Advancement of science has been steady and the traditional method of dissemination – print media is not able to cope up with the growth of this scientific knowledge. This is even severe in case of advancement of technology which is progressing extremely rapidly. The only accepted solution today for the timely dissemination of the science and technology information is through online means. Is Sri Lanka ready for this information avalanche? In higher education sector, almost all the organizations are well connected and have the capability to receive this information. How about the general education sector – Schools? Timely dissemination of scientific knowledge to schools should be mandatory if we are to keep abreast with the pace of growth in Science and Technology. Do we have the ICT infrastructure to achieve this? This paper looks at an ongoing effort in this area – connecting all the secondary schools at general education sector organizations in a single network and the new opportunities emerging as a result.

SchoolNet – towards a Next Generation Teaching/Learning Platform

Dr Ajith Pasqual

A mechanism for Science & Technology information dissemination

The introduction of computers into Schools in Sri Lanka dates back to little more than 2 decades. At the beginning it was just one or two computers, then came the computer laboratories with 10 or more computers. This again was more than decades ago. Establishment of computer laboratories in schools continued at a slower pace with the participation of all stakeholders, particularly Past Pupil Associations and other well wishers. This pace picked up considerably, from late 1990s, when donor agencies, World Bank (WB) and Asian Development Bank (ADB), through Ministry of Education (MoE), began funding the establishment of computer labs. In parallel began the process of training of teachers on the use of ICT basics as well as use of ICT in Education, commonly referred to as Computer Assisted Learning (CAL). Elsewhere in the world, another phenomenon was rapidly unfolding. Internet, which started as a research project in USA, has been growing exponentially and is increasingly being looked at as the biggest information resource ever seen in the world. By 2005, many schools have been accessing Internet through Dial-Up connections. Not only was this slow but also costly and in many cases led to disconnection of telephone services to the schools. Being in a network is considered a must for any computer for resource sharing as well as for being able to access Internet.

Establishment of SchoolNet

In year 2005, under the ADB funded Secondary Education Modernization Project (SEMP I), it was proposed to provide Internet Access to the 1000 computer laboratories, which it had set up. This led to the establishment of SchoolNet in June 2006. After considering many technical options, it was decided to connect all the schools using IP-VPN (Virtual Private Network) technology. At the end of SchoolNet - Stage 1, it had 1200 nodes which consisted of more than 900 schools, 17 National Colleges of Education, 9 Provincial IT centers and 100 Computer Resource Centers. Additionally, all organizations related to the administration of school education in Sri Lanka, namely, Ministry of Education, Zonal Education Offices, Provincial Education Department offices and National Institute of Education (NIE) have been connected to SchoolNet. SchoolNet was a ground breaking project for data networking in Sri Lanka as it has helped to spread the data network throughout Sri Lanka, which was limited to major cities in the country. SchoolNet Stage 2 is currently in progress and another 500 schools are to be added by July 2009.

SchoolNet Services

The primary service offered by SchoolNet is the provision of Internet Access. For schools, this access goes through a Web filter that blocks web sites deemed inappropriate. Although there are many criticisms for having this filter, steps have been taken to minimize any negative impact of such filtering on educational

activities. The following additional services are offered by SchoolNet:

Figure 1: SchoolNet Web Portal

- If an organization is to be recognized in today's Internet age, it must have a unique Internet address referred to as "domain name". Domain registration under sch.lk top level domain is administered by SchoolNet.
- SchoolNet offers facilities for any organization, which has registered a sch.lk domain name, to host its web site. A list of schools hosting their web sites can be found through the links available at the SchoolNet Web Portal – http://www.schoolnet.lk [Refer Figure 1]
- Provision of e-mail facilities under own domain name with no limit on number of accounts. If a student or teacher wants to be recognized as an Internet Citizen, it is mandatory to have an online identity, which is generally represented by an e-mail address. Providing an e-mail address is one way of exposing the younger generation to the most preferred mode of communication in the 21st century.
- Learning Management Server (LMS) to promote online teaching/learning.
- Web 2.0 technologies such as Blogging and SchoolNet Wiki are also provided through SchoolNet.
- FTP server which has many open source applications and many educational resources.

SchoolNet also hosts the official Country Mirror for Ubuntu – A Linux based Operating System which is heavily promoted by the Free and Open Source Community in Sri Lanka.

Opportunities in a Networked Environment

The schools currently connected or are being connected, represent a student population of more than 2.0 million out of a total of 4 million. What do these statistics tell us? These 2 million students, irrespective of their geographical locations within Sri Lanka, are reachable online for anyone who takes the necessary effort to do so. The online reach continues to expand and the current plan is to provide SchoolNet connections to around 4000 schools, representing approximately 3.2 million students (80% of the total student population) by end of 2011.

From schools point of view, having a SchoolNet connection primarily means getting access to Internet. Further it opens up many opportunities for collaborative work among Schools locally as well as internationally. But what about reaching to the families of these students and teachers through SchoolNet? A simple example would illustrate an opportunity: How about conveying information about dangers from pesticides and other agricultural chemicals to those engaged in farming through their children?

This online reach presents Ministry of Education, other government ministries, and key scientific institutions such as NSF, a wide range of opportunities. Timely dissemination of Science and Technology information is one such opportunity. Provision of information on Science and Technology activities to schools can go on a fast track. No longer do you need to wait for a letter to reach a distant school. It would be a huge challenge for everyone to come up with effective mechanisms of exploiting this sudden reachability to millions of our population, a challenge very much worth taking, if we are to move rapidly to catch up with the rest of the world.

In the traditional set up, schools are isolated and there is very little chance for students and teachers to collaborate with each other for the purpose of teaching/learning. Teachers do get some opportunities to interact with their fellow teachers during in-service teacher training workshops but that too is for a very limited period. This, seems to be a major obstacle in the development process of teachers in Sri Lanka. In

the case of students, this has been virtually non-existent. The only opportunity the students get to interact with their colleagues from other schools is during sports competitions. Geographical separations as well as language barriers play a major role in limiting these very little interactions.

The network environment completely removes the distance barrier. SchoolNet takes the geographical distance that separates Schools, decision makers and information sources, out of the logistic equations. There is now no need to be concerned about wasting time on traveling any more. A student/teacher in Jaffna can freely interact, if they desire, with their counterparts in Hambantota. The challenge is to make that happen. The infrastructure is there, but what is needed is commitment from all stakeholders to make it happen.

Through networked environment, the following activities are expected to take place:

- Build connections between students, teachers and schools – A case for intense collaborations. These collaborations could extend beyond geographical boundaries in projects that involve students and teachers from other countries.
- Sharing of information and resources – creation of locally relevant educational resources collectively.

Examples of Collaborative Projects

The following represents few selected projects that promote international collaborations:
Global SchoolNet – http://www.globalschoolnet.org
Globe Project – http://www.globe.gov
Connected Classrooms – http://www.epals.com

Changing landscape of teaching/learning environment

Until few years back, Sri Lankan school education system was based on a teacher-centric model. Now we have formally switched over to a student centric system even though it will be a gradual process until teachers are fully confident about its implementation. As a part of this process 5 E's – an instructional model based on constructivist approach to learning has been heavily promoted by NIE. These 5 E's represent different phases of learning referred to as Engage, Explore, Explain, Elaborate and Evaluate. SchoolNet can be used in an effective way within this model as it offers an ideal place for the students to explore vast array of information available in the Internet and extract the relevant. Here the burden is on teachers to guide the students to effectively use the resources available. The Internet information model is cross linked to such an extent that one needs to develop skills to understand the depth of information required for the task at hand. Without this skill the students might very well get into a never ending exploration.

Use of Web 2.0 Technologies for Teaching/ Learning

According to Wikipedia, "Web 2.0" refers to what is perceived as a second generation of web development and web design. It is characterized as facilitating communication, information sharing, interoperability, and collaboration on the World Wide Web.

Learning Management Server (LMS):

Making use of online environment for teaching/ learning activities has become the norm for most of the advanced countries. Not only does this broaden the scope of learning for students, it also helps teachers to keep track of learning activities in a convenient manner. As a step towards this direction, SchoolNet has set up a main Learning Management Server (http://moodle.schoolnet.lk) and provincial Learning Management Servers. For example, Western Province LMS can be accessed at http://wpmoodle.schoolnet.lk. LMS provides teachers a number of resources and tools useful to set up an online learning environment. Some of these are: online forums where a teacher can interact with students or get students to interact with each other, online quizzes to examine the level of understanding of subject matter. It also provides mechanisms for teachers to get feedback from students and conduct online surveys. Some of these activities offered by LMS would be immensely useful for school administrators to interact with teachers.

Every school can have its own space within its provincial LMS. The main LMS hosts a number of online resources, which provide a glimpse of what can be done in an online learning environment.

Blogging

Blogging can be thought of as an online form of expressing ones ideas freely. This is increasingly used

for teaching/learning activities – especially for learning English, as teachers can ask the students to create their own blogs and maintain an online diary of their daily activities related to the subject, which the teachers (even parents) can regularly check. Any student or teacher, who has a SchoolNet e-mail address, can create their own blog at http://schblogs.lk

Wiki

Wiki is a mechanism to build up a knowledge base on any topic through the collaboration of participants. SchoolNet has set up a Wiki at http://kb.schoolnet.lk/wiki for the purpose of building knowledge base relevant to SchoolNet activities. Any student or teacher can participate voluntarily in this endeavour to add information to this Wiki, which could be useful to the whole SchoolNet community.

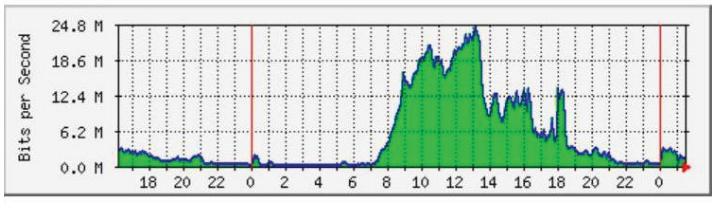
Statistics

At the time of writing this article, the following key statistics have been noted:

No. of Schools and other organizations applying for unique domain names under sch.lk	1162
Number of School Web sites hosted at SchoolNet	470 (approx.)
Number of E-mail Accounts as at 8th June 2009	11000
Number of daily Internet page views [Refer Figure 3]	0.9 million
Total daily traffic	30 GB (approx.)

The statistics were last updated **Tuesday, 9 June 2009 at 1:34**, at which time **'idc-b1'** had been up for **30 days, 20:54:52**.

`Daily' Graph (5 Minute Average)



	Max	Average	Current
Pre-policy	24.5 Mb/s (24.5%)	4947.5 kb/s (4.9%)	1468.1 kb/s (1.5%)
Post-policy	24.3 Mb/s (24.3%)	4933.6 kb/s (4.9%)	1468.1 kb/s (1.5%)

Figure 2: SchoolNet Internet Traffic

Daily Statistics for June 2009

Day	Hits		Files		Pages		Visits		Sites		KBytes	
1	3339457	19.36%	2316724	19.02%	798981	19.68%	6895	21.24%	3469	51.72%	30138753	20.28%
2	3493280	20.26%	2454353	20.15%	828189	20.40%	7121	21.94%	3633	54.17%	29200899	19.65%
3	3864014	22.41%	2752958	22.60%	903288	22.25%	7033	21.67%	3588	53.50%	33122030	22.29%
4	3783787	21.94%	2697621	22.14%	891964	21.97%	6485	19.98%	3498	52.15%	32362206	21.78%
5	2764716	16.03%	1961675	16.10%	637698	15.71%	4940	15.22%	2735	40.78%	23755445	15.99%

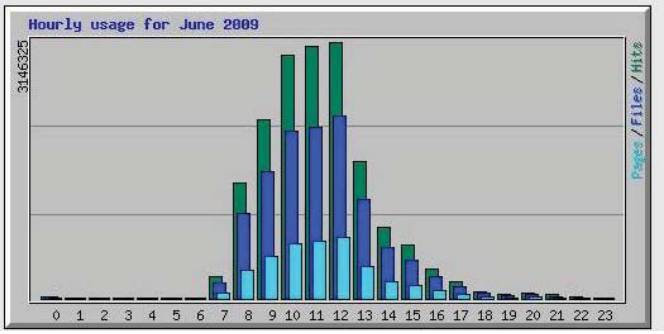


Figure 3: SchoolNet Cache Statistics

Figure 2 shows the SchoolNet Internet traffic chart. The peak here (about 24.8 Mbps) is much less than the 75 Mbps reserved bandwidth for SchoolNet. This level of traffic after almost 3 years since its inception is still very much below the expected level. A proactive approach for schools to make use of this invaluable resource is required. All stakeholders of schools (administrators, teacher, students, past students of the school and the parents) need to be aware of this facility made available to schools. Figure 3 shows the number of web page views on a typical day through SchoolNet proxy server.

Conclusion

This article describes the establishment of SchoolNet and the services it offers to the general education sector. Other than those services, SchoolNet offers key government ministries and related organizations a huge opportunity to reach the masses. But are we ready to take it up? A major paradigm shift in the way we work will be required if we are to exploit it.

If you want to get more information about SchoolNet and what it offers, please contact SchoolNet Network Operation Center by calling 011-2650650 or by sending an e-mail to info@schoolnet.lk

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