and creative way of learning using the latest ICT technology
- v. Clearly-communicate the benefits of using ICT as an enabler for education to parents
- vi. Encourage parents to provide ICT facility at home so that students will have a continuity in terms of ICT environment readiness in order to learn effectively
- vii. Encourage the use of ICT for life-long learning among students

***Roles and Responsibilities of ICT Coordinators***

- i. Play a role in championing the use of ICT as an enabler in education through the mentor model by showing good practices to other teachers
- ii. Play a role of trainer to other teachers by imparting important knowledge & skills learned from training attended
- iii. Play a role of encouraging the use of ICT in education by regularly meeting with other teachers and coaching them on the various methods that can be deployed in order to promote greater creativity and innovation among students

ICT coordinator's role in strategic leadership and management across subjects to promote the use of ICT in teaching and learning:

- iv. Coordinate the effective use of ICT across the whole curriculum and encourage the use of ICT in the aspect of cross-curricular planning
- v. Coordinate with the ICT subject leader on identifying ways of which ICT can support the teaching and learning of other subjects and how these subjects can contribute to the teaching and learning with ICT playing the role as an enabler
- vi. Guide, oversee and manage the school's ICT technician

### *Roles and Responsibilities of ICT Technicians at Schools and Educational Institutions*

#### **General Policy**

ICT technician must be deployed to schools and educational institutions depending on student population size to provide reliable first (1<sup>st</sup>) level of troubleshooting and maintenance support services

- i. Play a role of being responsible for general maintenance of computer equipment and for the resolution of technical problems and safe keeping of all ICT equipment deployed in training institutions
- ii. Play a role of being responsible to ensure all ICT equipment are functioning in proper order in accordance with existing guidelines and procedures

- iii. Escalate the unsolved technical troubleshooting and maintenance problems to second level support and observe and closely monitor the SLA with the appointed vendors
- iv. Define the specification for the procurement of basic ICT spare parts (for example mouse, Unshielded Twisted Pair (UTP) cable, keyboard) and make recommendation to the heads of schools or education institutions / deputy for replacement
- v. Seek official approval need to be sought from the heads of schools or education institutions / deputy in line with the procurement guidelines and regulations contained in the policy on ICT in education and existing procurement guidelines for purchases of recommended ICT spare parts

### c. Capacity Building and Professional Development

#### **General Policy**

Training for MOE officers, heads of schools or education institutions / deputy, school administrators, teachers and ICT coordinators should include modules on improving service delivery through the use of ICT in education management and administration to generate & communicate direct benefits to the community

- All stakeholders including relevant MOE officers, heads of schools or education institutions / deputy, school administrators, teachers, ICT coordinators and ICT technicians shall be up-skilled and equipped with the 21st century skills based on their level of competency on ICT in Education

- Selection, tracking and monitoring of training needs must be based and matched to the level of competency of trainees
- All teachers and students must meet the required minimum standards of ICT skill in enabling education that prevails at that time where the minimum standards can be set and adjusted from time to time by MOE and the schools to suit user requirement and the school environment
- Training on understanding technology and application of technology for education must be provided to all relevant stakeholders
- Training attended should be captured as part of KPI for all relevant stakeholders, i.e. MOE officers, heads of schools or education institutions / deputy, school administrators, teachers, ICT coordinators and ICT technicians
- There must be a sharing platform where heads of schools or education institutions / deputy, school administrators, teachers and ICT coordinators who have been trained must share knowledge acquired from the training with other teachers
- All recognition and reward schemes must be linked to KPIs
- KPIs should also cover assessment of teachers' creativity to develop their own digital learning resources upon completing the appropriate training courses on technology application
- Progressive career development path shall be established for key stakeholders for talent retention

***MOE Officers***

- Training for MOE officers from relevant divisions, state level and district level officers should include areas on how to acquire appropriate ICT skills based on their roles and responsibilities
- Where high technology is being deployed and technical expertise is required from external experts, the possibility of outsource would require MOE officers to be able to liaise with vendors on user requirements by having a good grasp of knowledge in the required technology area

***Heads of Schools and Education Institutions / Deputy Head***

- Training for heads of schools and education institutions / deputy should include areas on how to administer and manage an ICT environment

***School Administrators***

- Training for school administrators must include content to administer and assist the heads of schools or education institutions / deputy to manage an ICT environment especially with regards to education management and administration systems

***Teachers***

- Training for teachers should include areas on equipping them with the skills to act as facilitators to students on how to use ICT as an enabler for education
- Training for teachers should include awareness / perception of importance of ICT in education and this can be done through various approaches e.g. campaigns

- Training for teachers should include examples of how ICT can be integrated in teaching and learning and this should be emphasized in the pre-service and in-service training programmes
- Time / resources allocation for training and continuous professional development (CPD) of teachers for the purpose of promoting the use of ICT as enabler for education should be made on an adequate basis

#### *ICT Coordinators*

- Training for ICT coordinators should emphasize upon the skill on how to transfer knowledge to other teachers in terms how to use ICT as an enabler for education
- Training for ICT coordinators should cover relevant skills related to the ICT equipment and applications deployed in schools and educational institutions
- A detailed roadmap must be prepared to ensure the training of ICT coordinators are conducted at regular intervals and the training content are relevant and updated in line with ICT in education initiatives implemented in schools and education institutions

#### *ICT Technicians*

- Training for ICT technicians should cover methods of diagnosing and resolving technical issues for technical troubleshooting at the first level support for all ICT initiatives deployed at schools and educational institutions
- Training for ICT technicians should cover technical skills required for ICT maintenance and support, skills required for performing yearly health check for

all equipment, software and applications deployed at schools and educational institutions

- Training for ICT technicians should cover updated information about the latest ICT in education initiatives deployed at schools and educational institutions

## II. Budget

### a. Tangible Outcomes

- Improve efficiency and effectiveness with regards to the planning and implementation of procurement and budgetary aspect of ICT in education with focus on ROI
- Ensure sustainability of all ICT in education initiatives by considering Total Cost of Ownership (TCO)

### b. Budgetary Consideration for Procurement of ICT in Education initiatives related expenditure

- Policy caveat: Procurement of ICT products and services should comply with existing procurement policies and financial standing instructions
- The procurement of ICT infrastructure, hardware and software, and other enabling infrastructure can also come from various sources, for example private finance initiatives (PFI), public private participation (PPP) and corporate social responsibility
- All schools should devise a suitable ICT plan based on specific requirements based on its geographical location i.e. urban versus rural areas, types of schools, number of students

- Any ICT plan devised should contain cost-effective elements on how to maximize value out of investment made and keep the operational cost at the lowest, for example, below commercial rates
- When comparing different alternatives for purchase, the total cost of ownership of various options should be gauged and compared before the selection of vendor is made
- The procurement of ICT infrastructure, hardware and software, other enabling infrastructure, and even maintenance service and spare part must be made based on procurement strategy incorporating the principles of total transparency
- For gathering input before procurement is undertaken, one representative from the Community of Practice (COP) must be present to ensure that the voice of the community is heard
- The procurement decision of major ICT items should be decided and funded by a central budget in accordance with existing procurement policy and guidelines
- The procurement execution (e.g. Ordering, Delivery and Receipt etc) can be undertaken at local levels (state levels, district levels and school levels) whenever it is a more cost-effective and time-effective option
- Technology specification must be clearly communicated to all vendors in order to ensure only prudent purchases are made
- End-to-end solutions must be proposed (including post implementation support and training) for all ICT initiatives to ensure the sustainability of the ICT initiatives implemented

- Baseline budget for all types of schools can be allocated on par but on top of that, additional budget may be requested since different schools may have different needs
- Application for additional allocation of budget should be made to MOE as per existing policy and guidelines
- Vendor selection should be made on the principle of a multi-vendor environment and wherever possible, a single-vendor environment should be ruled-out

#### **c. Total Cost of Ownership**

- The federal and state level should make adequate budget allocation to cover the TCO for all ICT initiatives rolled-out for education to ensure effective use of ICT tools and applications in all schools and education institutions
- Based on the TCO analysis, ROI must be tracked and monitored ensuring adequate benefits realization

#### **d. Public Private Partnership**

- Public-private-partnership (PPP) should be encouraged wherever possible to allow greater participation and contribution from the private sector in accordance with existing policy and guidelines
- Special Purpose Vehicle (SPV) should be considered for deployment for ownership with regards to basic infrastructure, ICT infrastructure, hardware and software, digital learning resources and training

- The support of the private sector should be properly-acknowledged and sustained through good communication on the progress and benefits of ICT initiatives that are jointly-owned by the government and private sector
- Where voluntary services are offered by the private sector for the benefit of integrating ICT in education, programs and mechanism through which the voluntary services can be implemented can be proposed by the state and district education offices and then escalated to MOE for acknowledgement

### **III. Digital Learning Resources**

#### **a. Tangible Outcomes**

- Improve quality and relevance of Digital Learning Resources by adoption of a life-cycle approach
- Increasing uptake and usage of content and materials by focusing on user requirements in all developmental work

#### **b. Process Standards and Lifecycle Approach for the Development of Teaching and Learning Materials**

- The development of teaching and learning materials should focus on addressing complex topics and concepts that are difficult to be visualized and simulated in the classroom
- Modular approach in development of content must be established to ensure that teachers use resources creatively to meet the students' needs wherever possible

- The main outcome of content development must be geared towards increasing classroom participation and increasing student's knowledge and skills
- The development of teaching and learning materials must not be characterized as "one size fits all" to observe the different needs from different types of schools and education institutions
- The creation of teaching and learning materials should focus on the development of learning objects that can be selected to suit the requirements of different types of students from different school and education institutions' environments
- Teaching and learning materials developed should not come in the form of a forced-feed course / fixed learning package
- The content creation process must adopt a lifecycle approach which covers key stages from need analysis to user acceptance test and finally implementation
- User feedback mechanism should be incorporated throughout key stages of the lifecycle approach
- Process standards must be followed during the development of teaching and learning materials
- Qualified Instruction Designers (ID) and content developers with the right competency must be engaged for the different stages of digital content development
- COP's feedback and suggestions must be sought and incorporated wherever applicable at the point of creation of teaching and learning materials
- Moving forward, more detailed plans should be drawn to turn the policy into action that will bring the desired learning outcomes, such as a blueprint and

implementation plan on areas, such as for example, e-media and software applications

### c. Teaching and Learning in Educational Institutions

#### *Pedagogy and Curriculum*

- The curriculum should focus on honing 21st century skills to generate productive workforce i.e. with digital age proficiency and technology awareness
- The curriculum should also focus on creative thinking and learning
- The curriculum should focus on integrating ICT in Education where ICT is applied consistently and continuously in schools and education institutions
- Pedagogy should focus on the inclusion of the optimal use of ICT tools and applications in education
- Teachers' competency must be developed during pre-service teachers training with a focus on 'delivery of knowledge with the use of ICT as an enabler' to implement effective pedagogy

#### *Teaching – Learning Strategy and Process*

- Qualified Instruction Designers (ID) with the right competency must be engaged to craft teaching-learning strategy and process
- To deploy and effectively use ICT as an enabler, the contribution of COP must be included in the formation of teaching-learning strategy and process

**Assessment**

- Online assessment of learning and digital storage of assessment results, including for school-based assessment, should be implemented as far as possible
- Assessment results should be made accessible online or via mobile to allow parents and students greater ease of obtaining information
- Other useful information pertaining to assessment of learning, for example, the assessment centre (location), date and other important details should also be made accessible online or via mobile as far as possible to allow parents and students greater ease of obtaining information

**IV. Infrastructure****a. Tangible Outcomes**

- Improve maintenance and support of infrastructure investment by allowing teachers to focus on core deliverables
- Provide infrastructure readiness for all (no schools left out)
- Allow schools to take a leap forward in adopting ICT tools and applications

**b. ICT Infrastructure****Technology Assessment**

- Appropriate, practical and managed technology suited for education must be selected in order to ensure a good return on investment (ROI)

- The deployment of technology must be user-driven with the input and feedback gathered from the Community of Practice (COP)
- Only proven and tested ICT technology should be deployed for education
- Infrastructure provision must provide for special students who may require different technology applications
- Infrastructure must be ready for all teachers in all locations to access Learning Management System to obtain the required teaching and learning materials
- Education Technology Planning must be developed by investing in an internal research and development (R&D) team that will be responsible for investigating key industry technology developments, conducting benchmark testing for new solutions and experimentation of solutions via Proof Concept Testing and sharing of knowledge through the COP
- Technology best practices should be shared among schools in the same zone to point the direction for schools that need guidance for the right use of the right technology for education
- Development and application of policy for technology and infrastructure relating to ICT in education must not be characterized as “one size fits all”.
- The optimum ICT infrastructure should be defined by MOE based on the size of the schools and education institutions and user requirements
- The provision of technology and infrastructure should be made in reference to the NORMA standard and guidelines already put in place

- Technology and infrastructure must support the ICT in education initiatives for effective usage of digital learning resources
- Interoperable, cost-effective and easy-to-use technology must be applied in each phase of implementation of any ICT initiative for education
- Every 3 years, assessment of deploying new technology will be made and a revision of existing technology can be undertaken if necessary
- A yearly Health Check must be performed in all schools and education institutions.
- Heads of schools and education institutions must be responsible for all ICT resources in their school premises by keeping an inventory record of all software and hardware in their education institutions for any external audit performed by MOE
- All ICT in education initiatives implemented must operate in a secure cyber environment protected by the necessary security measures in compliance with existing cyber securities policies in place
- A Centre of Excellence (COE) focusing on identifying and continuously-innovating the use of advanced ICT technology in education can be established to boost Malaysia's image as a world-class leader for technology application in education
- Infrastructure and connectivity should be componentized and managed with the combination of centralize and distributive model

### *Hardware & Software*

- Free ware, free and open source software applications will be preferred and tested to be free of spyware and malware
- Creation and widespread dissemination of software compilations, including specialized software for different subjects, simulations, virtual laboratories, modeling and problem solving applications will be encouraged
- Adoption of a Service Oriented Architecture for application deployment for ICT in education should be encouraged
- Standardize development platform(s), language(s), toolset(s) and a common methodology should be deployed as far as possible
- Applications deployed in MOE should be scalable and flexible to support continuous growth of ICT in Education

### *Network Connectivity*

- Basic infrastructure to support network connectivity and a minimum of 4MB connectivity speed must be provided for all schools and education institutions
- Moving forward, more detailed plans should be drawn to turn the policy into action that will bring the desired learning outcomes, such as a blueprint and implementation plan on network connectivity

### *Technology and Infrastructure for Education Management and Administration*

- Technology and infrastructure deployed must be able to support the education management and administration

- Software and applications deployed in MOE should be integrated wherever possible to disseminate useful information effectively between departments and relevant stakeholders
- Data will be captured once at source, but information will be available at a centralized knowledge management system and made accessible for all relevant divisions to generate greater coordination wherever possible

### **c. Enabling Infrastructure**

- All schools and education institutions must be provided with basic enabling infrastructure and MOE must regularly update the list of schools which do not possess the basic enabling infrastructure

### **d. Maintenance and Support Services**

#### ***Post Implementation Support Services***

- The CPM will act as an independent party responsible for vendor management to ensure the SLA standard is adhered to by all the vendors
- The vendor management unit should track and record the compliance of post implementation service contract by vendors
- The name of vendors which do not fulfill the contract and SLA will be black-listed and will not be considered for future contracts to ensure timely and effective maintenance and support services are rendered to all schools and education institutions

- There should be a set of Standard Operating Procedures (SOPs) for the management of the maintenance and support services plan at MOE level and schools and education institutions level and the SOPs should be clearly-communicated to all stakeholders

### **Helpdesk**

- The helpdesk that provides the response to all ICT problems lodged by schools and education institutions must be managed by full-time and dedicated professionals who can provide prompt response and follow-up to education institutions
- The personnel managing helpdesk must be professionally-trained in managing maintenance support helpdesk
- As far as possible, local helpdesk including the call centre and vendor maintenance support centre should be in place to provide localized support
- There should be a feedback channel for the users to measure the satisfaction upon services received for support services and vendor performances, for example a Customer Satisfaction Index (CSI) can be implemented

## **9. ICT for Special Groups**

- I. ICT for Special Education (including juveniles, aborigines and students with special needs)**
  - ICT tools and devices such as screen readers and ‘*embosse*’ will be part of the ICT infrastructure provided to schools for students with special needs

- Teachers in schools for students with special needs will be trained and sensitized to issues specially-related to the use of ICT in teaching students with special needs
- All teachers in schools for the students with special needs will be provided with ICT-enabled methods during training and their course of professional development
- Web based digital repositories should be deployed to address the lack of availability of resources for students with special needs

## II. ICT for Technical and Vocational Education

- The institutions offering vocational courses should also seek to integrate ICTs in their skill development courses to improve students' performance
- Students should be able to leverage on ICT tools, applications and digital resources at any time
- Where feasible, job-oriented courses should fully leverage on the advancement of ICT technology to ensure students can fit the requirements of the job market
- Some forms of partnership with the private sector to develop suitable software platform, tools and applications can be made to facilitate the digital learning resources required for specific skill development
- The integration of ICT can be extended to include the development of central portal that links up all the vocational schools and provides useful information on skill development, distance - learning system, and online evaluation and certification system

## 10. Education Management and Administration System

- Sufficient development and supporting resources must be made available to ensure continuity and sustainability of Education Management and Administration
- The Education Management and Administration should deploy ICT to maximize efficiency and productivity of day-to-day administration of the schools and education institutions
- Communication of information should be streamlined and duplication of electronic and manual reports between the schools and education institutions and MOE / other ministries should be avoided where possible
- Encourage the usage of email as medium of communication due to its reliability and fast connection
- Reports prepared by teachers and submitted to heads of schools and education institutions must be made using ICT as a tool and enabler as far as possible so that no duplication of manual work needs to be undertaken
- The Education Management and Administration should deploy ICT to improve learning by implementation and utilization of Learning Management System
- MOE should encourage the use of ICT in all schools and education institutions to improve the delivery of services as part of public services to the community in accordance with national policies and aspirations
- MOE and schools should maximize the use of ICT to improve the delivery of services to the community especially the parents, for example through the use of ICT to enable online registration of standard one students and to facilitate request for transfer of students from one location to another

- All education management systems must have a check-and-balance mechanism attached to it
- There must not be “one size fits all” approach in the implementation of education management and administration system

### **11. Community Involvement (Parents, Alumni, Private Sector)**

- Process improvement should be undertaken by using ICT to improve the delivery of services to the community so that the community especially the parents can directly experience the benefits of ICT in the education management and administration, for example the ability to perform online registration of standard one students and to perform online request for transfer of students from one location to another
- All ICT initiatives (impacting learning) implemented at schools, its objectives, benefits and working should be communicated regularly by the respective schools and education institutions
- Parents should be reached through multiple ICT channels, for example, with the use of email and SMS, or through information published in the school and education institution’s website
- Parents should be allowed access to relevant information e.g. student performance and services (book list registration etc.) pertaining to their children
- There must be an engagement platform, for example formal set-up periodic meetings for stakeholders (parents, alumni, industry, etc.) to contribute to the ICT in education system improvement

- There must be a mechanism for measuring and monitoring the satisfaction of parents, for example, a Parent Satisfaction Index (PSI) to ensure that the community is engaged actively and their feedback taken into consideration

## 12. Implementing and Managing the Policy

### General Policy on Implementing and Managing the Policy

- The policy will stand as good as a policy if not well-implemented and well-managed. Moving forward, more detailed plans should be drawn to turn the policy into action that will bring the desired learning outcomes, such as an education technology roadmap, blueprints and implementation plans covering important areas such as connectivity, e-media / application and others.
- Additionally, there must be proper Change Management and Business Process Reengineering (BPR) in place to ensure that the policy on ICT in education can be implemented successfully without major glitches and supported with greater acceptance from all relevant stakeholders.
- There must be clear division of focus between Education and ICT where the overall concept of management and implementation of policy is concerned where:
  - the Ministry of Education (MOE) focuses primarily on the key elements of pedagogy i.e. curriculum and assessment
  - the Central Program Management (CPM) focuses on primarily managing and seeking the support from external professionals / experts with regards to areas such as hardware, software, network connectivity and also competency development that are related to ICT in Education

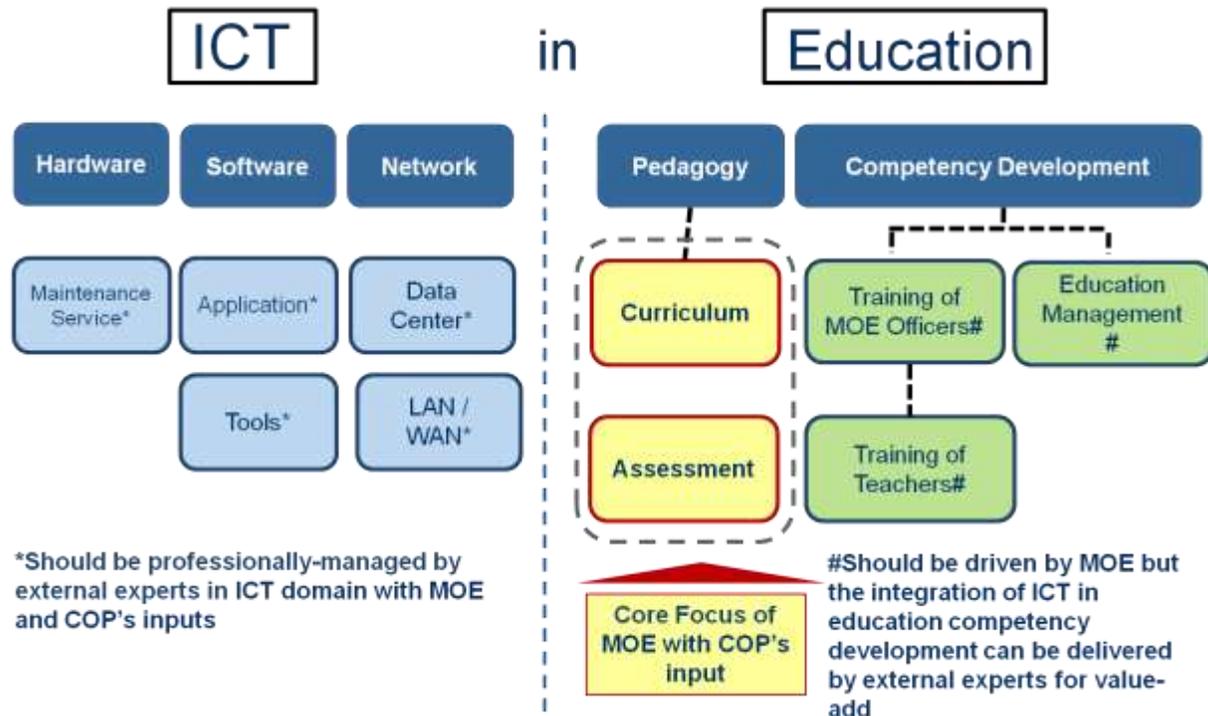


Figure 10: The Need for a Clear Division of Focus between Education and ICT

### I. Governance Mechanism and Central Programme Management (CPM)

- A Central Program Management (CPM) should be established to professionally program manage ICT in education initiatives
- CPM should perform key functions with relation to ICT in Education and should be staffed with members who are professionals with professional expertise, skill set, knowledge and experience in implementing large-scale program management for ICT in education
- CPM should be a corporatized entity that manages the service delivery for ICT in education with full-time members and has a direct reporting line to CEO of MDeC and the Secretary-General of MOE

- CPM will act as the central coordination, planning and execution body for the management of ICT in education
- There should be a good governance mechanism which is completely transparent to all stakeholders involved in ICT in Education
- The governing body should oversee and manage all initiatives pertaining to ICT in Education
- CPM will analyze all the data gathered by the various divisions in MOE during their review and monitoring work and provide useful and meaningful interpretation of the data to identify areas of improvement
- CPM should be responsible to monitor the key performance indicators of relating to:
  - ❖ Vendor Management & Monitoring of SLA
  - ❖ Performance Level of ICT Delivery Services
  - ❖ Evaluation of School Review and Monitoring data
  - ❖ Risk Management
  - ❖ Crisis Management
  - ❖ Co-design and monitor programme management competency development

## II. Importance of Monitoring Key Performance Indicators (KPIs)

- A comprehensive set of Key Performance Indicators (KPIs) that are driven by the tangible outcomes of each pillars of delivery supporting the ICT in Education i.e. Human Capital, Budget, Digital Learning Resources and Infrastructure must be designed to measure the performance of relevant MOE officers, Heads of Schools and Education Institutions / Deputy, Administrators, Teachers, ICT

Coordinators and ICT Technicians in relation to their roles and responsibilities with regards to ICT in education

- Criteria, performance measures, methodology for assessment, periodicity and manner of reporting should be identified for the purpose of KPIs assessment
- Monitoring should be performed as an ongoing process to facilitate the effective functioning of the role of ICT in education and to remove inefficiencies
- In addition to monitoring, it is critical that a thorough evaluation of infrastructure, digital learning resources, capacity building and overall management of ICT in education is conducted
- The Smart School Qualification Standards (SSQS) must be used in all the schools to measure the performance of schools in relation to the ICT in education
- Revision and improvement to the SSQS framework can be made as and when necessary

### **III. Recognition and Reward Programmes Linked to KPIs**

- There must be a holistic approach in the formulation of reward and recognition programs to inspire all the stakeholders to contribute to ICT in education
- The support of Central Agencies such as MOF, MAMPU and EPU should be leveraged to support the reward and recognition program
- Schools with best practices with regards ICT in education must be recognized and rewarded in a tangible manner by MOE

- The performance measurement and recognition mechanism must consider the differences between different types of schools during the design of recognition and reward program

#### **IV. Policy Review**

- To accommodate the dynamism and rapid pace of development in the ICT landscape, the policy for ICT in Education is equipped with a review mechanism to revise and modify its content
- Any policy review must seek the input and approval of senior management in MOE and inputs from the community must be gathered to support the review
- Where applicable, input from review and monitoring performed on schools and education institutions can be used to form input for policy review
- Timeline for revising the policy is once every five years or earlier if necessary

### 13. Glossary

#### ICT

ICT stands for Information and Communication Technologies and are defined as a “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information”. These technologies include computers, the Internet, broadcasting technologies (radio and television) and telephony (UNDP, 2000)

The term, Information and Communication Technologies (ICT) refers to forms of technologies that are used to create, store, share or transmit, exchange information. This broad definition of ICT includes such technologies such as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software, as well as the equipment and services associated with these technologies, such as video conferencing and electronic mail (UNESCO 2002)

Information and Communication Technologies (ICT) consist of the hardware, software, networks, and media for collection, storage, processing, transmission and presentation of information (voice, data, text and images) as well as related services. ICTs can be divided into two components, i.e. Information and Communication Infrastructure (ICI) which refers to physical telecommunications systems and networks (cellular, broadcast, cable, satellite, postal) and the services that utilize those (Internet, voice, mail, radio and television) and Information Technology (IT) that refers to the hardware and software of information collection, storage, processing and presentation (WORLD BANK 2002)

For the Malaysian education context, ICT is defined as “all digital resources including tools, applications and learning objects, which are deployed as enablers for effective teaching and learning and education management which ultimately encourages creativity and innovation towards achieving a knowledge-based economy”.

**Integrated**

In the ICT in education context in Malaysia, integration of ICT in education refers to the use of ICT as a powerful tool in the teaching and learning process. Where useful, technology is integrated in the curriculum in such a way that it aligns teaching goals with students' requirements. ICT integrated in education refers to the entrenchment of ICT as part of education during the entire process of teaching and learning across all subjects in all levels of education institutions. In other words, ICT is part and parcel of education and it delivers a major impact to the way of doing things for all stakeholders. The most direct impact aimed for integrating ICT in education is to create students who are more creative, innovative and productive from all disciplines through the amalgamation of ICT in education in a holistic manner.

**Schools**

In the ICT in education context in Malaysia, schools refer to all of the following types:

- Pre-school
- Primary School
- Secondary School

**Education Institutions**

In the ICT in education context in Malaysia, education institutions refer to all of the following types:

- Fully Residential Schools
- Technical Secondary Schools
- Vocational Secondary Schools
- Religious National Secondary Schools
- Special Education Schools

- Sport Schools
- Art Schools
- Private Educational Institutions
- Teacher Training Institutes
- Matriculation Colleges

### **21<sup>st</sup> Century Skills**

In the education context, 21<sup>st</sup> century skills refers to the skills required to address the new requirements in the modern teaching and learning scenarios in the digital age with the emergence of new technology innovations. It refers to the proficiency in using digital devices that are powered by new ICT technologies in education institutions to allow a more effective teaching and learning process to take place. It involves stronger creativity, thinking skills, reasoning and innovation using ICT as an enabler as compared to the conventional teaching methods that were not supported by ICT.

### **Central Program Management (CPM)**

The CPM is an independent, autonomous and empowered body which consists of full-time professionals with the right knowledge, experience and skill-set to manage the implementation of ICT initiatives in education institutions. The CPM is a corporatized entity that manages the service delivery for ICT in education which is well-equipped with program management expertise. The CPM should be equipped with project management capabilities through a professional, full time Program Manager which has experience and qualification in large scale project management ICT in education and full time team members who are exposed and experienced in implementing ICT in education with Project Management skill. The major role of the CPM is to act as the central coordination, planning and execution body for the management of ICT in education.

**Change Management**

In the ICT in education context, change management is a systematic approach to dealing with change that arises out of implementation of new initiatives with regards to ICT initiatives in education. Change management in this context, will typically involve management of change agents, encouraging the adaptation to change, facilitating change to take place effectively and efficiently by involving stakeholders in change management programs. Change management also involves implementing procedures and/or technologies to deal with changes in the external and internal environment and to leverage on opportunities that arise out of it.

**Business Process Re-engineering**

In the ICT in education context, Business Process Re-engineering (BPR) refers to a systematic, disciplined improvement approach that critically examines, rethinks, redesigns, and implements the redesigned processes of integrating ICT into teaching and learning (T&L).

BPR's goal is to achieve dramatic improvements in performance in areas important to customers and other stakeholders. BPR is also referred to by such terms as business process improvement (BPI) or business process development, and business process redesign. While the term can be applied to incremental process improvement efforts, it is more commonly and increasingly associated with dramatic or radical overhauls of existing business processes. BPR typically relies on information technology to achieve breakthrough results.

(Source: The University of British Columbia)

**Community of Practice (COP)**

The COP is a group of heavy users of technology and applications deployed in educational settings. Representatives from MDeC, MOE, IHLs, industry, teachers, IT Coordinators, administrators should also form a part of this community. Members of the COP must come

from a diverse range of background in order to represent varied users' requirements from different geographical locations and circumstances, adequately.

### **Education Management**

Education management refers broadly to all areas of education institution management, the liaison between education institutions and relevant government ministries and agencies, education institutions' liaison with the community (parents, alumni and the private sector).

### **Customer Satisfaction Index (CSI) for Helpdesk**

In the ICT in education context, the Customer Satisfaction Index (CSI) measures the degree of satisfaction of users (head of schools / deputy, teachers, administrators, technicians) on the level of service provided by the Helpdesk to them based on their request for IT troubleshooting logged.

### **Parents Satisfaction Index (PSI)**

In the ICT in education context, the Parents Satisfaction Index (PSI) measures the degree of satisfaction of parents a part of the community in terms of reaping the benefits of ICT initiatives implemented at education institutions where their children are being educated.

### **Risk Management**

In the ICT in education context, risk management refers to the policies, procedures, and practices involved in identification, analysis, assessment, control, and avoidance, minimization, or elimination of unacceptable risks relating to implementation of ICT initiatives in education. It refers to a proper evaluation of all identifiable risk factors that may threaten the effective implementation of ICT in education. In the policy, general practices and procedures are discussed on how to minimize risk. However, actual implementation of risk management may take a more comprehensive approach involving

the decisions taken by the Risk Management Committee from time to time according to the requirements.

### **Stakeholders for ICT in Education**

In general term, stakeholders are defined as persons, group of individuals, or organization that has direct or indirect stake in an organization because it can affect or be affected by the organization's direct and indirect actions, objectives, and policies.

In the ICT in education context, stakeholders include:

- (i) The CPM and COP;
- (ii) At government level - Relevant officers from MOE, relevant officers from MDeC, relevant officers from other government ministries and agencies;
- (iii) At schools and education institutions level – head of schools and education institutions, principals / deputy principals, teachers, school administrators, on-site technicians and students

Under this context, the general public, though has a stake in the overall development of ICT in education as *rakyat* of the nation, they will not be included by the definition of stakeholders. As and where applicable, the general public and the private sector will be specifically-mentioned to address them separately.

### **Return on Investment (ROI)**

Return on investment (ROI) generally refers to the profitability measure that evaluates the performance of a business by dividing its net profit over its net worth. Under the ICT in education context, the ROI is defined as:

- (i) The degree of improvement in the quality of manpower that is supplied by the education system in Malaysia that matches the requirement of the nation's

national agenda as spelled out in for example, the GTP, NEM, RMK10 and the National Philosophy of Education as a result of ICT integrated in education

- (ii) The degree of improvement in the production of researchers, innovators, and even creators of new inventions and new ideas as a result of ICT integrated in education
- (iii) The degree of improvement in the advancement in multi-disciplinary entrepreneurship and technopreneurship
- (iv) The degree of improvement in 21<sup>st</sup> century skills for all relevant stakeholders such as officers from relevant MOE divisions, school heads / deputy, teachers, ICT coordinators and students as a result of ICT integrated in education
- (v) The degree of satisfaction from the user group (school heads /deputy, teachers and student) and community (parents and alumni) in terms of the benefits they derive as a result of ICT integrated in education

### **Subject Matter Experts (SMEs)**

Subject matter experts (SMEs) refer to the experts that have specific skills, direct knowledge and ability to understand and exhibit sound knowledge on a particular topic. Under the context of ICT in education, SMEs refer to educationists and private sector education industry practitioners who are specially-equipped with substantial skills and knowledge in relation to integrating ICT in education.

### **Digital Learning Resources**

Digital resources refer to the tools, devices and teaching and learning materials that are used for the purpose of education thus rendering ICT as an enabler of education.

**Assessment for Learning**

Assessment for Learning refers to the process of seeking and interpreting evidence for use by learners and their teachers as a feedback to modify the teaching and learning activities that keeps the learners on track.

**Assessment of Learning**

Assessment of learning refers to the process of seeking and interpreting evidence to determine the level of understanding (mastery) the learners have achieved at the end of the learning unit.

## 14. Appendix

### I. International Best Practices

#### Australia

**Name of the Initiatives:** Digital Education Revolution – DER

**When was it launched:** The current policy covers 2008-2013

**Purpose of the initiatives:**

The aim of the DER is to contribute sustainable and meaningful change to teaching and learning in Australian schools that will prepare students for further education, training and to live and work in a digital world. Through the DER, the Government has committed \$2.2 billion over six years to stimulate a quantum increase in access to and utilization of ICT as a tool for improving education. The aim is to:

- provide new information and communication technology (ICT) equipment for all secondary schools with students in years 9 to 12 through the National Secondary School Computer Fund
- support the deployment of high speed broadband connections to Australian schools
- collaborate with states and territories and Deans of Education to ensure new and continuing teachers have access to training in the use of ICT that enables them to enrich student learning
- provide for online curriculum tools and resources that support the national curriculum and specialist subjects such as languages
- enable parents to participate in their child’s education through online learning and access
- support mechanisms to provide vital assistance for schools in the deployment of ICT

The DER is now governed by the Digital Education Revolution National Partnership with the State and Territories and by Digital Education Revolution Funding Agreements with the Catholic and Independent education authorities.

Australian Information and Communication Technology in Education Committee (AICTEC) which is a semi-autonomous body is responsible for providing advice to the Ministry of Education and also training on effective utilization of ICT in education.

### **Technology:**

- All schools have a digital learning plan covering Infrastructure, Learning resources and teacher capability
- Schools are provided with affordable high-speed broadband connections with associated low download costs
- The affordable high-speed broadband is made possible through DER fibre to the school initiative, School Sector connectivity initiatives, and Local area networks
- Desire to have 1:2 computers to students' ratio (the average ratio is 1:5 currently)
- Every student has access to digital resources and tools to enable 21<sup>st</sup> Century learning across the curriculum
- Learners, teachers and parents have access to resources, digital tools and agreed performance data anywhere and anytime through DER's parent portal initiative, Jurisdiction, sector and school provision of portals

(Source: DER Strategic Plan)

### **Community Involvement**

Some of the specific community involvement programmes are mentioned below:

***School Business Community Partnership Brokers***

The School Business Community Partnership Brokers (Partnership Brokers) program is focused on building partnerships to support young people to attain Year 12 or equivalent qualifications and reach their full educational and social potential.

The program is designed to foster a strategic, whole of community approach to improving education and transition outcomes for all young people. This is achieved through a national network of Partnership Brokers that create new partnerships and enhance existing partnerships between and among four key stakeholder groups:

- Education and training providers
- Business and industry
- Parents and families
- Community groups

The Partnership Brokers work with key stakeholders to identify the needs of their region, help partners to agree on how they can work together towards a common purpose, and support partnerships to achieve their goals.

They also have DER Parents Portal Initiative which will enable parents to have access to digital resources, performance data anytime and from anywhere.

***Business-School Connections Roundtable***

The Government announced the Business-School Connections Roundtable as part of the response to the 2020 Summit. The Roundtable comprises a small group of leaders from the education, business and community sectors. The group will use their expertise and experience to oversee the development of a practical strategy to ensure secondary schools benefit from connections with business.

**Monitoring, Evaluation and Review:**

There is currently no specific monitoring and evaluation process. However, AICTEC has advised on developing an overarching monitoring and evaluation strategy for the DER. AICTEC monitors regularly educational software and technology and advises on implementation and implications of DER. The policy is covering 6 years. However, the annual performance is reviewed and annual report is published for public viewing.

**Possible Outcomes:**

In meeting the aims of the DER, projects and activities funded by the Initiatives seek to achieve the following outcomes for digital teaching and learning in Australia.

- i. A national, consistent approach to e-Learning and ICT that enables collaboration between schools, systems and sectors
- ii. E-Learning that is effectively integrated into national curriculum, assessment and reporting arrangements for schools
- iii. Teachers that are capable, confident and effective at integrating e-Learning in their classroom
- iv. Schools' e-Learning and ICT arrangements are sustainable and capable of capitalising on the educational value of emerging technologies
- v. High-quality digital learning resources that can be readily discovered, accessed, used and shared by schools

**Ireland**

**Name of Initiative:** Schools Integration Project - Schools IT 2000

**When was it launched:** 2001

**Purpose of the initiative:**

The Government invests in ICT to enhance significantly the use of ICT in all first and second level schools. This investment will ensure that our students and teachers remain at the cutting edge of international innovation and development in ICT.

The aim is to provide every school in the country with substantial grants for the development of their computer infrastructure and equipment with significant extra support for special needs pupils.

In specific terms, the objectives and strategies are:

- The development of ICT school plans to meet individual school needs
- Provide Locally based teacher training
- The development of Education Web resourcess
- A new scheme of innovative ICT projects
- Collaboration with other European countries
- Partnership with the social partners, with industry and with the broader community
- Feedback from schools to determine future priorities

NCTE which is an autonomous body was charged with overall responsibility for the national implementation of ICT policy including the provision of a range of school supports for ICT in primary and post primary schools and the direction of a regional ICT advisory service.

**Technology:**

- All classrooms should be networked to include between 5 and 8 serviced points of access (2 at the teacher's desk and 4-6 for students)
- Ideally, schools should work towards an eventual 5:1 pupil to computer ratio (PCR) in classrooms
- All computers in the schools should be networked and broadband-enabled
- Access should be available to a mobile laptop trolley, supporting between 10-30 laptops capable of linking to the school network and the internet (1 for a small school and 2 for a larger school)

Some of the programmes to support the technology deployment in schools include:

***Schools Broadband Programme***

The programme provides an integrated set of services to schools which includes broadband connectivity, and hosted services including content filtering, webhosting, and security services including anti-virus control and firewall.

***School Networking***

NCTE provides advice and support to assist schools in having a high quality school's network throughout the school to support learning and teaching, and support the delivery of broadband access, online content and learning applications to all classrooms and learning areas throughout the school.

**Community Involvement**

The parents and community can gather information about the education system through Scoilnet which is portal for Irish education.

***Information Age Towns***

The vision for the Information Age Towns programme is to have all sectors in selected towns collaborating and interacting together, through the use of ICT, and working towards achieving the common goal of making these towns guiding forces in the advancement and implementation of ICT concepts. The community, business, education and public sectors are all involved.

**Monitoring and Evaluation and Review**

Up until 2007, there was an annual plan which highlighted the priority area for all initiatives under ICT in education for each planned year. Annually the plan was reviewed and annual report was published. In 2007, a new strategy for Information and Communication Technology in Schools was planned for the period 2008-2013.

The department constantly monitors and review progress in the context of feedback from schools while NCTE monitors and evaluates educational software is regularly.

To encourage schools to utilize ICT effectively Digital Schools Award initiative was created. This initiative recognises the excellence in a school's approach to the integration of ICT in learning and teaching.

**Possible Outcomes:**

In broad terms, the Plan sought to advance the use of ICT in education by:

- Expanding the ICT capital provision to schools

- Increasing access to, and use of Internet technologies
- Further integrating ICT into the school curricula
- Improving professional development for teachers
- In more specific terms, the objectives and strategies of the Plan were:
  - Augmenting the ICT capital provision to schools with EUR78.72m capital grant aid for primary and second-level schools
  - Lowering the Computer/Pupil ratio significantly
  - Expanding access to and the use of Internet technologies
  - Increasing the priority for special needs students
  - EUR29.2m for support services including teacher training
  - Developing locally-based teacher training and the further development of the teaching skills to fully integrate ICT into learning and teaching
  - Developing wiring-networking infrastructure in all schools and introduction of broadband access to the schools
  - Facilitating Software/Multimedia resources development for use in schools
  - Developing ICT schools' plans to meet individual school's needs
  - Developing education web resources primarily through Scoilnet
  - Scheming of innovative ICT projects
  - Collaborating with other European countries
  - Creating partnership with the social partners, industry and with the broader community
  - Seeking feedback from schools to determine future priorities

## New Zealand

**Name of the Initiatives:** ICT Strategy for Schools

**When was it launched:** 1998 (Current Strategy covers the period 2006 – 2010)

**Purpose of the Initiatives:**

The ICT Strategic Framework for Education seeks to deliver this vision through:

- A more learner-centred education system transcending organisational boundaries
- More informed decision making within the education sector by learners, teachers, parents, communities, public, businesses, researchers, policy makers, and administrators
- Increased ease and opportunity of access and reduced compliance costs for all participants
- Increased confidence, capability and capacity from the use of ICT by all participants in the education sector
- Greater opportunities for the generation, application and sharing of new ideas and technologies
- More effective and efficient investment in ICT by education sector government agencies

The Ministry of Education is the lead advisor on the New Zealand's education system and they are responsible for ICT in School in New Zealand. The Ministry of Education develops the Software for Learning area on Te Kete Ipurangi in collaboration with schools and vendors.

**Technology**

- A sustainable and dependable ICT infrastructure in schools will enable teachers to manage their teaching programmes more effectively. Through school networks and links to the Internet, teachers can use a wealth of digital resources, content, and services to develop learning programmes that support the needs of their learners.
- Within the 2010 time frame, an increased percentage of schools have an ICT infrastructure that reflects best practice and is sustainable (there is no mention on the % nor the best practice)
- Within the 2010 time frame, all schools have access to and are using broadband capacity appropriate to their needs (there is no mention on the capacity)
- Support a range of managed Internet services to enable schools to create a safe and secure web environment for users
- Extend the range of services and support provided by the virtual learning network (VLN)
- Support and shape initiatives that provide open access networks for schools
- Support and promulgate the appropriate standards for hardware and software to ensure dependable and user-friendly systems

*Source: ELearningActionPlan*

**Community Involvement:**

Te Kete Ipurangi is responsible to New Zealand schools, both teachers and learners, in mainstream and Māori medium education. The vision is to provide New Zealand schools with a cost effective electronic platform to communicate curriculum and administrative materials, enhance teaching and learning, raise student achievement and advance professional development for school management and teaching staff.

Its audiences include:

- Principals

- Teachers
- Parents
- Whanau

The Ministry of Education website provides parents with useful information about their child or teen's education including tips on choosing an Early Childhood Education (ECE) service or school, what they learn, how their progress is assessed and other topics of interest.

**Monitoring, Evaluation and Review:**

The Crown Entity Monitoring Team is a small team that has responsibility for the government ownership monitoring of the New Zealand Qualifications Authority, the Tertiary Education Commission, the New Zealand Teachers Council, and Career Services. All the ICT in education programmes/ initiatives are monitored regularly to ensure:

- the alignment of the entity's plans with government directions;
- the maintenance and enhancement of the entity's longer term capability;
- risks to the entity's delivery of its agreed outputs, and to the desired outcomes

The policy is reviewed and modified once in 5 years.

*Source:*

<http://www.minedu.govt.nz/NZEducation/EducationPolicies/TertiaryEducation/AboutTertiaryEducation/WhoWeAre.aspx>

**Possible Outcomes:**

- Teachers have the confidence and capability to effectively integrate e-learning into their professional practice

- All ICT professional development programmes in schools focus on effective teaching, ICT literacy, and understanding the potential of ICT to support learning across the curriculum
- Teachers use online communities of practice to strengthen collegial support, professional dialogue, and reflective practice
- Interventions are in place that relieve workload pressures on Māori teachers and explore and provide professional development opportunities
- Boards of trustees' and the wider school communities' understanding of the role of e-learning in schools of the future is strengthened
- Online learning environments are widely used to support effective learning and teaching in New Zealand schools
- The knowledge and availability of high-quality software for learning is increased
- All schools and communities have access to levels of bandwidth that meet their educational needs
- There is increased public understanding of the importance of ICT and information literacy – the 21st century skills that are important for participation in a knowledge society
- There is increased community participation in school ICT activities and the use of ICT facilities
- Schools' ICT infrastructures enable libraries to link learners with information and with each other within the virtual learning community
- All schools have access to timely and effective ICT support
- All schools have access to a reliable, high-speed Internet connection
- A central electronic register replaces the current paper-based exchange of enrolment data between schools, improves enrolment management, and reduces the need for non-enrolment intervention
- A national student identifier is introduced that allows students to be tracked through the whole school system, and this supports longitudinal analysis of student data

Source: E-Learning ActionPlan

## Examples of Countries with a Policy on 'ICT in Education'

### National Policy on Information and Communication Technology (ICT) In School Education India

India developed a draft National Policy on ICT in Education in 2009.

The ICT Policy in School Education will:

#### **Create**

- an environment in the states to develop ICT knowledgeable community
- an ICT literate community who can deploy, utilise, benefit from ICT and contribute to nation building
- an environment of collaboration, cooperation and sharing, conducive to the creation of a demand for optimal utilisation of and optimum returns on the potentials of ICT in education

#### **Promote**

- universal, equitable, open and free access to state of the art ICT and ICT enabled tools and resources to all students and teachers
- development of local and localised quality content and enable students and teachers to partner in the development and critical use of shared digital resources
- development of professional networks of teachers, resource persons and schools to catalyse and support resources sharing, upgradation, and continuing education of teachers; guidance, counselling and academic support to students; and resources

sharing, management and networking of school managers and administrators, resulting in improved efficiencies in the schooling process

- research, evaluation and experimentation in ICT tools and ICT enabled practices in order to inform, guide and critically utilise the potentials of ICT in school education

### ***Motivate and Enable***

- wider participation of all sections of society in strengthening the school education process through appropriate utilisation of ICT

Programme Monitoring and Evaluation Group of the Department of School Education & Literacy will be tasked with the overall responsibility of guiding the implementation of the ICT programme in schools across the country. Each State/ District will facilitate and monitor the implementation of various aspects of the programme.

### **Technology**

- Each school will be equipped with at least one computer laboratory with at least 10 networked computers to begin with. Each laboratory will have a maximum of 20 computers, accommodating 40 students at a time. A student computer ratio of minimum 10: 1 is to be achieved progressively in all schools.
- All computers in the school will be part of a single local area network to enable optimum sharing of resources.
- Each school will be serviced with broadband connectivity of at least 2MBPS capacity.
- An Edusat network will be planned at each state with interactive terminals and Receive Only Terminals (ROTs). At least 1000 such terminals could be planned at each state.
- A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad based ICT literacy and ICT enabled teaching learning programme.

**Monitoring, Evaluation and Review**

The Advisory Group constituted by the States will identify criteria, performance measures, periodicity of monitoring/ measurement, methodology to be adopted and reporting mechanism.

Monitoring of progress and achievement of physical targets will be an ongoing activity built into the ICT programme. In addition to the national level monitoring of targets and objectives, the respective States would have an internal mechanism for overseeing the implementation of the programme through a monitoring committee constituted for the purpose.

- An independent third party evaluation of the programme will be undertaken at appropriate stages in the project. The States will identify a suitable agency to carry out the evaluation as per the requirements of the project.
- University Departments of Education, Educational Technology or ICT related departments will be encouraged by the States to take up research studies on various aspects, like impact assessment studies of the ICT programme, in order to inform and correct the process.
- A suitable mechanism to revisit each segment of the Policy will be evolved. The policy should ideally be revised every two years.

**Information and Communication Technology Policy Framework for use in the Education System Dominica**

The Ministry of Education, Sports and Youth Affairs (MOES&YA) drafted a policy on ICT in Education to gather stakeholder inputs to the process of defining a Common Vision for the systematic integration of Information and Communications Technology in the education system. The purpose of implementing the measure is to:

- Ensure that education in ICT is part of the entitlement of all Children

- Provide the necessary infrastructure, training and other resources for the delivery of ICT
- Ensure that the design and mode of delivery of school curricula are such that children benefit
- All children should be educated in ICT irrespective of occupational choice
- Reduce the curricular load and ensure that maximum attention is paid to basic skills in reading, spoken and written communication and computation
- Ensure ICT literacy in the school system
- Provide continuing education and training in relevant areas with special emphasis on ICT
- Establish awareness of ICT and the link with the environment in a sustainable way

The Objectives of the policy are to:

- Promote equitable access to educational resources through the strategic application of ICT
- Ensure that all school leavers are computer-literate thereby providing them with the requisite ICT skills as a platform for imminent employment and/or entry to specialised training for the information economy
- Create a teaching force in which all practitioners possess the critical requisite skills and competencies required to use ICT as a tool in enhancing the teaching/learning process and a cadre of ICT teacher specialists
- Improve the efficiency and effectiveness of educational administration through the promotion of the use of appropriate school management information systems
- Exploit the interactive potential of Information and Communications Technology in the provision of lifelong learning, anytime, anywhere via distance education programmes

- Create smart partnerships for a sustainable ICT programme through collaboration with between the public, private and community sectors
- Establish a schools network system for the collaborative sharing of educational resources and stakeholder participation
- Employ the new ICT tools for increased online communication, stakeholder participation and improved management of the sector
- Foster the concept of Life Long Learning among students and teachers and also within the general population of the Country
- Encourage the principals, teachers and students within the education system to be involved in the development of applications and to use ICT, meaningfully, to enhance the teaching-learning process
- Ensure that there exists equitable access to ICT resources by all students and teachers within the Education system
- Demonstrate the MOES&YA's intention at providing a reasonable level of Computer Literacy to all students and teachers in the system
- Encourage and facilitate the use of the Internet as a research and communication tool among students, parents, teachers, principals, other MOES&YA officials and members of the community
- Facilitate the implementation of an Education Management Information System (EMIS) so as to ensure the effective management of the Education system
- Encourage partnerships between the various stakeholders in the Education Sector
- Provide the avenue for increased electronic networking of educators in Dominica and overseas
- Foster greater professional development opportunities for all educators

### **Technology**

- MOES & YA is responsible for deciding, implementing and monitoring ICT in educational system.

- They are currently in the process of providing computer labs at every school and eventually to network all of the schools on a WAN
- MOES&YA will adopt a common set of standards for hardware and system architecture for use in the Education System.
- MOES&YA through its nominee on the OECS ICT Education Committee will periodically (at least every year) review Hardware and General-Software Standards and recommend changes/upgrades as needed

### **Monitoring, Evaluation and Review**

The MOES&YA will assist every school (Primary and Secondary) to develop a Technology Plan, which would act as a guide for that school's integration of ICT into its curriculum.

### **Community Involvement**

The *I.T. (information technology) for Dominica Project* works to provide contemporary learning for students through information technologies. The Information Technology (I.T.) for Dominica project is a collaborative partnership between the Commonwealth of Dominica and several Canadian partners.

The project provides students and educators access to computing technologies and services, creates school partnerships, leads professional development activities, provides technical training, support, installations and instruction.

The intent of the I.T. for Dominica project is to provide technologies, expertise, instruction, installation assistance and guidance in the implementation of information technologies in the Commonwealth of Dominica.

Source: <http://www.itfordominica.org/index.html>

The ***Sustainable Living Initiative***, is a registered NGO, and has been established to promote awareness of environmental issues and specifically to promote the use of simple technology to minimize negative impact on the environment and conserve natural resources in Dominica.

Source: <http://www.slicdominica.org/>

### **Policy for Information and Communications Technology in Education - Trinidad and Tobago**

The ICT in Education Policy of Trinidad and Tobago is based on the national priorities outlined in the Vision 2020 document which seek to ensure that Trinidad and Tobago is prepared to fully participate in the global information society and to reap the rewards of this participation. The ICT Policy goals and objectives of the Ministry of Education are to:

- i. Achieve continuous alignment with the Ministry's general goals for education and the National ICT policy
- ii. Ensure all stakeholders possess the critical requisite skills and competencies to use ICT in the education system as a tool to enhance learning and teaching, communication and research, and to generate innovative processes
- iii. Ensure the establishment of an efficient ICT environment that provides for collaboration, the sharing of education resources and stakeholder participation and allows for open access to national and international networks
- iv. Inform the framework for the establishment and operations of the Education Management Information System (EMIS) so as to ensure the effective management of the education system
- v. Encourage innovative models of ICT use such as:
  - a. Teacher education;
  - b. Teaching;
  - c. Learning; and

- d. Curriculum materials development
- vi. Harmonize activities, approaches and standards in the use of ICT within the Education System
- vii. Achieve administrative and management excellence in education through the establishment of ICT as the major business operations platform of the Ministry;
- viii. Encourage critical and creative thinking, lifelong learning and social responsibility;
- ix. Establish a regulatory framework for ICT issues in education;
- x. Ensure that quality ICT education provided by private institutions are aligned with the Ministry's standards for ICT;
- xi. Point to the establishment of an ICT organization at the highest level to continuously promote and foster ICT industry.

ICT Executive Committee consisting of members appointed by the Minister of Education shall manage this policy.

### **Technology**

A dedicated task force shall be established to coordinate the implementation of this Policy. The task force shall:

- Identify and recommend ICT investment decision models
- Identify and recommend open standards and maintain an approved list of these standards which shall make provision for platform neutrality, content diversity, vendor independence, functionality, and ICT competency value for the education community
- Make recommendations to the Executive Committee with regard to mutually agreed standards of acceptance, cost and quality of operations, services, support and maintenance, teacher and staff training, institutional development, capacity building, research, and public awareness within the ICT Policy Framework

To address the goals of the policy, a series of specific development levels are developed. Their key highlights of each level include:

**Level 1**

- The school is capable of accommodating up to sixteen (16) computers inclusive of that for use by the resources personnel
- The technologies are used for teaching ICT skills such as basic computer use, learning how to use a word processor, introduction to the Internet and sourcing information
- At least one member of staff possesses a minimum basic ICT Literacy qualification
- Students spend at least one hour a month using computers and the audiovisual and broadcast facilities

**Level 2**

- The school is connected to the Internet, and is equipped with a mobile computer and projector system and other technologies
- Learning resources are downloaded for instruction and occasionally created by teaching staff
- At least two of the site staff has professional ICT certification
- Students spend at least one hour every two weeks interacting with the computer and other ICT related technologies

**Level 3**

- ICT is significantly integrated into the teaching and learning process
- The school has two or more classrooms equipped with computer and projector systems and other audiovisual equipment and materials
- ICTs are available for classroom use by students and teachers
- Thirty percent (30%) of staff have professional ICT certification

- Students spend at least two hours each week interacting with the computer and other ICT related technologies

#### ***Level 4***

- At this level ICT is fully integrated into the teaching and learning process.
- The school has fifty percent (50%) of its classrooms equipped with computer and projector systems and other audiovisual equipment and materials
- The school has Internet connectivity with adequate bandwidth.
- Computers are available for use by students at a ratio of one (1) to seven (7) and teachers at the ratio of one (1) to one (1).
- Learning materials are downloaded for instruction, created, and uploaded by teaching staff.
- Software is available to allow student to experiment and investigate.
- Seventy five percent (75%) of staff have professional ICT certification.
- Students spend at least one hour each day interacting with the computer and other ICT related technologies.

#### ***Level 5***

- Software is available to allow student to experiment, investigate and create software.
- All teaching staff have professional ICT certification while at least fifty percent (50%) have ICT related work experience.
- Students spend at least four (4) hours each day interacting with the computer and other ICT related technologies.

**Monitoring, Evaluation and Review**

ICT Executive Committee will monitor and publish performance measures and guidance documents to address levels of development of appropriate ICT for Education, distribution and delivery of ICT, maintenance and support of ICT, ICT literacy, and ICT integration annually.

**Community Involvement**

The Ministry of Education shall develop and implement strategies to ensure the use and integration of ODL in the development and delivery of its lifelong learning programmes.

- ICT and distance education services shall be available to the wider education community.
- All MOE courses and programmes shall be available to nationals in a multimodal format.
- Special programmes for parents shall be developed and delivered using multimodal formats.
- The MOE shall forge linkages and partnerships beyond government, to civil society, NGO's, commercial interests and the international community to develop the ICT economy of Trinidad and Tobago.

Parents portal which is available in MOE's website provides parents with information on education system, student transfer and programmes to support their child.

**Policy and Strategies on Information and Communication Technology in Education in Cambodia**

Cambodian Ministry of Education, Youth and Sport (MOEYS) developed the ICT in Education policy to reform its education delivery services effectively. MOEYS is introducing various initiatives to facilitate greater integration of information and communication technology (ICT) to improve the effectiveness of education at all levels and to produce the technologically literate, productive and critically thinking workforce for the country.

The goals of ICT in Education Policy are:

- Increased access to basic education for all, both formal and non-formal, using ICT as one of the major tools for learning, teaching, searching and sharing information.
- Improved quality of basic education and promote independent and lifelong learning, especially for post-primary education,
- Availability of workforce with the ICT skills needed for employment and use in a knowledge-based society; to ensure that Cambodia can compete and cooperate in an increasingly interconnected world.

### **Technology**

- Build ICT infrastructure and provide hardware for education and training. This will include computer rooms and networks (local, intranets and Internet). Computers will be provided in educational institutions, secondary schools, colleges, universities, municipal/ provincial education services and precinct/district education offices, community learning centres. MOEYS departments, municipal/provincial education services and precinct/district education offices will be linked together providing access to various databases and resources for educational management.
- Equip all teacher training colleges and universities with the necessary hardware and infrastructure to allow teachers and students to access to computers and the Internet
- Promote the use of community learning centres, community information centres and community libraries. Expand activities to include the use of video, radio and TV for learning
- Work with NGO partners to provide more facilities for out of school youth
- Where possible, provide power supply and the Internet connection to secondary schools
- The Ministry will promote the application of ICT for expanding access to primary and secondary education through “Open Schools” to provide educational opportunities in dispersed locations where schools are not viable

**Monitoring, Evaluation and Review**

The MOEYS monitors the policy annual along with Education for All Nation Plan and Education Strategic Plan annual and set the goals for the next academic year based on the outcomes.