Building and sustaining national ICT/education agencies:

Lessons from Malaysia

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Acknowledgements

The *World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series* explores a variety of topics and issues related to the use of information and communication technologies (ICTs) in the education sector.

The Systems Approach for Better Education Results (SABER) initiative seeks to improve the global knowledge base related to education systems analyses, assessments, diagnoses, and opportunities for dialogue. SABER-ICT aims to improve the availability of policy-related data, information, and knowledge on what matters most in using ICTs to improve the quality of education.

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Executive summary

Malaysia, like many countries in the region, has invested heavily in the use of ICT in schools since 1999. Unlike many other countries, Malaysia does not rely on a single specialized agency or a particular division of the Ministry of Education to implement its ICT in education programmes. Instead, the Malaysian government rolled out a nation-wide initiative known as the 'Smart School Initiative', which is based on strategic public-private partnerships involving various stakeholders including ministry, industry, and community.

This case study examines how the *Malaysian Smart School Initiative* (MSSI) was developed and implemented in its initial years. The study demonstrates that the MSSI was the result of a deliberate, holistic approach to incorporate the use of ICT in Malaysian schools. The MSSI involved not only the use of ICT in the teaching and learning process, but also in the management and administration of schools. The MSSI paid particular attention to the capacity development of teachers, administrators and technicians in using ICT effectively in their daily practices.

The introduction of ICT into Malaysian schools was done cautiously and deliberately, stage-by-stage. The Malaysian experience highlights the need for continual support, monitoring and evaluation as an integral part of the implementation process. At each stage, reviews and evaluation were undertaken to collect feedback and information to fine tune policies, to fill in gaps and to re-allocate resources. A set of performance indicators to measure the utilization of ICT in schools, the *Smart School Qualification Standards* (SSQS), are examined. The paper concludes by offering eight key lessons from the Malaysian experience for policymakers in other countries.

1. Introduction: Background and context

In the past decade, with the advancement of information and communication technology (ICT), many governments have invested huge sums of public funds to build ICT infrastructure and enable various kinds of services in the public sector as part of initiatives to promote activities related to 'e-government', 'e-health', and 'e-learning'. Since most of the related ICT technologies are new, there has been a great deal of experimentation in the utilization of these technologies to improve the efficiency and quality of public services. This has been particularly so in the field of education, where ICT is often used to enhance the efficiency of school management and administration, to improve the quality of teaching and learning, and to widen the access to education through alternative delivery systems (such as distance learning). Some governments have established ICT/education agencies or institutions such as KERIS in South Korea, Becta in the UK, and NCET in China to be responsible for the development and application of ICT in the field of education. In other countries, such functions are carried out by foundations and NGOs such as the Omar Dengo Foundation in Costa Rica and the Pilipinas Schoolnet at FIT-ED in the Philippines. There are still other countries which assigned such roles to a special division of the Ministry of Education, or to universities.

Beginning in the late 1990s, Malaysia rolled out a nation-wide initiative to introduce the use of ICT in both primary and secondary schools. Instead of relying on a single specialized agency or a particular division of the Ministry of Education (MOE), the *Malaysian Smart School Initiative* (MSSI) was based on strategic public-private partnerships involving various stakeholders, including government ministries, industry actors, and local communities. This paper briefly examines how the initiative was organized, funded and implemented in its initial years. It addresses the following key research questions:

- What are the key contextual factors of relevance to the development of the Malaysian Smart School Initiative (MSSI)?
- How has the MSSI developed and been implemented over the years?
- What were the monitoring and evaluating mechanisms put in place to inform and sustain the initiative?
- What are some of the impacts of, and future directions for, the initiative?
- What are the key lessons learned from the Malaysian experience of potential relevance to policymakers in other countries?

The particular focus of this paper is on the monitoring and evaluation of the initiative, highlighting the shortfalls, gaps and challenges of its overall implementation. Monitoring and evaluation is a crucial component of any new programme in Malaysia of the size and scope of the MSSI, because policy makers need to collect regular feedback for policy enhancement, allocation of resources and to assess its cost-effectiveness. The tool used to monitor the utilization of ICT in schools in Malaysia consisted of a set of indicators to measure ICT integration in school administration, teaching and learning in the classrooms. This monitoring tool, which is known as the *Smart School Qualification Standards* (SSQS), may represent a useful model of relevance policymakers looking for a set of standards to measure the use of ICT in schools in their own countries. An analysis of the Malaysian experience under the MSSI also provides some useful lessons to policy makers in other countries more generally.

Since the early 1970s, the Malaysian government has introduced various initiatives to capitalize on the use of information and communication technology (ICT) in every sector, including

education. The Malaysian Smart School Initiative (MSSI) is one of the seven flagship applications of the *Multimedia Super Corridor* (MSC) undertaken by the Malaysian government to strive towards becoming a knowledge-based economy. The MSC,[1] which was launched in 1996, is a key component of Malaysia's strategy to harness the potential of ICT and multimedia technologies to create high-value jobs and to improve national productivity and competitiveness in the global economy. The broad goals of MSC are to develop human capital, bridge digital gap and nurture development of local multimedia small-medium enterprises. The seven flagship 'applications' under the MSC are Smart Schools; Multi-purpose Card; Tele-health; Electronic Government; Technopreneur Development; R&D Clusters; and Electronic Transactions.[2]

The MSSI was officially launched in July 1997 in 88 pilot schools, with the aim of using ICT as a tool to enhance learning and improves the efficiency and effectiveness of school administration. The Ministry of Education's main policy goals for ICT in Education are:

- ICT for all;
- ICT as a teaching and learning tool, as part of a subject or as a subject on its own;
- Using ICT to increase productivity, efficiency and effectiveness of the management system.[3]

By definition, the Malaysian Smart School is "a learning institution that has been systematically reinvented in terms of teaching and learning as well as the improvement of the school management process in order to help students cope and leverage on the Information Age".[4] The pilot and post-pilot phase of the Malaysian Smart School Initiative ended in 2005, after which time the initiative was extended to all schools in Malaysia via the "Making all schools smart" programme. This programme is an on-going process of the Smart School endeavour, under which the MOE:

- provided the ICT infrastructure;
- provided broadband and local area network facilities;
- facilitated training to enhance teachers' competency in integrating ICT in education;
- made the 88 Smart Schools the benchmark;
- incorporated ICT elements into the curriculum;
- introduced ICT programmes at the school level;
- provided various courseware, educational TV programmes and other resources for teaching and learning; and
- established collaboration programmes to expedite the process of making schools smart.

Since 1999, the MSSI has evolved in a number of ways. Developments in each phase of the initiative were based on feedback and information on the implementation of the previous phase

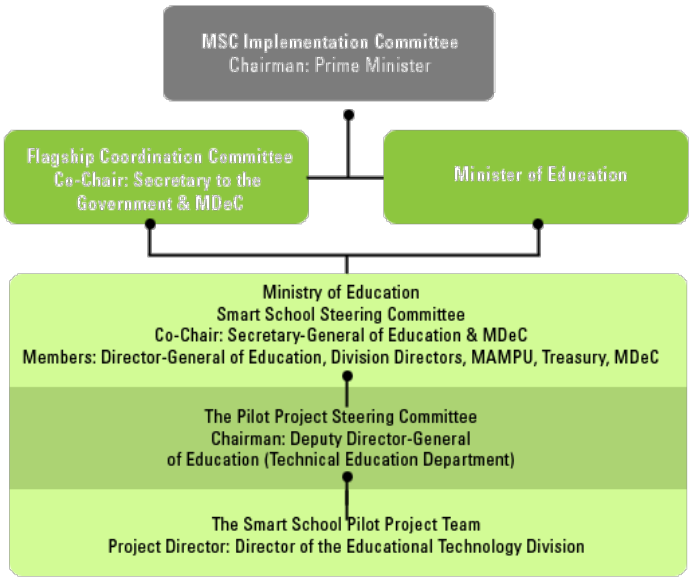
[1] *MSC is a government-designated zone in Malaysia which covers an area approximately 15km x 50km (i.e. 750km^2), stretching from Petronas Twin Towers to Kuala Lumpur International Airport. It aims to attract companies with temporary tax breaks and facilities such as high-speed internet access and proximity to the Kuala Lumpur International Airport.*
[2] *NITC, National IT Council. (2012). Multimedia Super Corridor Malaysia. http://www.nitc.my/index.cfm?&menuid=28.*
[3] *Ministry of Education. (2008). Malaysia ICT in Education: Cutting Edge Practice. Kuala Lumpur: Ministry of Education.*
[4] *Ministry of Education. (2009). Smart School Qualification Standards (SSQS). Second Edition. Kuala Lumpur: Ministry of Education.*

as well as on the advancement of ICT technologies. It is important to note that the initiative was first piloted in 88 schools before it was rolled out to all Malaysian schools.

2. The Organization and Development of MSSI

At its start, the MSSI had six main components. They included: (a) teaching-learning processes; (b) management and administration; (c) human resources, skills and responsibilities; (d) processes; (e) technology; and (f) policies.[5] The teaching and learning processes relating to curriculum, pedagogy, assessments, and teaching and learning materials were redesigned to enable students to practice self-accessed and self-directed learning at their own pace. The management and administration of the Smart School was computerized so as to help school heads to manage more efficiently and effectively the resources and processes required to support the teaching-learning process. Multiple stakeholders, including parents, the community and the private sector, were involved in the Smart School initiative. The MSSI was continuously studied and reviewed to ensure it was producing the desired outcomes. Such reviews were undertaken both internally, by the Educational Technology Division, School Inspectorate and the Curriculum Development Division, and externally, by Frost & Sullivan[6] and a number of local universities. Technology was used as an enabler of Smart School practices in teaching and learning, management and communication with external constituencies. To ensure the successful implementation of the MSSI, policies and regulations were constantly reviewed and changed, based on feedback from monitoring and evaluation processes.

The implementation of MSSI was directed by a high level Implementation Council chaired by the Prime Minister. This high level committee planned drove all of the various flagship initiatives. Directly under this Committee was the Flagship Coordination Committee (FCC), to whom the MSSI reported progress, identified issues and suggested necessary next steps. At the Ministry of Education (MOE), MSSI was under the Smart School Steering Committee and the Pilot Project Steering Committee, which guided and supervised the Smart School Pilot Project Team. The Pilot Project Team was responsible for all planning, development and implementation of the Smart School; this team resided within the Educational Technology Division in the MOE.



The MOE formed smart partnerships with leading industry and community players to accelerate the use of ICT in schools. The partners included corporate companies, parent-teacher

[5] *MDec, Multimedia Development Corporation. (2009). Malaysian Smart School Roadmap 2005-2020. Kuala Lumpur: Multimedia Development Corporation Sdn. Bhd.*
[6] *Frost & Sullivan (2004). Benchmarking of the Smart School Integrated Solution. Kuala Lumpur: Ministry of Education.*

associations, teachers' unions, alumni and educational associations. Collaboration with key players such as Microsoft Malaysia, Intel Malaysia, TIME Engineering Berhad (TIME), Telekom Malaysia, and MDeC enhanced the professional development of teachers through the integration of pedagogy with ICT.[7] Over time, smart collaborations were extended to include many other corporations, such as ELMO Japan, Oracle, CyberSafe Security, Maxis and Digi. Different partnerships brought with them advantages and challenges to the MOE. Companies such as TIME, Telekom Malaysia and MDeC were government-linked corporations, and they were commissioned by the MoE to carry out specific tasks, such as to train practicing teachers to use ICT in schools, to develop digital curriculum materials for teachers, to develop information management system for schools, etc. This kind of outsourcing strategy was adopted by the MOE to overcome the shortage of qualified personnel for these specialized tasks. Partnerships with key players such as Microsoft Malaysia and Intel Malaysia were one mechanism to keep up with the rapid change of technologies in the IT industry. Collaboration with teachers' unions and educational associations in organizing training workshops helped to smoothen the process of adoption of ICT usage by teachers. Donations from parent-teacher associations and school alumni helped to equip schools with computer equipment and facilities. On the other hand, it was very challenging to coordinate among the various divisions in the MOE which had different roles and responsibilities for the Smart School Initiative, as well as the different partnerships established with external partners.

As mentioned earlier, MSSI represented a *continual process* of integrating ICT in schools. It evolved over 15 years as a result of changing contexts and technologies. The key Smart School Milestones occurred in four waves:

Wave 1 – The Pilot (1999-2002)

Wave 2 – The Post Pilot (2002-2005)

Wave 3 – Making All Schools Smart (2005-2010)

Wave 4 – Consolidate and Stabilize (2010-2020)

The original implementation plan of MSSI comprised two phases: a pilot phase; and a broad roll-out phase. Eighty-eight (88) schools were selected at the pilot phase to be Smart Schools. These 88 Smart Schools tested three models of technology[8]: a computer laboratory model (Level B); a limited classroom model (Level B+); and a full classroom model (Level A). The pilot project also tested the *Smart School Integrated Solution* (SSIS) by providing these schools with courseware in four subjects (Malay language, English, Science and Mathematics); a computerized Smart School Management System (SSMS); a Local Area Network (LAN); and a Help Desk; as well as providing training for teachers, school heads and appointing an ICT Coordinator in each of the pilot schools.[9]

Following the pilot phase, the government undertook a massive computerization programme by constructing computer laboratories in all 10,000 Malaysian schools and providing broadband and Internet access to these schools. To help bridge the digital gap, rural schools were provided with School Access Centres (SACs) -- cyber cafes for students to source materials, select

[7] *Ministry of Education. (2008). Malaysia ICT in Education: Cutting Edge Practice. Kuala Lumpur: Ministry of Education.*

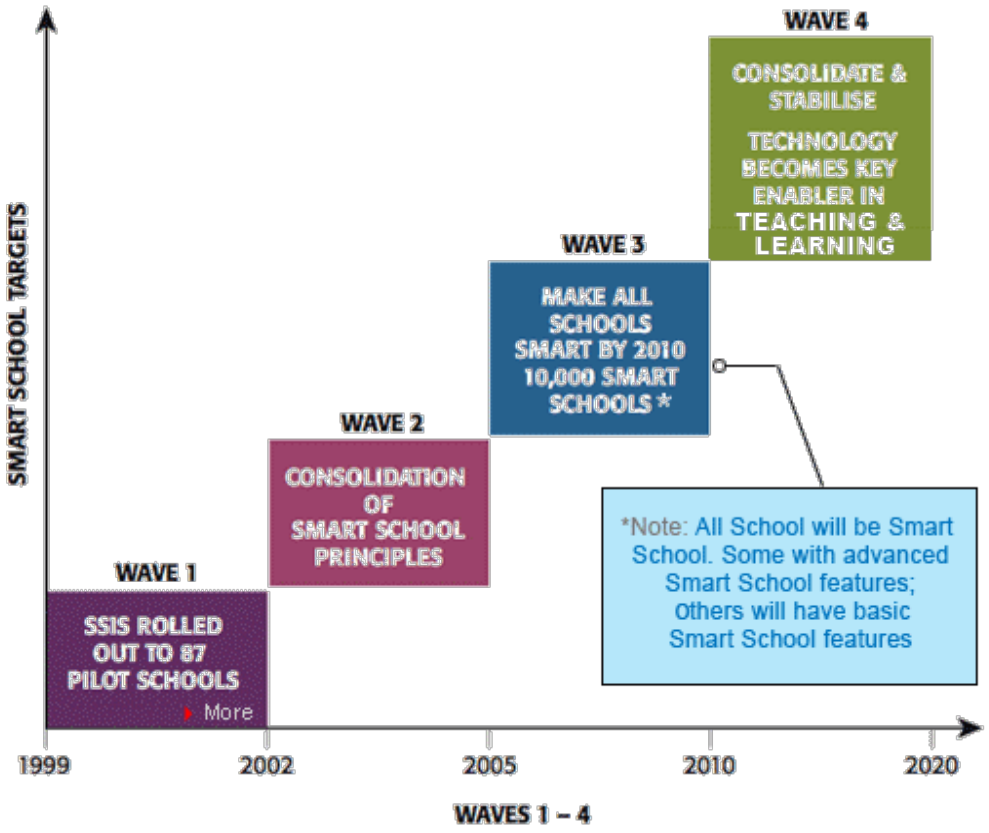
[8] *The three models of technology are three ways of providing ICT infrastructure to the smart schools: (i) a computer laboratory model (Level B) consisting of 37 computers, 2 notebooks, 3 servers, 4 printers and a leased line of (128/64kbps) to a school; (ii) a limited classroom model (Level B+) consisting of 81 computers, 2 notebooks, 3 servers, 8 printers and a leased line of (128/64kbps); and (iii) a full classroom model (Level A) consisting of 520 computers, 5 notebooks, 6 servers, video conference equipment, leased line of (512/256kbps). Out of the 88 Smart Schools, 6 are at Level A, 2 at Level B+ and 80 at Level B.*

[9] *Ministry of Education. (2009). Smart School Qualification Standards (SSQS). Second Edition. Kuala Lumpur: Ministry of Education.*

information and monitor their own learning progress. In 2003, the *Teaching and Learning of Science and Mathematics in English* programme was introduced. To ensure the success of this programme, schools were provided with laptops, LCD projectors and screens, television sets and printers. Teaching and learning courseware were developed to facilitate the teaching of Science and Mathematics in English.

At the post-pilot phase, the focus was on providing supervision and support as well as coordinating parallel efforts of integrating ICT in schools. The aim was to monitor the implementation and to take corrective actions in the implementation of MSSI. *Making All Schools Smart* (MASS) was a process to roll-out the Smart School concept to all Malaysian schools by leveraging on all of the MOE's various ICT initiatives. This was an on-going process to improve the effectiveness of school management and the quality of teaching and learning.[10] It was considered 'on-going' because the full incorporation of ICT in a particular school was seen to depend on a variety of factors, including its ICT infrastructure, the competency of its teachers and the leadership of school heads.

Monitoring and evaluation is a crucial component of any new programme because policy makers need to collect feedback for policy enhancement, allocation of resources and to assess its cost-effectiveness. The following section provides an analysis of the various types of support given to schools and teachers under MSSI, how the project was developed based on feedback from several reviews, and some of the outcomes of the initiative.



[10] *Ministry of Education. (2011). Hearts and Minds Towards Making All Schools Smart. Kuala Lumpur: Educational Technology Division, Ministry of Education.*

3. Monitoring and Evaluating Mechanisms

The Pilot Phase (1999-2002) of the MSSI was closely monitored.[11] Although there were no major difficulties identified, it was evident from the start that the 80 schools provided with Level B ICT infrastructure found it difficult to share the computer laboratory facilities among all the classes in these schools. A study found the teachers used the computer laboratories for teaching and learning four to eight times a month on the average.[12] Maintenance of hardware was problematic and breakdowns were frequent. It was reported in several reviews that the Smart School Management System (SSMS) and the Smart School (SS) courseware were found to be under-utilized. The utilization of SSMS was reported at 40-50%, largely because there were other school management systems introduced by other divisions and departments in the MOE; schools found these demands overwhelming. Teachers were not keen on using the SS courseware, as they found usage of materials directly related to examination preparation saved precious teaching time. The lack of monitoring and support made teachers less inclined to use the SS courseware. It was reported that the MOE help desk faced problems in addressing queries within a stipulated timeframe.[13]

In addition, the training of teachers on ICT competencies and ICT-pedagogy integration was found to be inadequate. A review reported that a sum of MYR 288 million (USD96million) was allocated for the training of teachers in Smart Schools. A 14-week, in-service training course implemented in the beginning period (1998-2000) was reduced to a 12-week course in 2001-2003, and later to an 8-week course in 2004–2005.[14] Since 2007, the length of ICT in-service teacher training course was further reduced to 4 weeks. All the reviews pointed to the fact that the ICT in-service teacher training was not sufficient enough in helping teachers to use the SSI courseware.

In brief, the issues and challenges from the Pilot Phase can be summarized as: infrastructure readiness; connectivity; change management; parallel ICT initiatives; training of teachers and administrators; technology obsolescence; and policies.[15]

To overcome the issues and challenges that emerged during the pilot phase, and in line with the move to make all schools ‘smart’, a monitoring tool known as the *Smart School Qualification Standards* (SSQS) based on the *Star Rating* was introduced in 2006. The SSQS was a set of indicators to monitor, evaluate and categorize schools in the usage and impact of the technologies. These indicators were developed to monitor the types of ICT resources available, the extent and nature of professional development efforts, and changes in teaching/learning practices.[16] The key objectives of the SQSS were:

- to increase utilization of ICT in schools;
- to develop a set of indicators to measure ICT integration in administration, teaching and learning;
- to provide a basis for policy planning and programme improvements.[17]

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[11] *The parties concerned were MOE, MDeC, Telekom Smart School (TSS). When the Pilot Project concluded in 2002, a number of formal reviews were carried out by MoE and MDeC, MoE and TSS, and local academics. (MDeC, 2009).*
[12] *KPM, Kementerian Pendidikan Malaysia. (2002). Pemantauan Kolaboratif Pelaksanaan Projek Rintis Sekolah Bestari. Kuala Lumpur: Bahagian Sekolah, Kementerian Pendidikan Malaysia.*
[13] *MDeC, 2009*
[14] *Shaharuddin, B. & Abbidin, N.Z. (2009). “Reviewing the Implementation of the Smart Schools and the Training of Bestari Teachers in Malaysia”, Uluslararası Sosyal Arastirmalar Dergisi / The Journal of International Social Research, Volume 2/6 Winter 2009.*
[15] *MDeC, 2009*
[16] *MOE, 2009*
[17] *Ibid.*

The SQSS evaluated schools by performance indicators across four focus areas[18], as follows:

- *Utilization* (40%): monitored the extent to which the school makes use of ICT in its operation, management, teaching and learning activities; examples of related indicators include: student-to-PC contact hours; courseware/ICT-based content integration by teachers for core subjects; School Management System updating; Education TV content and Learning Management System (LMS) usage; and student completion of self-learning materials.

- *Human Capital* (40%): referred to the competency of end-users in integrating ICT in teaching, learning and/or administration; examples of related indicators include: ICT Coordinator's competency; core-subject teachers' ICT competency; use of ICT in dissemination of information; smart partnerships; use of multimedia in teaching; and students' competency and awareness of the availability of educational courseware.

- *Applications* (10%): referred to the various applications provided by the MOE and others adopted by schools; examples of related indicators include: at least 5 modules used for school management; LMS and MoE courseware are used for teaching; and website presence and maintenance.

- *Technology Infrastructure* (10%): a comprehensive audit of the infrastructure was provided by the MOE, inclusive of maintenance and support within the schools; examples of related indicators include: PC-to-class ratio; PC accessibility; LAN & WAN; and technology downtime.

All schools are required to periodically participate in this self-assessment exercise[19] to determine their achievement according to the indicators. The SSQS rated the achievement of schools from one (1) to five (5) stars. This Star Rating was awarded based on a unified score from the indicators to:

- Serve as a device for monitoring;

- Provide information for specific actions to uplift the integration of ICT in schools;

- Facilitate decision and policy making towards making all schools smart.

The Star Ratings[20] were:

Basic *(1 Star)*: Schools with merely basic conditions across all indicators;

Basic Plus *(2 Stars)*: Star rating for schools with basic features, with slight additions but falling below the average conditions of for all indicators;

Median *(3 Stars)*: Star rating awarded to Smart Schools with fair or average conditions of all the indicators;

Advanced *(4 Stars)*: A seal of approval awarded to Smart Schools with good or advanced conditions for most indicators;

Advanced Plus *(5 Stars)*: The highest approval rating, awarded to Smart Schools with advanced conditions for most indicators.

Schools achieving one (1) or two (2) stars had not achieved the desired level according to the indicators, while schools with a three (3) star rating and above had achieved 'Smart School

[18] *Ibid.*
[19] *The SSQS on-line system for assessment is accessed via http://ssqs.moe.edu.my.*
[20] *MOE, 2009*

status'. A number of schools that attained high rating levels were selected as 'Champion Schools' under the *1Bestarinet* initiative, which was being rolled out to all schools in the country. The 1Bestarinet initiative provided increased broadband connectivity of up to 10 Mbps and the use of the Frog Virtual Learning Environment (VLE). For schools that attained low ratings, catalyst schools (those categorized with 5-star ratings) were assigned to nurture them to attain higher star ratings in future.

The SSQS was used to monitor the number of Malaysian schools that achieved smart school status. The monitoring results for the last three years in this period are shown in *Table 1*. The results show that the percentage of schools that have achieved smart school status increased from 89.60% in 2009 to 94.76% in 2011, leaving a small percentage (5.24%) of Malaysian schools that had not achieved smart school status.

Table 1. Achievement of Smart School Status (2009 -2011)

Year	No. of Schools	SSQS benchmarking					No. of Schools with Smart School Status	No. of Schools yet to achieve Smart School Status
		5 Stars	4 Stars	3 Stars	2 Stars	1 Star		
2009	8 454	96	2 412	5 067	662	217	7 575 (89.6%)	879 (11.60%)
2010	8 955	271	3 440	4 436	621	187	8 147 (90.98%)	808 (9.92%)
2011	9 662	627	4 552	3 977	399	107	9 156 (94.76%)	506 (5.24%)

source: Bahagian Teknologi Pendidikan (BTP), MOE, 2012

Besides monitoring the usage of ICT in schools, a couple of studies were undertaken to investigate the impact of ICT on students' learning achievement. A quasi-experimental study (Soon, 2003) was carried out to compare students' achievement in science between smart schools and non-smart schools. The study shows that students in smart schools performed significantly better than those in non-smart schools in the pre-test, post-test and gain scores. Another impact assessment study on the SSI undertaken in 2006 (Frost and Sullivan, 2006) shows that:

- 90% of students demonstrated sufficient ICT literacy for learning;
- less than 50% of students were unable to conduct independent/self-learning due to limitations in access to facilities and content;
- 82.5% of teachers felt that their ICT competencies had been positively impacted by SSIS;
- 90% of teachers were using the computer laboratories for lessons and preparations of materials;
- 73% of teachers noted their productivity has improved using ICT;
- 90% of information technology coordinators (ITCs) were technically competent;
- 70% of ITCs felt their efficiency was impacted due to late response from Help Desk;
- the Smart School Management System (SSMS) helped general administrators in managing school resources and planning; and
- the productivity of general administrators was impacted by poor equipment reliability.

On the whole, the monitoring and evaluation mechanisms put in place helped to monitor the implementation of MSSI nationwide and evaluate its impact at the school, teacher and student level. It provided useful information for responding to emerging challenges and for policy refinement, which the eventual goal of making all Malaysian schools ‘smart’ by the year 2020.

4. Moving forward

The SSQS rating for 2011 showed that only a small percentage (6.49%) of all the Malaysian schools achieved a 5-Star rating. One of MOE's key strategies to ensure that schools would achieve Smart School status was the *Catalyst Schools* programme.[21] This strategy was designed to generate a 'multiplier effect' to speed up the process of achieving a 5-Star rating. Catalyst Schools – those schools which had received a 5-star rating -- were required to mentor, guide and support schools within their cluster and help them to improve the usage of ICT in their schools. By design, each Catalyst School were responsible for guiding between four to five schools in their 'cluster' to achieve a 5-Star rating. In 2010, 100 Catalyst Schools were appointed to coach a total of 400 schools. Of the 400 schools, 271 successfully attained 5-Star rating. In 2011, these 271 schools were appointed to coach 1,394 schools. Of the 1,394 schools, 627 attained 5-Star rating. In 2013, these 627 schools were designated to coach 2,500 schools.

When the monitoring tool SSQS was introduced, schools were required to carry out a self-assessment survey, which was conducted once a year through an online monitoring system, to input the data against the indicators specified in SSQS. Very often the data collected were not valid or reliable, because teachers misunderstood the indicators and input incorrect data. As a result, it was quite common that a particular school was rated higher in the star rating than it should have been. To overcome this problem, on-site monitoring was undertaken by the Malaysian School Inspectorate, working closely with the Educational Technology Division (ETD), starting in 2012.

Although Malaysia developed the Smart School Qualification Standards (SSQS) to rate schools in the utilization and impact of ICT in their schools, what was lacking was a national ICT Competency Standard for teachers. Although the SSQS had some indicators on teachers' ICT competencies, such as the number of ICT-related courses attended by teachers in the last three years, the number of ICT knowledge-sharing activities conducted by teachers, and frequency of ICT-related information dissemination by teachers, these indicators were considered insufficient when measuring the actual ICT competencies possessed by the teachers. The Educational Technology Division (ETD) in the MOE obtained input from international and local consultants and completed the draft of a national ICT Competency Standard for teachers, with reference to the standards developed by ISTE. The draft national standards were pilot tested in early 2012, and an actual study was conducted in a number of schools throughout the country upon its completion. With a national ICT Competency Standard for Teachers in place, the Teacher Education Division and teacher training institutions were in a better position to design and deliver relevant in-service and pre-service ICT teacher training courses. In addition, the ICT competencies for students were also developed to provide indicators for curriculum planning undertaken by the Curriculum Development Division.

The courseware for all subjects was developed and disseminated to schools by ETD, with the expectation that it would help facilitate teachers' ICT-based teaching and students' self-directed learning. However, it was found that the courseware was hardly being put into use by the teachers, because either the courseware was not relevant to the local context or that it did not meet the diverse learning needs. ETD initially focused on the development and provision of the CD-ROM based courseware, while online support to teachers was limited to downloading of syllabus and instructional materials. Subsequent future developments under MSSI included the development of more e-materials, the introduction of the VLE (virtual learning environment), the upgrading of connectivity through 1BestariNet, and promoting the use of EduWebTV.[22]

[21] *MOE, 2011*
[22] *EduWebTV is a video-based educational portal designed to help teaching and learning within and outside the classroom.*

5. Conclusion

The Malaysian case of the MSSI shows that the wide scale implementation of ICT in education across an education system need not be the sole responsibility of a Ministry of Education, but rather that it can instead involve multiple stakeholders from the ministry, industry, community and educational associations. The Malaysian government drew expertise and resources from both the public and private sector through smart partnerships in implementing the Malaysian Smart School Initiative. Furthermore, the implementation of ICT in education in Malaysia remains an on-going and evolving process, given organizational and technological changes that are taking place over time. For Malaysia, it was crucial that monitoring and evaluation was an integral part of the implementation process of MSSI, as it helped policymakers to refine or reformulate policies, re-allocate resources and set new targets.

The Malaysian model of involving multiple actors in its Smart School Initiative has had its advantages and disadvantages. The fact that the Implementation Committee of the Multimedia Super Corridor (MSC) was chaired by the Prime Minister and that the Smart School Initiative was one of the seven flagships under MSC sends a clear signal that it is one of the top priorities in the Malaysian government's agenda. The Smart School Steering Committee consists of representatives from multiple stakeholders, from both the public and private sector. The effective functioning of this steering committee is of utmost importance, because this is where major policies are formulated and coordination among the different actors is put in place. The organization chart of MSSI (see *figure 1*) identifies five levels of management in the planning, development and implementation of this initiative. The flow of information and channels of communication among these different management levels, as well as between management and implementers in the field, were crucial to the roll-out of MSSI.

The involvement of the private sector in this model brought with it the practice of corporate management and the elements of competitiveness, all of which contributed to the efficiency and quality of the deliverables. Under the MSSI, private companies had to bid for contracts with the Smart School Steering Committee for specific tasks and deliverables related to the MSSI, such as training of teachers, development of curriculum materials, and the supply of computers to schools. Meeting targets and deadlines with quality deliverables were critical to the functioning of the numerous public-private partnerships established under MSSI. This kind of 'privatization' is often used in various public sectors in Malaysia to overcome the slowness and inefficiency of public management. This model also brings with it the nimbleness and speed in responding to the rapid technological change in the IT industry. However, this sort of model can contribute to a lack of continuity and institutional memory, because specialists and consultants come and go depending on the length of each contract. In addition, the remoteness of schools located in the interior regions of Sabah and Sarawak brought about many challenges to the private sector's involvement in these projects.

As mentioned earlier, the coordination among the different actors in this initiative was essential to the success of its implementation. More often than not, one division of the Ministry of Education may not be aware of what is being done by other divisions. Similarly, one private company may not know what other companies are doing under the MSSI. As a result, schools and teachers may receive conflicting messages from these various actors and at times there are competing demands from different authorities. This has been observed under the MSSI. For example, a number of reviews have shown that many Smart Schools are not using the Smart School Management System (SSMS) because there are other management systems introduced and supported by other divisions in the MOE.

Although it was necessary to implement the MSSI phase-by-phase and to pilot test educational innovations in a small number of selected schools, there was the tendency to channel most of

the limited resources to these pilot schools so as to showcase them, both nationally and internationally. This strategy raised the issue of educational equality among the general public in Malaysia. During the pilot phase of MSSI, many parents questioned why only certain schools were selected to become Smart Schools. Although there were plans to roll out MSSI to all Malaysian schools, there were still many schools, especially those in the rural areas, which lacked computer facilities and teachers with ICT competencies.

The development of the Malaysian Smart School Initiative can provide some useful lessons to policy makers from other countries. These include:

1. **It is important to adopt a holistic approach to incorporate the use of ICT in schools right from the onset.** The MSSI involved the use of ICT in the teaching-learning process as well as in the management and administration of schools. It also entailed the capacity development of teachers, administrators and technicians in using ICT effectively in their daily practices.

2. **Effective public-private partnerships can be a useful strategy to mobilize resources and expertise in the implementation of ICT in education.** The Ministry of Education in Malaysia formed partnerships with key players in the industry and community to implement the MSSI.

3. **Since large sum of money is involved and the fact that the application of ICT in the field of education is relatively new to many people, it is essential that this educational innovation is piloted before it is being up-scale.** The MSSI was piloted in 88 schools before being rolled out to all Malaysian schools.

4. **Research and development, monitoring and evaluation are essential components of the implementation process.** The MSSI developed and adopted a monitoring tool (SSQS) to measure the utilization of ICT in schools. However, it was not adequate to rate schools in Malaysia only the utilization and impact of ICT on learning outcomes; it was also necessary to assess teachers on their ICT competencies.

5. **Teachers need adequate training, continual supervision, professional and technical support before they become more inclined to use ICT in their daily work.** The case study shows that these essentials were lacking during the initial part of MSSI, resulting in under-utilization of the ICT facilities by teachers in the smart schools.

6. **The maintenance of hardware and the provision of software and courseware are indispensable if educational personnel were to make effective use of ICT in education.** The case study shows that timely maintenance service was missing in some of the smart schools in Malaysia.

7. **Any ICT initiative on a large scale requires managing change effectively.** In Malaysia, introducing a massive ICT initiative required teachers and school administrators to adopt change readily and implement the project with creativity and innovativeness.

8. **The success of any ICT initiative must be complemented by robust broadband connectivity to the internet.** Based on the Malaysian experience, failure to do this will result in teachers not wanting to use the web-based resources available and ultimately results in low adoption rates.

The implementation of ICT in education in Malaysia is an on-going process with contributions required from various stakeholders so that teachers and students can benefit from the use of

ICT in teaching-learning, management and administration. The Ministry of Education seeks to continue to monitor and evaluate the MSSI so that it can ensure better returns on the huge investments related to ICT in education as part of the MSSI.

Bibliography

Frost & Sullivan (2004). *Benchmarking of the Smart School Integrated Solution*. Kuala Lumpur: Ministry of Education.

KPM, Kementerian Pendidikan Malaysia. (2002). *Pemantauan Kolaboratif Pelaksanaan Projek Rintis Sekolah Bestari*. Kuala Lumpur: Bahagian Sekolah, Kementerian Pendidikan Malaysia.

Ministry of Education. (2008). *Malaysia ICT in Education: Cutting Edge Practice*. Kuala Lumpur: Ministry of Education.

Ministry of Education. (2009). *Smart School Qualification Standards (SSQS). Second Edition.* Kuala Lumpur: Ministry of Education.

Ministry of Education. (2011). *Hearts and Minds Towards Making All Schools Smart.* Kuala Lumpur: Educational Technology Division, Ministry of Education.

MDec, Multimedia Development Corporation. (2009). *Malaysian Smart School Roadmap 2005-2020*. Kuala Lumpur: Multimedia Development Corporation Sdn. Bhd.

NITC, National IT Council. (2012). *Multimedia Super Corridor Malaysia*. http://www.nitc.my/index.cfm?&menuid=28.

Shaharuddin, B. & Abbidin, N.Z. (2009). "Reviewing the Implementation of the Smart Schools and the Training of Bestari Teachers in Malaysia", *Uluslararası Sosyal Arastirmalar Dergisi / The Journal of International Social Research*, Volume 2/6 Winter 2009.

Soon, S.T. (2003). *Indicators That Contribute Towards The Achievement Of Science In Smart Schools. Paper presented at the 10th National Research Seminar, 29 September - 2 October 2003.*

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