

SOME POLICY ISSUES ON ICT IN EDUCATION

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ABSTRACT

Educational institutions need to adapt to new ICT environments and circumstances, and be provided with tools and models to be able to do so. Information and communication facilities, services and management should be procured at reasonable or reduced costs. The quality and efficiency of services and products need to be continuously improved. The Brunei Ministry of Education needs to set up mechanisms to promote the sharing of resources and information, transparency, accountability and reduce bureaucracy within and between institutions and departments. All these need to be incorporated into policy and prioritized as immediate, mid-term and long-term strategic plans. The fast rate with which ICT is developing and evolving poses challenges for educational research and policy-making, teacher education, and day-to-day use of ICT in the classroom. This paper discusses and suggests that policies should consider that these means of communication can open up new possibilities for education and bring about profound changes in traditional processes and transactions in teaching and learning.

INTRODUCTION

The corporate development statement for IT 2000 and beyond in Brunei Darussalam illustrated in figure 1, encompasses the structure, vision, mission, goals, and core strategies. This is well documented by the Brunei Darussalam Information Technology Council (BIT, 2000) on its website at <http://www.bit.gov.bn/>.



Figure 1. Corporate development of BIT Council (<http://www.bit.gov.bn/>).

About \$950 million has been allocated by the government for the e-Government initiative under the 8th National Development Plan for ministries and government departments. Among the 10 roles that the BIT Council enumerated, six are relevant for the education sector. These are in the areas of ICT leadership, needs, literacy, manpower, links, and relevance to Brunei Darussalam.

Since the year 2000, there have been multi-pronged efforts in the country to develop the ICT infrastructures and human capacities needed for this 21st Century. These include efforts by the VILIS Brunei project (an e-Library system) which will be able to bring about a new wave of learners by supporting the electronic and digital learning environment and uniting e-libraries and e-learning (Brudirect.com News, 2004). However, the major concern of ICT educators is not just the provision of information but technology utilisation that can develop process and cognitive skills to enable and expand minds to create and re-create knowledge.

In Brunei, development is envisaged on national, regional and global levels via ICT developments, the identified strategy of BIT Council for the 21st Century.

The core strategies documented in Figure 2 by the Brunei Darussalam Information Technology Council (BIT, 2000) include:

- National IT Strategy
- National Drive Towards Paperless Society
 - *Paperless governance and information/data exchange through multimedia technologies
- Public Sector IT Strategy
 - Public Sector Drive Towards Electronic Government

- Private Sector IT Strategy
Private Sector Drive Towards Electronic Business

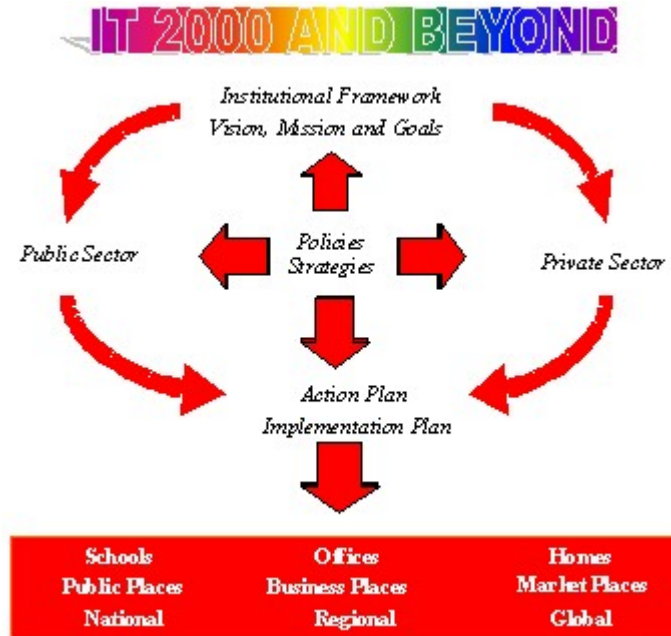


Figure 2. Core strategies of BIT Council (<http://www.bit.gov.bn/>).

GOALS OF ICT IN EDUCATION POLICIES

UNESCO, Bangkok (2003) in a synthesis of goals often mentioned by countries in their national policies on the use of ICT in education for Asia and the Pacific into the 21st Century, lists the following common goals of ICT policies.

Increasing the benefits from information technology.

As ICT is increasingly used by the private sector leading the public sector, processes and transactions become more efficient, and long queues should be minimal. In schools and in higher learning institutions in small economies, the benefits of ICT in administration and in teaching and learning are increasingly felt, albeit more slowly in emerging economies due to financial constraints. It is both wisdom and prudence to prioritise expenditures when funds are limited. ICT expenditure should be able to energise the local economy and create employment as side benefits. Especially in education, local cultural research findings in schools must provide the foresight and

guidance for such high capital and recurring maintenance expenses. Proposals and plans requiring huge budgets should be thoroughly discussed, modified, prioritized, and accepted by all levels of decision-makers and stakeholders.

The UNESCO Bangkok report states that teachers will use computers if they find them beneficial. They will not use them if it takes too long to master the skills of using the machine and its software; if it takes longer to prepare classes; if there is the risk of an embarrassing situation where the computer gets stuck or crashes (with the even greater risk that some insolent kid will get it unstuck); if its proposed use does not follow the curriculum; or if the skills learned are not required in tests.

Educational software is expensive, especially the more sophisticated ones, and time-consuming to develop. Teaching students how to use the Internet, word processors, spreadsheets, databases, and graphic tools is a safe and inexpensive way to bring ICT to schools since these are the productive tools required later for life skills. It is also important to prepare teachers to give their students interesting and practical experiences and exercises for the productivity tools. Student teachers in their courses, with advice from teachers and university faculty, can efficiently without significant expenses, produce local exemplary curricular resources for schools to use. These student teachers can surf the Internet for relevant materials that are appropriate for schools in Brunei. Additionally, they can prepare interactive activities for teachers and students in schools. School teachers, students and parents can manipulate the materials in and out of class/school. These pedagogically-sound resources that are appropriate for the local curricula can be shared readily and easily over the Internet and school networks, especially so where there is centralized curriculum as in Southeast Asian countries including Brunei Darussalam. Many teachers in schools and faculty in UBD and SHBIE are already making efficient use of such e-resources in their teaching and research.

Helping educational institutions to adapt to new circumstances and providing tools and models to respond rationally

For decades, computers have been viewed as *teaching machines* for drill and practice and the like. Computers have also been used to *develop cognitive and thinking skills* and to enrich educational experience, deploying their potential to simulate problems and stimulate the intellect. A third type of application is to use *computers as tools*. In this case, computers are preparing students for the use of computers at work.

Computers should take their place as a natural and powerful part of the teaching and learning process, affecting both teaching and learning in new ways. This new technology

influences how information is presented; how students interact with the medium and through the medium with the teacher and other learners; and how knowledge is structured (Warschauer, 1998). Instrumental perspectives view technologies as isolated tools which can be used toward any ends. Ecological perspectives view technologies as social practices which become part of the ecology of human activity, both at an individual and sociocultural level (Postman, 1993). Ecological perspectives on technology are seen in the field of communication, cognitive psychology, and political economy.

What then are the implications regarding the use of computers and ICT in education? Teachers are likely to move toward Internet-based activities, CD-ROM resources, and easy-to-use applications, no matter what their overall framework or perspective. However, the consideration of an “electronic literacy” framework can signify new approaches on how we use the Internet, Intranet and networks in the classroom and school. Do we help students develop research skills? Do we help teachers and students learn to author multimedia hypertexts? In effect, do we see electronic networks as a legitimate medium in their own right rather than just as a pedagogical tool? How can teachers use the Internet and Intranet to promote learning? From an electronic literacy perspective, how can we promote online learning and thinking and communication skills? This new technological innovation is really challenging educators to change the ways that teaching and learning take place. Policy makers need to support such goals of ICT in education rather than teach specific current content and specific software which very soon become obsolete.

Providing information and communication facilities, services and management at a reasonable cost

All schools and classes do not need the same “state-of-the-art” technology. Policies should address these issues. There are students who have the great passion and skills for ICT. Opportunities should be provided in the curriculum for these students to take ICT courses and develop their potential and ability in these ICT fields. These classes, especially from the upper secondary level onwards, need “state-of-the-art” technology. The other students who are not specializing in the field can make do with less sophisticated and less expensive technology and software, especially primary school classes. Just so that teachers can keep pace with the latest technology and software, a few such computers could be provided for the ICT staff in primary and lower secondary classes. Support staff are needed to provide maintenance and other services in schools and other educational institutions including the various faculties in the university. Such

expenses have to be budgeted and the utilization of human resources available maximized. ICT diploma holders could be employed and provided teacher education so that they can play the dual roles of assisting in teaching ICT as well as providing the much needed technical expertise in schools and other educational institutions.

Improving the quality of services and products

ICT in education is a necessarily high-cost venture, and expenses need to be carefully planned to exact maximum benefits and high quality services and solutions from limited budgets. Innovations that can off-set costs without too much sacrifice in quality should be adopted, such as the utilisation of tertiary students in producing ICT resources to support teaching and learning, and employment of local ICT personnel and expertise, rather than out-sourcing funds to agencies outside Brunei; bringing in foreign consultants at very high costs; or making un-necessary expensive educational visits overseas. Less expensive alternatives are needed if we are to stretch the dollar. In order to achieve these goals, there should be readily available funds for innovations in technology development, and use of technology in general everyday commercial activities such as media production at the local level. Teachers and students at all levels in the education system should be challenged in such projects and ventures that could become economically viable and lay foundations for the development of entrepreneurship and the local economy.

Promoting information sharing, transparency, and accountability and reducing bureaucracy within and between institutions and departments in the Ministry

Bureaucracy in so far as it can promote accountability and transparency is a necessary constraint. Nonetheless, in so far as ICT is involved, procurement of infrastructure, hardware and software cannot be un-necessarily delayed or un-attended. When that happens, educational institutions will perpetually be short-changed for “state-of-the-art” technology, and keep receiving out-of-date hardware. Schools, departments and other educational institutions will be paying more for older technology. There should also be provision for schools and other educational institutions to access information, be it from within the institution or over the Internet. The quality of that access in terms of media, retrieval performance, and so on should be carefully planned and budgeted. There should not be a policy of waiting for implementation or consideration for six months, and then recurring six-month periods of delay (like forever) for priority issues. Administrators must make decisions, not delay decision making or leave such decision-making to low-level administrators, especially when small budgets are involved.

As with most countries in the region, there are certain elements that are important in the overall national ICT policies and programmes that need leadership, support and attention. The development of a second infrastructure is critical. A second critical factor is getting leadership involved at every level – establishing centres of expertise – especially when that involvement can be initiated at moderate or low cost. In this respect, the government is in the enviable position of making decisions that will benefit the whole country. Even if other elements in the ICT strategic plan are delayed, high speed data communications service should be the best available regardless of cost.

POLICY ISSUES ON ICT IN EDUCATION DEVELOPMENT

Development of ICT infrastructure

ICT policy in education cannot be formulated without addressing the degree of development of a country's ICT infrastructure and its overall ICT policy. Schools, departments in the Ministry of Education and institutions of higher education such as the university find it difficult to acquire funds and computers to have access to the Internet if the country's telecommunication infrastructure and costs are too expensive or inadequate to wire up the whole department, institution or establishment.

Communications over the Internet are often hindered or even made inaccessible for many reasons. Although schools in Brunei, following in the footsteps of institutions of higher learning such as the university, have been provided with computers and Internet access, often there is congestion on Internet lines, virus infection and other server and network bugs. As of late 2006, the development of ICT infrastructure and facilities for e-government and e-education are still on-going in many educational establishments. ICT facilities for quality teacher education are still forth-coming although the Ministry of Education has made it very clear that newly trained teachers must be pedagogically sound in the use of technology. Proactive teacher educators have had to buy their own laptops, LCD projectors and DVD writers; and subscribe to commercial website hosting and learning management systems. Similar services provided by the university are just inadequate and inefficient. The paradigm of recurring 6-month waiting period prevails.

Infrastructure development for all sections of the educational communities in all districts and inter-operation of information systems within institutions and across institutions need to be further enhanced and hastened. Likewise, enhancement of public

services by educational establishments will provide better information more efficiently to students, parents, teachers, administrators and all involved in education in the nation.

It is perhaps the most difficult to determine the huge budgets needed to provide hardware and software in a cost effective manner, and meeting the needs of office, staff and student-computer ratios. Such determinations should not be arbitrary un-concerted decisions but should be made in an integrated purposeful manner to meet stated goals, perhaps progressively in stages with consultations amongst all concerned. Such costs, including configuration and placement of ICT facilities and wireless-networks, and technical support for students and teachers have to be considered. These require careful deliberation, research, planning and implementation by knowledgeable educators, administrators and managers; not uninvolved bureaucrats.

Development of skills

From the onset of ICT developments in education, there should be leadership, collaboration and support for research and development. Likewise with ICT education and training for all parties involved. The expenditures required to provide personnel and funding for infusing ICT into the educational system can be very prohibitive for emerging economies, especially after the economic downturn in 1997. Economical models have to be explored that can efficiently enable teachers and provide them with ICT training, computer facilities, and professional support.

Research and development need to be supported and funded to explore models and strategies of what 21st Century education is, and how such education can be enhanced with expensive technologies, and whether new school curricula and skills need to be introduced into the system to increase educational productivity commensurate with the expenditure and maintenance costs. It is certainly not a case of the need “*to adapt the school curriculum accordingly*” if you have the technology as postulated by UNESCO, Bangkok (2003). Such expenses are justifiable only if the education system can prepare students capable of working more efficiently and productively in the new technological world that is so competitive. ICT is no longer a mere tool, it constitutes the whole world environment and can extend the minds and capabilities of students, and nurture a whole new ICT culture for learning, developing cognitive and thinking processes and creativity in the language arts, mathematics and the sciences.

Budgets have to be allocated in order to appoint additional staff to support computers and related technology in schools. Computer systems have to be constantly maintained by support staff to provide a network infrastructure for teachers and students to gain access

to knowledge and share information. The necessary software and other instructional resources have to be provided for their creative application in teaching and learning.

Institutional development and coordination

Especially in the area of ICT, it is normally the younger junior teachers who are more skillful and passionate about the subject, but they are hardly involved in decision-making. The administrative leadership in schools is mostly senior teachers who may not be cognizant of the extensive roles of ICT. There should be in place in each school, a few teachers, including senior teachers, who can provide the motivating, driving and sustaining impetus for ICT developments and innovations. Such teachers may need to be moved around in the schools to ensure catalytic groups are provided for in every school.

Their impact could be monitored and nurtured in terms of effectiveness and involvement in ICT innovations and developments at the ground level. Exemplary innovations and activities could be shared with other schools and teachers. ICT resources, and school and student communications could be shared on school and teacher websites, within and outside the country.

PACE OF CHANGE OF ICT, DOMINATION OF ENGLISH AND OTHER FACTORS

Many developing countries have policies to build up the means of access and use of technologies in education as well as in other sectors of development. This is apparent in policies adopted at the national level. Brunei Darussalam is integrating the use of ICT across the curriculum for all primary and secondary students in addition to teaching about the technology to selected secondary school students.

The fast rate with which ICT is developing has very important implications for its use in education. The pace at which it is evolving poses challenges for educational research and policy-making, teacher education, and day-to-day use in the classroom (Byron & Gagliardi, 1997). Policies must consider that the means of communication can have many possibilities for education and bring about profound changes in traditional processes and transactions of teaching and learning.

That English is used as a medium of instruction in Brunei is a small advantage. The English language will continue to dominate technologies and the Internet, unless the other major languages and cultures are able to increase their roles and influence on the Internet

and avert a complete cultural domination by the English and American world culture as well.

The tremendous amount of foreign information and trash disseminated on the Internet calls for greater efforts to monitor information and direct teachers and learners to relevant and useful educational materials. Local resources developed and identified by local educators and students can be more relevant both intellectually and culturally. Decreasing costs of hardware and improved telecommunications, including wireless links should offer greater opportunities for local teachers and students to develop and share local resources and culture.

The central involvement of education authorities is crucial to the success of ICT initiatives. The support of the central authorities for such major innovative change is vital. The Ministry plays a regulatory role, helping to clearly define objectives, ensuring equitable distribution of resources and ongoing evaluation of innovative change. At the same time there seems to be a clear need for the active involvement of other sectors of society in launching and sustaining such efforts. The private industrial sector and academic and research institutions have a particularly important role to play. Participatory approaches involving all sectors of society are likely to be the best means of integrating the technologies in formal and non-formal education.

ICT IN EDUCATION IN BRUNEI DARUSSALAM

While all elements of an implementation policy are essential to the success of an innovation, teacher education seems particularly important and critical to the successful introduction and sustaining of the use of ICT in formal education. Many teachers in Brunei still lack computer and other technical skills. Opportunities and reduced costs of regular access to the technologies will encourage teachers to adopt new ICT pedagogical methods and approaches. Some older teachers are likely to resist innovation if they are not adequately prepared for it or involved in its development. The more familiar they are with the technologies, and the more they are aware of how ICT can be of assistance to them and their students, the more likely they are to incorporate them into their lessons, and slowly build up their own confidence.

The traditional role of the teacher is likely to change to a greater or lesser extent with the increasing use of ICT in schools. They will no longer be the unique sources or controllers of knowledge in the classroom, but it seems clear that they will be needed in

new and more varied roles (Australian Education Council, 1996). Students generally exhibit very positive attitudes towards use of the new technologies and it is felt that their acceptance of ICT in education may act as a catalyst for eventual change in the system.

Products on the market should better meet curricular needs and standards and more collaboration is necessary between local technologists and local educators. Commercial interests should not be allowed to dominate educational objectives.

ICT innovation into education should proceed through a pilot approach or in phases. The introduction of ICT into Brunei primary schools in phases has shown this to be the best way for initially and continuously implementing and evaluating such projects. Mechanisms for the evaluation and improvement of implementation at each phase must be included as a continuous strategy to further develop and enhance policies to ensure success.

The introduction of ICT in the curriculum involves considerable initial capital expenditure and important recurrent costs. The cost-effectiveness rationale of the 70s and 80s which argues that computer-assisted instruction can replace teachers in the classroom has been rejected on the grounds that it adopts a purely techno-economic approach to problems requiring "human" solutions (Hawkridge, et al., 1990).

International collaboration among countries in the Southeast Asian region which share similar cultures appears to be able to share expertise, ideas and costs of educational resources. With Internet access to technologically advanced countries which share their expertise readily, countries in the region need to find ways of working together in order to share limited resources and address common problems. Such collaboration among educational institutions within the region should be developed and nurtured for the benefit of all who participate.

CONCLUSIONS

The establishment of research and development centres in key areas of information technology for the purpose of nurturing local expertise and building up a bank of knowledge and resources related to local needs and experience should form the core thrust of policies relating to ICT in education. These centres should be set up as joint efforts among local businesses, the Ministry of Education, university, colleges and schools. Part of their focus would be on the development of ICT in education models and

databases of expertise and resources in areas of critical importance to schools, teachers and students.

Where ICT has been introduced into schools, research must be carried out into effective ways of maximizing limited resources within large classes, looking at methods of group dynamics, peer teaching, lessons involving different activities for various groups, et cetera. Research is needed into innovative and cost effective methods of teacher education and development of resources to deal with the huge and ongoing demands for training which the introduction of new technologies into the classroom creates.

It is vital to develop information sources for administrators and decision-makers to guide them in the development of policies and guidelines in the effective use of ICT in education. Information is needed for teacher educators, schools and also for teachers themselves who are expected to use new tools and resources, involving unaccustomed teaching methods in their lessons. Some staff of the Sultan Hassanal Bolkiah Institute of Education (SHBIE), Universiti Brunei Darussalam, are embarking on collaborative efforts to maximize the energies and efforts of student teachers to develop ICT resources with guidance from willing practising teachers. Teachers have expressed their willingness to provide such assistance to student teachers and it is envisaged that websites, educational CDs and DVDs developed by SHBIE, student teachers, teachers and schools will become the enabling network of minds, ideas and creativity for the benefit of all in the country to create and re-create knowledge.

Support from establishments, administrators and policy-makers form the initial key determinant as to whether sound policies and practices can be approved and explored to realise the goals already planned elaborately and documented by the Brunei Darussalam Information Technology Council for the nation. It is hoped that all stakeholders can move forward together.

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