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The Development of Information and Communication Technology in Education in Brunei Darussalam

*(Datin Hajah Khadijah Binti Haji Akbar)**

ABSTRACT

This paper will discuss the development of Information and Communication Technology (ICT) in education in Brunei Darussalam which started in 1983. With only few teachers being sent to undergo computer training and limited units of computers, ICT begins to play a greater role in education in Brunei Darussalam. As it shows a positive progress, the Ministry of Education of Brunei Darussalam via its Department of ICT continues to *provide special funds to implement ICT in education particularly in upgrading facilities in school and higher institutions. Among the early development of ICT facilities in schools and higher institutions include the establishment of computer laboratory in primary schools which is equipped with several units of peer-to-peer networked Personal Computers complete with headphones, microphones, external speakers, a colour printer and a hub for networking.* Such special allocation proves to have positive impact on the teaching and learning of most subjects and enhanced the motivation of students. Hence, with such improvement, it is believed that ICT will be one of the pinnacles for the progression of education in Brunei Darussalam. It becomes a priceless 'add-on' as students to prepare them to be more innovative, mould their critical thinking and prepare them for the fast-paced changing world.

* Datin Hajah Khadijah binti Haji Akbar is a executive secretary in Brunei Darussalam National Accreditation Council (BDNAC), Brunei, and also SEAMOLEC Governing Board member from Brunei Darussalam.

Education in Brunei Darussalam

Brunei Darussalam has a policy of providing a minimum of 12 compulsory years of education. This comprises 7 years in primary education (inclusive of 1 year in pre-school) and 5 years in secondary. The education system in Brunei Darussalam places strong emphasis on literacy, numeracy, science, physical education, as well as civics and moral education. In 1984, the bilingual policy introduced which enables the child to acquire the national language, Bahasa Melayu, and an international language, English. Proficiency in the latter enables the child to access a greater mass of information in this globalise world. School children are also exposed to Information and Communication Technology (ICT) skills to promote creativity, independent learning and enhance higher order thinking skills.

To meet future challenges in an ever changing world, the Ministry of Education, Brunei Darussalam has developed a vision of 'Quality education towards a developed, peaceful and prosperous nation' along with a mission 'to provide holistic education to achieve the fullest potential for all'. These vision and mission are believed to realize the nation's aspirations and produce citizens who are committed and capable of contributing towards the continued growth, stability and prosperity of the country.

In its endeavour to develop the fullest potential of the child, the Ministry continuously reviews the education system in order to meet with the demands and future challenges of the nation and, more importantly, to cater to every child's ability and aptitude. For this, the Ministry has devised ten-year strategic objectives (2006-2015)

prioritising human resource development in order to meet Brunei Darussalam's need for an educated and marketable workforce. The education system also aims to inculcate sound moral values as a strong foundation in an era of rapid progress and change.

2. Development of ICT in Education

The introduction of ICT in education in Brunei Darussalam went back as far as 1983 where 12 teachers were selected to attend a course in computer training for a month. In 1992, Computer Studies was introduced as an elective subject for upper secondary in 3 secondary schools. The subject was further offered to 20 other secondary schools in 1995. In 1997, the Ministry of Education introduced the Educational Information System (EIS) as an initiative developed to replace a PC-based Educational Statistic System.

As development of ICT in educational sector shows a positive progress, the Ministry of Education decided to allocate special funds to implement ICT in education particularly in upgrading facilities in school and higher institutions.

Among the early development of ICT in schools and institutions include the implementation of the Primary School Computer Project in 50 selected Government primary schools in 1999. In the first phase of the project, each primary school has a computer laboratory which is equipped with 13 units of peer-to-peer networked PCs complete with headphones, microphones and external speakers. Additionally, each school was also provided with a colour printer and a hub for networking. The use of ICT in this initial phase concentrated in four core subjects namely Bahasa Melayu, English, Mathematics and Science. These participating schools

also started to use computer textbook written in Bahasa Melayu.

To support this project and to ensure proper utilization of ICT in the selected schools, teachers involved in this phase were provided with 'ICT Scheme of Work' prepared by the Department of Planning, Research and Development (JPPP), Ministry of Education as a guideline. Several courses were also organized for teachers such as 'Basic ICT Skills' course which was conducted by Sultan Hassanal Bolkiah Institute of Education (SHBIE), Sultan Saiful Rijal Technical College and Jefri Bolkiah College of Engineering (MKJB) for a total of 100 teachers (two from each school) while 50 teachers participated in another course conducted by SHBIE namely 'Integration of ICT Use in the Primary School Curriculum'.

The project in a way activated a 'technology boom' in Brunei Darussalam where in the early 2000, JPPP started to provide Internet and e-mail services to selected senior officers using existing EIS infrastructure and equipment. E-Mail service was also provided to all principals, headmasters and headmistresses in Government schools and senior officers.

Following that, the second phase of the project took place in 2001 which involved a total of 72 Government primary and secondary schools. Here, 20 units and 33 units of multimedia PCs were supplied to selected primary and secondary schools respectively. All supplied PCs were wirelessly peer-to-peer connected which came along with a colour printer, a hub for networking, a laser printer, a modem, a CD-Read and Write Drive and some other educational softwares.

This phase also instigated various courses for teachers which include the 'Basic ICT Skills' course conducted by Institut Teknologi Brunei (ITB) and MKJB which was attended by 146 Government primary teachers; 'Microsoft Excel and Microsoft PowerPoint' course organized by SEAMEO VOCTECH which was attended by all Government secondary principals and deputy principals and the 'Multimedia Production' course at SEAMEO VOCTECH attended by 10 Primary teachers.

On top of the above courses, the second phase of the project also saw the provision of training development continuity notably in the Project 'Integration ICT Across the School Curriculum in the Government Primary and Secondary Schools' where a total 265 primary and secondary school teachers and five officers from the Department of Curriculum Development (JPK), Ministry of Education attended the 16-week professional staff development course in July 2003.

The end of 2002 saw a 'Design & Technology (D&T) Project' being implemented in four primary and secondary schools in Brunei Darussalam. This project was a joint initiative between the Ministry of Education and BAE Systems (UK). BAE Systems (UK) also arranged a five-day ICT and D&T training course which was participated by 80 teachers and officers from the Department of Schools, Department of ICT, and JPK. The project was conducted by experts from the United Kingdom.

3. Further progress of ICT

As Brunei Darussalam embracing the National Education System for the 21st Century (*Sistem Pendidikan*

Negara abad ke-21, SPN21), ICT continues to play a greater role in ensuring major educational changes.

SPN21 that started in 2008 with an interim (transitional) stage for Year 7 aims to meet the social and economic challenges for the 21st Century and to equip students with 21st Century skills. SPN21 further highlights the rationale for the change which includes achieving Brunei Vision 2035 where Brunei Darussalam should be recognized for the accomplishment of its well-educated and highly skilled people; the quality of life; and the dynamic and sustainable economy.

To hold the rationale of SPN21, the e-Education project was crafted in 2004 in conjunction with the 8th National Development Plan e-Government initiative. Having considered the potential benefits and challenges, the relevant projects under the e-Education Plan were endorsed and approved by e-Government Programme Executive Committee in November 2004. Since then, several pilot studies and learning management systems were implemented to explore the promises of using ICT to support learning and teaching.

The e-Education has a vision of transforming Brunei Darussalam nationals to become more knowledgeable, thoughtful, multi-skilled, competitive and smart based upon the teaching of Islam according to *Ahlis Sunnah Waljamaah* and a mission to enable access for all to e-Education by providing a strong foundation in ICT thereby promoting excellence in human capacity building. Given this vision and mission, the Ministry of Education intends to achieve the following:

- Provision of reliable and efficient ICT resources

Increased ICT pervasiveness in the working and learning environment

Transformation of the teaching and learning environment

Ensuring management, administrative and operational excellence in the education system.

Establishment of e-Education related Research and Development (R & D) capabilities.

The e-Education caters five pillars namely Edunet; e-Learning; Educational Information System; Digital Library; and Human Capacity Building. It is estimated that a total of B\$145 million would be spent to support these five pillars of strategic ICT programmes by 2005 which of this, 15% has already been spent in 2003.

Out of five pillars of e-Education, e-Learning Program is a system that directly help to deliver 'proof of concept of appropriate technology' and to add a new dimension in learning and teaching environment. e-Learning is commonly defined as the use of internet technologies and innovative styles to enhance the learning environment through a Learning Management System platform. Teachers/lecturers can upload or electronically distribute their teaching materials to the students as and when necessary. The busy part of note taking during classroom can soon be replaced with more interactive discussion. Using online assessment and automatic grading, the level of understanding among the students can be quickly monitored and adjusted. In

addition, the various e-learning tools allow better collaboration and interactions between teachers and students and among themselves.

One project in the e-learning Program namely 'The Design, Verification, Commissioning, Implementation and Maintenance of e-Learning Systems and Strategies' was implemented in 2004 with the main objective to deliver the benefits of using internet technologies to enhance learning and teaching focusing on blended classroom environment. The effective implementation of e-learning in all the A-level colleges, technical and vocational colleges, nursing college, ITB and UBD will help students to develop greater confidence and ownership in developing digital literacy. Teachers/lecturers will be encouraged to adopt easy-to-use authoring tools and to create contents which can be readily distributed, reused and modified. The project also aims at installing an instructional design facility to catalyst the authoring and collaboration of contents.

Among the ICT facility introduced in the e-Learning Program is the Interactive White Board (IWB) for teaching and learning to all learning institutions and departments. IWB is a digital board that connects to a PC and LCD projector creating a large interactive projection screen. Using IWB that is by touching the board surface with an electronic pen or simply using finger, the presenter enable to stay in front of the audience without touching the computer. For the record, the installation of IWB in schools used about BND3 million out of BND145 million allocated budget for ICT in education.

The project further includes a strategic study on

e-learning in Ministry of Education, implementation of a Learning Management System, instructional design facility, provision of authoring tools, notebooks, and digital contents. The project duration is a year of implementation with four subsequent years of maintenance and support. This project is expected to bring in international best practices and e-learning expertise particularly from Singapore, USA, India and Pakistan.

4. Benefits of ICT

1.1 Students

Better provision of ICT facilities leads to better understanding of ICT among the students. Hence, several projects are organized for students to show their understanding of ICT. The Inforama, for instance, is a national level computer competition for students in primary, secondary, technical, vocational schools as well as institutions of higher learning. Launched in 1996, the competition, which is a project of the Ministry of Education in co-operation with Universiti Brunei Darussalam (UBD) and some private organisations such as Brunei Shell Petroleum Company Sendirian Berhad, is in line with the Ministry's plans for developing the concept of thoughtful schools with the aims to boost students' and community awareness on the use of Information Technology as well as unleash and nurture innovative and creative students.

The competition is organized annually with the latest competition, Inforama 2009, took place in March 2009 with a theme of 'Realising SPN21 through ICT'. The Inforama

2009 was known to be more interesting as it includes primary school students through to higher educational institutions and the public, workshops for primary and secondary school teachers, an Inforama camp and carnival as well as micro teaching for teachers from government and private schools.

Another well-known project is Brunei ICT Award (BICTA) which is a component of Asia Pacific ICT Award (APICTA) whose vision is to widen the influence of ICT industry in Asia Region. The main objective of BICTA is to stimulate innovation and creativity in ICT industry amongst individual and associations including Small-Medium Enterprise (SME); to be benchmark for local company to compete amongst each other and to be nominated in the annually held APICTA.

BICPA supports ICT in education in a way that it creates a category of 'Education and Training' that allows any applications software, hardware or its combination to promote a programs that develop, support and administer the training, general knowledge, academic, technical, vocational skills and cultural attainments of individuals. Programs competing in this category should be able to be used in schools, preschool activities and childcare centers, colleges, universities, schools for the mentally retarded or physically handicapped, educational radio and television stations, libraries, enterprise or museums. This category also includes the e-Learning application intended for close user group or openly available through internet access for public as a free courseware or commercial courseware

1.2 Teachers

The focus on technology in education has precipitated several efforts by the Ministry of Education to provide the necessary training required to equip and enable teachers to participate more actively in ICT integration. The teacher training programs at the SHBIE at the UBD contribute to this effort through courses offered in Educational Technology and other related courses. One such core course for the Post Graduate Certificate of Education (PGCE) program is Educational and Information Technology. Under the Integration of ICT into the Curriculum project, teachers from secondary schools and colleges were selected to attend in-service training on the use of ICT in education.

Teachers are also exposed to several exchange programmes. For example in 2006, an Education and ICT exchange programme between UBD and Osaka University, Japan was held at the Ministry of Education which was jointly organised by the Ministry and UBD. The program was attended by four research collaborators from the Osaka University who were in the country for an educational exchange visit. The objective of the programme was to exchange knowledge in the field of education and ICT that focused on collaborative research relating to ICT between educational institutions of both countries.

In May 2008, the e-Education Project was launched which is also one of many efforts to fully utilise ICT in every aspect of teaching and learning activity. This project includes the provision of schools' ICT infrastructure, provision of ICT being integrated into the curriculum, teacher training, pedagogy and the

need to train all the teachers to acquire basic competency and skills in ICT by providing them with International Computer Driving License, ICT courses and the use of the IWB.

5. Conclusion

The Ministry of Education, Brunei Darussalam is very enthusiastic about ICT in education. This is proven when there are funds allocated specifically to upgrade facilities in schools and institutions with the setting up of computer laboratories and the required infrastructure.

With such funds, the Ministry continuously makes an effort to fully develop ICT facilities in schools and institutions which include every aspect of teaching and learning activity through the e-Education project. Apart from facilities, the funds are also allocated for ICT competency training courses for teachers, administrators and officers to familiarise them with the integration of ICT across the school curriculum. Here, the Ministry continues to provide the necessary training required to equip and enable teachers to participate more actively in utilizing ICT facilities.

The outcome of utilisation of the fund can be seen today as almost all Government primary and secondary schools are equipped with computer hardware and software resources which, as confirmed by the Department of ICT, Ministry of Education, has had a positive impact on the teaching and learning of most subjects and enhanced the motivation of students.

Although various ICT projects are still yet to be implemented, it is hoped that, by the end of the implementation

period, Brunei Darussalam will be able to equip all students with modern-day skills, emphasising on effective communication and innovative thinking to produce a digitally literate generation.

In general, ICT in schools in Brunei Darussalam is believed going to be one of the pinnacles for the progression of education in Brunei Darussalam. It becomes a priceless 'add-on' as students who used to get information from books are now able to get information from Internet search engines which holds a countless number of researches and information. Hence, proper usage of ICT in schools will prepare students to be more innovative, mould their critical thinking and prepare them for the fast-paced changing world.

ABBREVIATION

APICTA	: Asia Pacific ICT Award
BICTA	: Brunei ICT Award
D&T	: Design and Technology
EIS	: Educational Information System
ICT	: Information and Communication Technology
ITB	: Institut Teknologi Brunei
IWB	: Interactive White Board
JPK	: Department of Curriculum Development
JPPP	: Department of Planning, Research and Development
MKJB	: Jefri Bolkiah College of Engineering
PC	: Personal Computer
PGCE	: Post Graduate Certificate of Education
R & D	: Research and Development
SHBIE	: Sultan Hassanal Bolkiah Institute of Education
SPN21	: Sistem Pendidikan abad ke-21
SME	: Small-Medium Enterprise
UBD	: Universiti Brunei Darussalam

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