A BASELINE STUDY ON TECHNOLOGY-ENABLED LEARNING IN THE ASIAN COMMONWEALTH REPORT
The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government to promote the development and sharing of open learning and distance education knowledge, resources and technologies.

Commonwealth of Learning, 2015
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<td>ADB</td>
<td>Asian Development Bank</td>
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<td>BRAC</td>
<td>Bangladesh Rural Advancement Committee</td>
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<td>CEMCA</td>
<td>Commonwealth Educational Media Centre for Asia</td>
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<td>COL</td>
<td>Commonwealth of Learning</td>
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<td>DELNET</td>
<td>Developing Library Network</td>
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<td>ETMA</td>
<td>Educational Technology and Management Academy</td>
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<td>GTZ</td>
<td>Deutsche Gesellschaft für Technische Zusammenarbeit</td>
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<tr>
<td>ICT</td>
<td>Information and communication technology</td>
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<td>ICTA</td>
<td>Information and Communication Technology Agency (Sri Lanka)</td>
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<td>IISc</td>
<td>Indian Institute of Science</td>
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<td>IIT</td>
<td>Indian Institute of Technology</td>
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<td>IT</td>
<td>Information technology</td>
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<td>MNU</td>
<td>Maldives National University</td>
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<td>MOOCs</td>
<td>Massive open online courses</td>
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<td>NER</td>
<td>Net enrolment ratio</td>
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<td>NGO</td>
<td>Non-governmental organisation</td>
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<td>NIOS</td>
<td>National Institute of Open Schooling</td>
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<td>NITC</td>
<td>National IT Council (Malaysia)</td>
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<td>NMEICT</td>
<td>National Mission on Education through ICT (India)</td>
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<td>NROER</td>
<td>National Repository of Open Educational Resources</td>
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<td>ODL</td>
<td>Open and distance learning</td>
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<td>OER</td>
<td>Open educational resources</td>
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<td>OUSL</td>
<td>Open University of Sri Lanka</td>
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<td>SEWA</td>
<td>Self Employed Women’s Association</td>
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<td>TEL</td>
<td>Technology-enabled learning</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<td>UNFPA</td>
<td>United Nations Population Fund</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>VMOU</td>
<td>Vardhman Mahaveer Open University</td>
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<tr>
<td>VUSSC</td>
<td>Virtual University for Small States of the Commonwealth</td>
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<td>WOU</td>
<td>Wawasan Open University</td>
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</table>
INTRODUCTION

Global concern in education is steadily shifting towards quality of education, but the last mile for education internationally is to reach those who still do not have access to learning. Information and communication technology (ICT) offers a major opportunity to achieve both universal access and quality across the globe and affordably. No wonder ICT in education generally, and in technology-enabled learning (TEL) in particular, has become one of the most popular themes in educational discourse in recent years. The Commonwealth of Learning (COL) has been providing leadership by bringing together global expertise to exploit the full potential of ICT in education in Commonwealth Member Countries. The developmental disparity between the former colonialists and most of the former colonies is wide. COL’s pioneering initiatives may contribute to reducing this developmental divide, especially in education, and catalyse educational development in the Commonwealth.

Although ICT in education has picked up momentum in many countries, ideally there should be a baseline index to compare growth and development over the years. COL has taken the initiative to conduct baseline surveys in African and Asian Commonwealth countries in 2015. The present work, A Baseline Study of Technology-Enabled Learning in the Asian Commonwealth, was commissioned by COL. The geographical scope of the study is limited to the eight Asian Commonwealth Member Countries: Bangladesh, Brunei Darussalam, India, Malaysia, Maldives, Pakistan, Singapore and Sri Lanka. Amongst these eight, three Southeast Asian countries — Brunei Darussalam, Singapore and Malaysia — are ahead of the remaining five on several development indicators. The countries differ widely in population size, land area and development indices, as well as their current ICT status, such as Internet connectivity, mobile phone penetration and access to personal computing.

Four South Asian countries — Bangladesh, India, Pakistan and Sri Lanka — account for nearly 98 per cent of the population of the eight countries examined. These four lag behind the other four in ICT in education. This study can be used as a reference point or milestone for counting the distance covered in the journey during the next six years.

Academic Scope: This study researched national ICT policies and ICT in education policies to identify the basic mileposts in these countries’ vision and mission regarding ICT. The study examined the efforts and initiatives that characterise the countries’ ”process profile” in the adoption of ICT in education. Further, the study looked into the institutional framework and mechanisms of implementing ICT-in-education initiatives, including donor agencies and their contributions in this field. Online learning was a special area of focus in this study, and this included identifying institutions that offer online courses, for such institutions can become sources of expertise. Open educational resources (OER) and repositories are important developments in education that enhance learning choices and access to quality learning resources. This study made a special effort to document OER policies and repositories in the selected eight countries. Collectively, these OER repositories can revolutionise education.

The study looked at three different issues related to human resources in ICT in education: the number of students enrolled in ICT and media-related courses as an indicator of future manpower in the field. Access to ICT in education, especially in the teaching–learning process, is dependent upon teachers. Hence, an effort has been made, although with limited success, to figure out the number of teachers needed to be trained in ICT in education. Although ICT is gender neutral, and all of the countries covered under this study provide equal access to both women and men, there are gender disparities in ICT in education — in both training and employment opportunities — for a variety of reasons extraneous to ICT in education. Women and ICT in education has been specially examined in this study.

Methodology: The methodology of this study restricts itself to qualitative and descriptive data. In a way, it is an “analytic” of Internet-based sources. Data sources for this study were both primary and secondary. Government/official sources — for example, censuses, ministries of education, human
resource departments, information technology departments, and so forth — are considered primary; other sources are considered secondary.

This study was greatly facilitated by a few comprehensive works of certain international agencies on TEL, including the following:


3. The World Bank’s global multi-donor programme infoDev (www.infodev.org) has come out with a series of regional surveys on ICT and education.


The study of these documents was complemented by consultations of a very large number of relevant web-based materials on different countries, as will be evident in the country reports.

There were some interesting challenges in preparing this baseline report. Firstly, the Internet coverage of different countries with respect to the issues under study is not uniform. For example, for certain countries, women and ICT has a prominent place in Internet sources, but for some other countries there is silence. Another important challenge was reconciling information from different sources. The data and information from some of the most reputable sources, such as UNICEF, UNESCO, the World Bank and COL, do not match each other. It was therefore a challenge to decide on the authenticity of the data without any objective criteria. A third major challenge was the data gap. For example, gender disaggregated data are available on the number of teachers at different levels of the educational system; data are also available, for some countries, on the number of teachers trained — meaning teachers with qualified teacher training. But no data are available on teachers trained in TEL. For example, ICT in Education: Policy Toolkit (Mukhopadhyay, 2011) mentions that more than 79,000 schools in India have ICT training through various agencies. In large measure, this means computer literacy and skill training of students according to the BOOT (build, own, operate, transfer) model1 but negligible or no ICT skills training amongst teachers. Thus, such data do not provide any meaningful insight into the number of teachers either trained or to be trained in TEL.

In terms of sequence, the consulting team conducted an overview of similar works, mentioned earlier, by UNESCO, the World Bank, CEMCA-COL and others. In the next stage, country-specific studies were taken up with respect to all the dimensions mentioned in the Terms of Reference (see Appendix 1). Country cases thus developed were reviewed for accuracy and further enrichment with fresh data and evidence.

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At stage three, multiple case analyses were undertaken. At this stage, data and information on one issue — for example, ICT in education policy — were tabulated across the eight countries in a table. Each table was analysed and interpreted to compare and contrast amongst the countries and thereby derive lessons from experiences that are of mutual benefit to the Commonwealth countries in Asia.

**Structure of the Report**: Based on the methodology described above, the report is presented in four chapters. The first chapter provides an overview of the region: the geography, population, basic education and ICT profile of the region’s countries. Chapter two presents regional trends in ICT in education. The country cases in chapter three are followed by a brief summary (chapter four) of the study and a few indications of steps for the future.

The Educational Technology and Management Academy (ETMA) in Gurgaon, India, is grateful to COL for entrusting this assignment to ETMA. It was a delightful project, as it synchronised with ETMA’s basic mission. The primary contribution to this study came from Professor Madhu Parhar, a distinguished specialist on ICT in education. I thankfully acknowledge her contribution. I sincerely acknowledge the technical assistance provided by Dr. Paushalee Datta, Dr. Bharat Rout and Mr. Sabyasachi Panja in completing this report.

Professor Marmar Mukhopadhyay
Chairman
Educational Technology and Management Academy
CHAPTER 1
ASIAN COMMONWEALTH COUNTRIES: OVERVIEW

Introduction

Asia comprises 48 countries. Russia and Turkey straddle Europe and Asia. The Asian Commonwealth countries are Bangladesh, Brunei Darussalam, India, Malaysia, Maldives, Pakistan, Singapore and Sri Lanka. The common inheritance of all these countries is their having been British colonies over a prolonged period in the 18th and 19th centuries. Post-independence, these countries have struggled to overcome cumulative underdevelopment during colonial rule. With few exceptions, these countries are economically weak. Three of the eight Asian Commonwealth countries — Bangladesh, India and Pakistan — also are part of UNESCO’s E-9 Initiative, involving nine of the world’s most highly populated nations. Further, these eight Asian Commonwealth countries belong to more than one geographical zone. Bangladesh, India, Maldives, Pakistan and Sri Lanka belong to the South Asia region, whilst Brunei, Malaysia and Singapore are Southeast Asian countries. A brief overview of their geographies, populations and basic education follows.

Geography

The eight Asian Commonwealth countries together occupy 4,723,198 square kilometres of land. Of the total land area, Bangladesh, India and Pakistan account for 4,231,255 square kilometres — almost 90 per cent of the area (Figure 1). Bangladesh is inset in eastern side of India. India share boundaries with both Bangladesh and Pakistan; all three countries also have sea on their south. Brunei and Malaysia share common land border. Maldives, Sri Lanka, Malaysia also shares maritime boundaries. All these countries receive heavy rains and are flood prone.

![Land Area in Sq. Km](https://en.wikipedia.org/wiki/Geography_of_India)

![Land Area in %](https://en.wikipedia.org/wiki/Geography_of_India)

Figure 1. Land area of the eight Asian Commonwealth countries. (Source: specific country pages from https://en.wikipedia.org/wiki/Main_Page.)

Population

The eight Asian Commonwealth countries are home to nearly 1.7 billion people. The population varies widely, from 340,000 in Maldives to a staggering 1.28 billion in India. The three Indian subcontinent countries (Bangladesh, India and Pakistan) account for 96.5 per cent of the population; with Sri Lanka, this becomes almost 98 per cent. The remaining four account for only about two per cent. Except for Brunei Darussalam, all of these countries are thickly populated, the density (persons per square

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2 Data on land area, population, and basic education have been collected from various sources. The websites consulted were:
kilometre) varying from a high of 7,713 in Singapore to a low of 73 in Brunei. Bangladesh is the most thickly populated country in the Indian subcontinent (1,203 per square kilometre); India follows with 382 and Pakistan with 236 (Figure 2). However, a comparison of the capital cities of these eight countries reveals a different picture (Figure 3).

Figure 2. Populations of the eight Asian Commonwealth countries. (Source: www.worldometers.info/world-population.)

Figure 3. Population density of the capital cities of the eight Commonwealth Asian countries. (Source: www.worldometers.info/world-population/india-population.)

The people in these countries speak a variety of languages, including Bengali, Dhivehi (in Maldives), Hindi, Malaya, Sinhala, Tamil and Urdu. The Indian Constitution recognises 18 languages in addition to English.

**Basic Education**

Basic education was gauged using literacy rates and net enrolment ratios (NERs) in primary education. The literacy rate ranges from a low of 55 per cent in Pakistan to a high of 99 per cent in Maldives. Apart from Bangladesh, India and Pakistan, the other five countries score 90 per cent or above (Figure 4).
The NER ranges from 72 per cent in Pakistan to 100 per cent in Maldives and Singapore. The NER in Bangladesh, Brunei, India, Malaysia and Sri Lanka is more than 90 per cent (Figure 5).

ICT Profile

The ICT profile of a country is the backbone of technology-enabled learning, since TEL is dependent upon access to hardware such as mobile phones, computers/laptops, associated software and broadband connectivity. These eight countries differ widely in the following selected ICT profile items (each per 100 households): telephone usage; mobile cellular phones; active mobile broadband or Internet connectivity; fixed or wired connectivity; and PCs. The data were sourced from the International Telecommunications Union (ITU)\(^3\) if available. Figures 6 to 10 on ICT profiles are self-explanatory.

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\(^3\) www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx
Figure 6. Telephone usage.

Figure 7. Mobile-cellular subscriptions

Figure 8. Active mobile-broad subscriptions

Figure 9. Fixed (wired) broadband subscriptions

Figure 10. Households with a computer.
Conclusion

The eight Asian Commonwealth countries, despite their geographical proximity, provide certain contrasting pictures. Along with including the second most populated country in the world (India), these countries also host one of the least populated countries in the world (Maldives). Four countries — Bangladesh, India, Pakistan and Sri Lanka — house 98 per cent of the population of the eight; the remaining four account for only about two per cent. Hence, the development of Asian Commonwealth countries is dependent upon the development of the four most populated ones. The countries also differ in their educational profile. Most significantly, they differ widely in their ICT profile. The countries with smaller populations — Brunei Darussalam, Malaysia, Maldives and Singapore — are far ahead in terms of mobile phones and Internet connectivity. Hence, the chances of TEL success are much higher there. Special focus and strategies will be required to bridge the digital divide between the high- and low-population countries in the Asian Commonwealth.
CHAPTER 2
TECHNOLOGY-ENABLED LEARNING: REGIONAL TRENDS

Introduction
ICT in education is increasingly recognised as central to educational development. However, apart from exceptions like Singapore, ICT in education is still struggling to find a firm footing in the Asian dialogue on education. It is worth examining how far the dialogue has gone in terms of policies, initiatives, open educational resources (OER), teacher training in ICT integration and education, and the participation of students — women in particular. This report is an effort to create a 2015 baseline. The report has been developed on the basis of primary and secondary data available on the Internet. The quantity and quality of data vary from one component to another within a country and from one country to another within the same component. Hence, this is a qualitative statement of the baseline.

Trend analysis has been done using multiple case analyses. Forty-eight major trends on selected issues across the eight Asian Commonwealth countries have been identified, as follows.

Regional Trends
A. National ICT Policies
1. IT/ICT activities started in all these countries long before any of the governments adopted a national ICT policy.
2. All eight countries have now enacted national IT/ICT policies, from Sri Lanka in 1983 to India in 2012 (although the latter constituted a national task force on IT and software development in 1998 under the chairmanship of the Prime Minister).
3. The major stated objectives of national IT/ICT policies have been to boost the economy, improve the quality of life and governance, and provide ICT training for manpower development. The only exceptions are India and Singapore. Indian IT policy goals also include increasing revenue and global market share in IT and IT-enabled services, developing language technologies, promoting open standards and promoting open sources and technologies. Singapore aspires to become a global IT hub.
4. A few of the countries’ governments have created national agencies responsible for the implementation of IT/ICT policy: the Information and Communication Technology Agency (ICTA) in Sri Lanka; the Brunei Darussalam Information Technology Council; and the National Information Technology Council (NITC) in Malaysia. Other countries have preferred to retain this responsibility within an existing government ministry or department.
5. All national IT/ICT policies contain statements on education and health.

B. ICT Policy in Education
6. National IT/ICT policies in all eight countries acknowledge education to be critically important for developing ICT human resources.
7. ICT policy on education is not common in these countries. India, Malaysia and Sri Lanka have ICT policy on (school) education; however, this does not include higher and professional education. In some of the countries, ICT policy in education is built into a master plan for ICT in education and into a national development plan.

4 www.it-taskforce.nic.in
8. In most of the countries, ICT in school education began long before the formulation of a national ICT policy on education. Hence, ICT in education is not primarily a result of national ICT in education policies.

9. The main concerns for ICT policies in education are: ICT infrastructure development; training of students and teachers in ICT; ICT-integrated education to foster engaging learning experiences; and connecting to the world. Interestingly, neither ICT integration in education nor TEL figure in ICT policies.

10. The national policies and plans on ICT in education are lacking in comprehensiveness as well as in differentiation between policies, plans and strategies.

C. National Initiatives on ICT in Education

11. Initiatives on ICT in education have come from government, civil society organisations and private enterprises. These initiatives are not necessarily the results of ICT policies.

12. Common initiatives are: ICT infrastructure developments in educational institutions; computer skill training; software development; and content generation.

13. In terms of the content of ICT initiatives, open universities in Bangladesh, India, Pakistan and Sri Lanka were widely using radio and television broadcasts as well as audio and video cassettes long before the advent of computers and the Internet. Sri Lanka used community radio to extend the benefits of ICT to rural areas.

14. eLearning is another new initiative that is picking up in all eight Asian Commonwealth countries.5

15. ICT initiatives are credited to national governments, international agencies (especially UN agencies), multinational banks, multinational IT companies, private enterprises, and academic institutions such as schools, colleges and universities.

D. Major Donors

16. A large number of agencies are actively supporting ICT initiatives in education. Some of the prominent donor agencies are: UN agencies such as UNESCO, UNICEF, UNDP and UNFPA; the International Labour Organization; the World Food Programme; Relief International; the World Bank; the Asian Development Bank; the Islamic Development Bank; USAID; GTZ; the Japan International Cooperation Agency; Orebro University (Sweden); and the U.S. State Department’s Educational and Cultural Affairs Bureau. Amongst the IT giants, prominent donors are Intel, Microsoft, IBM and Dell.

17. Donors fund primarily through country governments or government-authorised agencies. However, there are instances of donors supporting individual institutions directly.

18. Donors support the development of ICT infrastructure, ICT skills training and innovative projects.

E. Key Agencies/Institutions and Ministries in TEL

19. The most important key agencies are the countries’ governments, represented by ministries of education, human resource development, telecommunication, and information and communication. In Maldives, the Ministry of Civil Aviation and Communication “is responsible for pacing up the process of integrating ICT into education.”6

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5 Some examples are DNet in Bangladesh, NMEICT in India, online streaming video in Malaysia, recorded lectures in Brunei, ApnaFuture in Pakistan, e-content for high school students in Sri Lanka, and a web-based environment in Singapore universities.

20. In Bangladesh, the Prime Minister’s Office has been directly involved in framing the ICT in education policy.

21. The IT industry — national and multinational corporations — as well as non-governmental organisations (NGOs) and academic institutions such as universities play a key role in human resource development in ICT, and ICT integration in education.

22. Key agencies contribute to formulating ICT in education policy, creating master plans, mobilising resources, implementing projects, developing human resources, and monitoring and evaluating progress and outcomes.

F. Institutions Offering Courses Using Technology and Online Learning

23. Engineering institutions offer online courses on technology. These include the Nanyang Technological University (Singapore), the Birla Institute of Technology and Science (India), the Ahsanullah University of Science and Technology (Bangladesh), polytechnics in Bangladesh, and the Punjab Technical University (India).

24. Open universities (in Bangladesh, India, Malaysia, Maldives, Pakistan and Sri Lanka) offer online courses and/or use technology in course delivery. The Virtual University of Pakistan and Malaysia’s Asia e University also deserve mention in this context. The National Online Distance Education Service (NODES) in Sri Lanka co-ordinates online distance education programmes.

25. Some universities and institutions have form consortiums (groups of institutions that collectively offer online programmes/courses). For example, the Malaysia Online Education Initiative has ten member institutions. India’s National Programme on Technology Enhanced Learning (NPTEL) is a collaborative endeavour of the Indian Institutes of Technology (IITs), the Indian Institutes of Science (IIScs) and the Indian Institutes of Management (IIMs), offering more than 750 courses in various subjects and disciplines.

26. Many dual-mode universities offer distance education courses using technology.

27. Online courses are also offered by many private institutions and commercial enterprises, mostly in skills education.

G. Institutional Policies for eLearning and TEL

28. Separate institutional policies on eLearning are not common in these eight countries. The Open University of Sri Lanka (OUSL) has framed an institutional policy on eLearning. The Government of India has proposed an eLearning policy. Brunei, Maldives and Singapore are promoting and offering online courses without any stated eLearning policy.

29. Some of the countries’ governments have issued policy statements on eLearning. For example, Malaysia’s national higher education policy on eLearning (Embi, 2011) aims to have 30 per cent of all higher education courses delivered online by 2015.

30. Some developed countries, such as Canada, France, Japan, the UK and the USA, have framed eLearning policies. There is a need to promote the concept of eLearning policy in Asian countries.

7 www.vu.edu.pk
8 www.aeu.edu.my
H. OER Policies and Repositories

31. OER activities are growing in all eight countries, but there is no evidence of national OER policies. However, India’s and Malaysia’s policies on ICT in education do mention OER and digital resources.

32. Open learning institutions are increasingly adopting OER policies. Examples include Wawasan Open University (WOU) in Malaysia,9 the National Institute of Open Schooling (NIOS) in India10 and Vardhman Mahaveer Open University (VMOU) in India.

33. There are OER repositories in all of the countries except Brunei Darussalam and Maldives.

34. The OER repositories in higher education cover a variety of subjects, including: health and medicine; computers and IT; engineering and technology; arts and humanities; language and literature; business and economics; law and politics; library and information science; management and planning.

35. Digital libraries are other major initiatives. These include: the national digital libraries of Brunei, India and Pakistan; Malaysia’s Electronic Book Project; and OUSL’s database of books and e-journals. Library networks, such as India’s Developing Library Network (DELNET),11 are also important sources. However, many digital library initiatives and repositories are not available on an open-licence basis.

36. The majority of the repositories’ archived materials are in English. However, a few countries’ repositories also host materials in local languages, such as Bengali in Bangladesh, Sinhalese in Sri Lanka and Malay in Malaysia. India’s National Repository of Open Educational Resources (NROER) contains resources for all school subjects and grades in multiple Indian languages.

37. There are institutional repositories, subject portals, media portals and other community-developed portals in the Asian region, including in India, Malaysia and Pakistan (Dhanarajan & Porter, 2013).

38. OER repositories are available at the school level in Bangladesh and India.

I. Teacher Training in TEL

39. Teacher training in these countries primarily implies qualified pre-service teacher training. Training in TEL is the domain of in-service education. There are data on teachers and the percentage of trained and untrained teachers, but there are no official data on teachers trained in TEL.

40. Several donors have sponsored ICT in education capacity building for teachers (one example being Intel® Teach), which can involve both pre-service and in-service training of teachers in schools and tertiary institutions. A large majority of the programmes also provide training in initial ICT skills.

41. Training in TEL has begun relatively recently. All eight countries have introduced national-level initiatives in ICT training for teachers. NGOs such as ETMA have offered both ICT skills training and TEL training to teachers in India.

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9 www.weko.wou.edu.my/OER-Policy
10 http://oer.nios.ac.in/wiki/index.php/NIOS_Copyright_Policy
11 www.delnet.nic.in
42. Since a very small percentage of teachers are currently trained in TEL, approximately 2.3 million teachers in these eight countries need to be trained, meaning ten per cent of in-service teachers every year.

J. Women and ICT in Education

43. Women do not figure as a group for particular focus in ICT policies and ICT in education policies. In none of the eight countries do policy statements on ICT in education discriminate against women. There is a paucity of gender-related data regarding TEL policies and programmes.

44. There are several schemes, projects and initiatives exclusively dedicated to women’s empowerment through ICT in: Bangladesh (e.g., Grameen Bank), India (e.g., SEWA,12 e-commerce websites, Swayam Krishi Sangam13), Pakistan (Girls in ICT,14 PAN Localization Project15) and Malaysia (ICT facilities at women’s service centres).

45. There are scholarly articles on this subject. According to infoDev (2010), national policy creation must be sensitive to overcoming the persistent barriers to women’s access to and use of ICTs, and to ensuring that ICTs benefit women as much as men.

K. Students Studying ICT and Media-Related Courses

46. There are no authentic disaggregated data on students taking ICT and media-related courses in any of these eight countries.

47. ICT skills have assumed a new significance as life skills. A large percentage of higher education students possess basic ICT skills. The deep penetration of new-generation mobile phones amongst students has further facilitated their development of ICT skills.

48. All eight countries offer courses on computer sciences at the school and higher education levels. A certain percentage of students opt for engineering and technology courses in higher education (e.g., 16 per cent in India). Whilst all students in engineering and technology programmes learn ICT skills, a smaller percentage of students who choose courses in computer science specialise in ICT. It is probably safe to assume that only about five per cent of students develop specialised skills in ICT.

12 www.sewa.org
13 www.skango.org
15 www.panl10n.net/english/outputs/Book%2010.5.pdf
CHAPTER 3
TECHNOLOGY-ENABLED LEARNING: COUNTRY REPORTS

Bangladesh

Country Profile

A. Overview

The People’s Republic of Bangladesh, which became an independent country in 1971, has an area of 147,570 square kilometres; it extends 820 kilometres north to south and 600 kilometres east to west.

Bangladesh is bordered on the west, north and east by a 4,096-kilometre land frontier with India16 and, in the southeast, by a short land and water frontier (193 km) with Burma (Myanmar). On the south, it has a coastline of about 580 kilometres along the Bay of Bengal. Bangladesh is a unitary parliamentary republic with an elected parliament.

B. IT Profile

<table>
<thead>
<tr>
<th>Fixed-telephone subscriptions (per 100 persons)</th>
<th>Mobile-cellular subscriptions (per 100 persons)</th>
<th>Active mobile-broadband subscriptions (%)</th>
<th>Fixed (wired)-broadband subscriptions (per 100 persons)</th>
<th>Households with a computer (%)</th>
</tr>
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<tr>
<td>0.69</td>
<td>74.43</td>
<td>6.50</td>
<td>0.97</td>
<td>3.9</td>
</tr>
</tbody>
</table>


ICT Policy

The Government of Bangladesh formulated its national ICT policy in 2002. The primary objective was to harness the power of ICT. A revised national ICT policy was passed in 2009 (PricewaterhouseCoopers, 2010). The national ICT policy was further modified in 2015. This policy aims to develop and promote the ICT sector and thereby ensure its effective use to achieve the nation’s development goals (“Cabinet approves national ICT policy 2015,” 2015).

Bangladesh developed its Master Plan for Information and Communication Technology in Education (2012–2021) in July 2013.17 The ICT industry in Bangladesh has been making steady progress, with rapid growth in mobile telephony and Internet usage. The Ministry of Science, Information and Communication Technology is tasked with the responsibility of providing the policy framework and institutional mechanisms for developing a robust ICT sector in the country. Further, the Bangladesh Computer Council (BCC), set up by that ministry in 1990, is an autonomous body responsible for encouraging and supporting ICT-related activities in Bangladesh. The government also realises the importance of providing ICT access to all schools to familiarise students with modern ICT technology. It intends to provide computers, Internet connectivity and appropriate multimedia educational content for every primary, secondary and higher secondary school, with accessibility for all students; where necessary, solar energy panels will be supplied as well.

16 http://en.wikipedia.org/wiki/Bangladesh%E2%80%93India_border
ICT in Education Policy

As mentioned above, the Government of Bangladesh formulated its national ICT policy in 2009. This policy also covered education. Highlights include:

- establishing multimedia institutes up to the district level;
- creating facilities to promote ICT training and computer-aided training at all levels of education, including primary schools and madrasahs;
- stipulating that all private and public universities emphasise training students in ICT-related fields; and
- introducing computer science courses at the high-school level.

More information can be accessed from Bairagi, Rajon and Roy (2011).

An important initiative was the development of the above-mentioned master plan for ICT in education, in 2010. Four working committees — Early Childhood Care and Education, Non-Formal Education and Primary Education; Secondary, Technical and Vocational, and Madrasah Education; Higher Education; and Education Governance and Management — worked to develop the master plan.\(^\text{18}\)

National Initiatives on ICT in Education

The government has initiated a number of projects and programmes supporting ICT in education. Some of them, in brief, are:

- **Computer-Aided Learning Programme (CALP):** The Bangladesh Rural Advancement Committee (BRAC) initiated the project in 2004 to develop interactive learning materials for teachers, based on the national curriculum. CALP also trains teachers on using computers and implementing technology to expand their own knowledge.\(^\text{19}\)

- **Village Computer and Internet Project (VCIP):** This project gives rural areas access to modern ICT services. VCIP has provided computer lab facilities to schools and colleges, basic training courses in computers, and children’s educational programmes, such as learning alphabets and words.\(^\text{20}\)

- **Bangladesh Virtual Classroom** is a SPIDER-funded project run by Orebro University, in Sweden (SPIDER = Swedish Program for ICT in Developing Regions). It focuses on using electronic means to provide education to rural areas of Bangladesh. The objective of the Bangladesh Virtual Classroom is to test a method of making pre-recorded lessons delivered at Bangladesh Open University more interactive.\(^\text{21}\)

- **Relief International–Schools Online (RI-SOL)** has launched 47 Internet learning centres in rural and semi-urban areas. In May 2009, RI-SOL collaborated with Intel Corporation and the U.S. State Department’s Educational and Cultural Affairs Bureau (ECA) in an effort to provide ICT skills and development training to teachers in Bangladesh.\(^\text{22}\)

- **Gonokendros** (union libraries), introduced by BRAC, provide computer training for students at a low price. By December 2007, Gonokendros had organised computer training for more

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\(^{19}\) www.infodev.org/www.brac.net  
\(^{20}\) www.grameencommunications.org  
\(^{22}\) http://orgs.itigweb.org/risol-bangladesh
than 20,000 people. They are now being developed as information centres to ensure the participation of everyone, particularly women.\textsuperscript{23}

- **Computer Teaches Everyday English (CTEE)** is a project initiated by DNet (the Development Research Network) to assess the effect of using eLearning to teach English to secondary school children.\textsuperscript{24}

### Key Agencies/Institutions and Ministries in TEL

The key agencies are:

- Ministry of Education\textsuperscript{25}
- Prime Minister’s Office\textsuperscript{26}
- BRAC\textsuperscript{27}
- Bangladesh Telecommunications Company Limited\textsuperscript{28}

### Donors Active in Bangladesh

Some of the major donors are:

- **Asian Development Bank**: addresses the challenges of secondary education — making secondary education in Bangladesh more efficient, equitable and relevant to the economy’s needs.
- **Intel Corporation**: imparts technologically up-to-date teaching skills to pre-service teachers.
- **Orebro University (Sweden)**: focuses on using electronic means to provide education to rural areas.
- **Relief International**: has launched 47 Internet learning centres in rural and semi-urban areas.

### Institutions Offering Courses Using Technology and Online Learning

In Bangladesh, many higher education institutions offer courses in ICT. For example:

- Computer science was introduced as an optional subject for secondary-level students from the beginning of 1994.
- About 30 polytechnic institutes offer four-year diploma courses for those who have graduated with a secondary school certificate in computer technology.
- Four of the Bangladesh institutes of technology and some post-graduate institutes and colleges affiliated with national universities offer courses related to computer science and information technology.
- The Ahsanullah Institute of Information and Communication Technology has several relevant programmes, such as: a BSc in computer science; professional training; career-oriented training; children’s computer training; women’s IT training; computer sales; services and networking; customised software development; and a cybercafé.

\textsuperscript{23} http://education.brac.net/82-bhp/brac-projects?start=8
\textsuperscript{24} http://community.telecentre.org/profiles/blogs/elearning-in-bangladesh-a-new
\textsuperscript{25} www.moedu.gov.bd
\textsuperscript{26} www.pmo.gov.bd
\textsuperscript{27} www.brac.net
\textsuperscript{28} www.btcl.gov.bd
More than 200 colleges have introduced computer science as an optional subject for science-stream students.

The Department of Computer Science and Engineering of Ahsanullah University of Science & Technology offers an undergraduate engineering degree program.

Bangladesh Open University is offering three-semester diplomas in computer applications.

Notably, whilst 48 per cent of the country’s institutions use multimedia tools in their educational programmes, only 15.67 per cent of teachers use multimedia tools in their classrooms or laboratories (Bairagi et al., 2011).

Institutional Policies on eLearning and/or TEL

There are no separate and specific institutional policies on eLearning or TEL. That many institutions are conducting programmes on eLearning and TEL is an indication of policy support, albeit not specifically articulated.

OER Policies and Repositories

Bangladesh does not have any written policy on OER. However:

- **Bangladesh Open Source Network** has established an open source support centre to promote and facilitate the use of OER in the country.
- **Dhaka University** has an institutional repository in multiple disciplines.
- **BRAC University Institutional Repository** is funded by the International Network for the Availability of Scientific Publications (INASP) and covers: mathematics and statistics; health and medicine; general technology; architecture; computers and IT; general arts and humanities; language and literature; general social sciences; business and economics; and education.
- **Daffodil International University** has a digital repository that provides access to the institution’s research output. Its subject areas are: health and medicine; computers and IT; electrical and electronic engineering; general arts and humanities; language and literature; business and economics; law and politics; library and information science; and management and planning.

Teacher Training in TEL

Bangladesh has a shortage of individuals qualified to provide ICT training. The government’s ICT policy highlights that ICT training (i.e., computer-aided training) should be promoted at all levels of education, including madrasahs. ICT literacy is a desirable requirement in the recruitment and selection of teachers. The government is aware that it is difficult to train teachers in ICT in large numbers using the present infrastructure; hence, the government prefers to deploy virtual ICT trainers wherever possible.

The country has 365,925 primary education teachers, 378,276 secondary education teachers, and 38,558 higher education teachers, for a total of 782,759. Using the rule of thumb that ten per cent of

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29 [www.bdosn.org](http://www.bdosn.org)
30 [http://oasis.col.org/handle/11599/611](http://oasis.col.org/handle/11599/611)
31 [http://repository.library.du.ac.bd](http://repository.library.du.ac.bd)
32 [http://dspace.bracu.ac.bd](http://dspace.bracu.ac.bd)
33 [http://dspace.daffodilvarsity.edu.bd:8080](http://dspace.daffodilvarsity.edu.bd:8080)
34 [www.unicef.org/bangladesh/Quality_Primary_Education(1).pdf](http://www.unicef.org/bangladesh/Quality_Primary_Education(1).pdf)
teachers across all levels should be trained in TEL every year, Bangladesh will need to train approximately 78,000 teachers every year for the next six years, for a total of approximately 468,000.

**Women and ICT**

There is distinct recognition of the need to involve women to achieve national development and women’s empowerment. The vision of Bangladesh Women in Technology (BWIT) is to “empower women to achieve success through technology and drive change in the Bangladesh technology industry.” There is, however, a long way to go before gender equity in ICT is achieved in Bangladesh. A few data sets give a better idea of the present scenario:

1. Women comprise 15 per cent of the faculty in engineering and technology at Dhaka University and five per cent of the engineering department at Bangladesh University of Engineering and Technology.
2. Ten to 20 per cent of students in engineering and technology are women.
3. Only five per cent of students in software programming are female.
4. In the 597 BASIS (Bangladesh Association of Software and Information Services) software companies, only 4.36 per cent of staff are women.
5. Women comprise 25 per cent of ICT freelancers in Bangladesh, compared to a world average of 48 per cent.

The reasons for these figures are in part evident from other gender disparities — in literacy, and in education participation, especially higher education. Most women in Bangladesh who use information technology do so at work.

**Students in ICT and Media-Related Courses**

Whilst there are no authentic disaggregated data on students in ICT and media-related courses, it is possible to extrapolate from the available data. There were 611,380 students in higher education in Bangladesh in 2005 (BANBEIS, 2006a, 2006b). Assuming that ten per cent of students opted for engineering courses and ten per cent of these studied ICT-related courses, that means approximately 6,000 students were at that time studying ICT-related courses.

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35 www.uis.unesco.org/Library/Documents/Bangladesh.pdf
37 www.bwit-bd.com
38 http://girlsinit.org/program/bangladesh-women-technology-bwit
40 http://portal.unesco.org/education/en/file_download.php/1bb1630e3ed704a90a0ee2f1557a7cICT+EDUCATION+CASE+STUDY.pdf
Brunei Darussalam

Country Profile

A. Overview

Brunei is a sovereign state located on the north coast of the island of Borneo in Southeast Asia.\(^{41}\) It is a relatively small country, comprising 5,770 square kilometres of land area, with a population (as of 22 May 2015) of 436,520.\(^{42}\)

Brunei shares a 48.3-kilometre land border with Malaysia, as well as “substantial lengths of maritime borders stretching from the coastline of the two countries to the edge of the continental shelf in the South China Sea.”\(^{43}\)

Brunei’s literacy rate in 2012 was 96.9 per cent, which compared favourably to the world average of 84 per cent (Bandial & Begawan, 2013).

B. IT Profile

<table>
<thead>
<tr>
<th>Fixed-telephone subscriptions (per 100 persons)</th>
<th>Mobile-cellular subscriptions (per 100 persons)</th>
<th>Active mobile-broadband subscriptions (%)</th>
<th>Fixed (wired)-broadband subscriptions (per 100 persons)</th>
<th>Households with a computer (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.58</td>
<td>112.21</td>
<td>64.50</td>
<td>5.71</td>
<td>6.9*</td>
</tr>
</tbody>
</table>


ICT Policy

The Brunei government’s ICT department has developed an ICT master plan, and the government is now trying to develop the infrastructure to support IT utilisation of this master plan.\(^{44}\)

There is a de-facto ICT policy, IT 2000 and Beyond, established by the Brunei Information Technology Council\(^{45}\) in October 2000. It has a clearly defined vision — “[for] Brunei Darussalam to exploit IT to its full potential for national prosperity” — and its mission is for “Brunei Darussalam through its National IT Council . . . to lead and facilitate the strategic development and diffusion of state-of-the-art IT for the entire nation.” The document has clearly focused goals covering IT-related leadership, needs, literacy, manpower, applications, R&D, links, economy and businesses, as well as IT’s relevance for Brunei Darussalam.

BIT has signed a memorandum of understanding with Sabah IT Council, which was established in July 1996 with an emphasis on creating an information-rich society.

\(^{41}\) http://en.wikipedia.org/wiki/Brunei

\(^{42}\) http://countrymeters.info/en/Brunei_Darussalam

\(^{43}\) www.en.wikipedia.org/wiki/Brunei–Malaysia_border


\(^{45}\) www.bit.gov.bn
**ICT in Education Policy**

In 2010, the government announced a major roadmap for the development of ICT in education: the e-Hijrah Blueprint. This concept was intended to drive change within the country’s education system for the following six years. The country has also devised a plan called the National Education System for the 21st Century (SPN21), which focuses on building a sound ICT infrastructure in schools to meet the challenge of developing ICT in education.

**National Initiatives on ICT in Education**

The Ministry of Education has spent B$20.7 million on implementing ICT initiatives. The ministry has five strategic ICT programmes: Edunet, eLearning, Education Information System (EIS), Digital Library, and Human Capacity Building (Brunei Darussalam, 2003). Some of the national initiatives are:

- The Automated Lecture Capture and Publishing System. This was launched under the eLearning initiative by the Universiti Brunei Darussalam. It facilitates the recording of lectures so that students can view them later by logging in to the Ministry of Education website.
- The Developing Innovative Online Teaching–Learning Materials programme was announced at the end of 2010 (for 2011–2012) to initiate a pilot project to train teachers in using eLearning for developing innovative, multimedia learning materials in classrooms.
- The e-Education Flagship project.

The Ministry of Education also funds a project called National Digital Library of Libraries, or Dewan Bahasa dan Pustaka Library, to make resources easily accessible to all users at no charge.

**Key Agencies/Institutions and Ministries in TEL**

The Ministry of Education of Brunei Darussalam is the key agency for policy formulation and for the implementation of ICT-related schemes, programmes and projects.

**Institutions Offering Courses Using Technology and Online Learning**

Online learning is seen as a major component of the country’s educational initiatives, covering human development, enterprise information systems, and e-library and education networks. However, details of institutions offering such courses are not available.

ICT is used to teach Islamic subjects in religious schools and Islamic religious knowledge in secular schools (Lubis et al., 2011). The country’s top 15 master’s programmes do not include ICT.

**Institutional Policy for eLearning and TEL**

Brunei has recognised the need to adopt online education solutions and has recently developed an e-Education Strategic Plan, with the vision of making Brunei a more knowledgeable, thoughtful, multi-skilled, competitive and smart nation, based upon the teachings of Islam according to Ahli Sunnah Wal Jamaah. The government’s mission is to make eLearning accessible to all by providing citizens with a strong foundation in ICT, thereby promoting excellence in human capacity building.

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46 http://ehijrah.info/about-e-hijrah/vision-mission-goals/
49 www.onlineschoolnet.com/2010/11/01/Plan-To-Train-Teachers-In-E-learning-Bru-Direct/?r
50 www.dewanbahasaandpustakalibrary.org
51 www.icde.org/projects/regulatory_frameworks_for_distance_education/country_profiles/brunei/education_system
The Ministry of Education is mandated to promote eLearning initiatives and development and the use of e-content (Yong, 2009). Under the ministry’s direction, universities and other institutions have started using a customised learning management system that helps users upload content and share it with students and teachers. To support this initiative, an institutional design portal has been launched to assist with content-development activities at a large scale. However, no institution in Brunei has developed an eLearning policy.

**OER Policies and Repositories**

Brunei Darussalam has no OER repository. However, it has the Digital National Union Catalog of Libraries and, according to the Directory of Open Access Journals and OpenDOAR (The Directory of Open Access Repositories), the country has one open access journal — the Brunei International Medical Journal.

**Teacher Training in TEL**

Almost all government primary and secondary schools are equipped with computer hardware and software resources. ICT competency training for teachers is an integral part of the school curriculum. Although there are no official data online, it can be safely assumed that the majority of Brunei’s teachers possess the skills required for TEL. Now, the government plans to connect all schools to the Internet and the Web.

The numbers of primary and secondary education teachers are 8,665 and 6,643, respectively, for a total of 15,308. Data on higher education teachers are not available. Using the rule of thumb that ten per cent of teachers across all levels should be trained in TEL every year, 1,530 teachers — or up to 2,000 if we include an estimate for higher education — have to be retrained in TEL every year. Since the total number of teachers to be trained is not high, 15,308 teachers can be retrained in six years at a rate of approximately 2,500 per year.

**Women and ICT**

There is no gender discrimination in ICT policy, plans and programmes. Women and men therefore theoretically have equal opportunity to access ICT education and use ICT in professional capacities. The gender disparity in ICT in education is primarily due to gender-role stereotypes.

**Students in ICT and Media-Related Courses**

There is no clear disaggregated database on students enrolled in ICT and media-related courses. However, some extrapolation from the available data is possible. In 2012, 34,250 students were enrolled in higher education, 5,764 of these in engineering and technology courses. Assuming that ten per cent of engineering and technology students study ICT-related courses, a crude estimate is that about 600 students are enrolled in such courses.

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52 www.bimjonline.com
53 http://hrd.apec.org/index.php/Education_in_Brunei_Darussalam
54 http://unesdoc.unesco.org/images/0023/002305/230503E.pdf
56 http://hrd.apec.org/index.php/Education_in_Brunei_Darussalam
India

Country Profile

A. Overview

The Republic of India is surrounded by the Himalayas and China to the north, Pakistan and Afghanistan to the west, Myanmar to the east and the Indian Ocean to the south. In addition, Bangladesh is inset within the eastern part of the Indian landmass. India is the seventh largest country in the world, with an area of 3,287,590 square kilometres. According to the 2011 census, the population of India was 1,210,569,573, comprised of 51.47% males and 48.63% females. Worldometer estimated the population of India on 10 June 2015 to be 1,281,956,031.

B. IT Profile

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</tr>
</thead>
<tbody>
<tr>
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<td>70.78</td>
<td>15.10</td>
<td>1.16</td>
<td>9.5</td>
</tr>
</tbody>
</table>


ICT Policy

A National Task Force on IT and Software Development was set up in 1998 to draft a national informatics policy. The National Policy on Information Technology (NPIT) was adopted in 2001. The aim of the NPIT is to raise revenues and exports, create a pool of 10 million additional skilled IT workers and “leverage ICT for key social-sector initiatives like education, health, rural development and financial services to promote equity and quality.” The policy is oriented towards the use of ICT to promote decentralisation and citizen empowerment.

ICT in Education Policy

A National Policy on Information and Communication Technology (ICT) in School Education was approved on 23 March 2012. There is no policy on ICT in Indian higher education, although the Government of India has been investing heavily in developing ICT infrastructure, capacity and digital content for higher education since 2009 through its National Mission on Education through ICT (NMEICT).

National Initiatives on ICT in Education

The Computer Literacy and Studies in Schools (CLASS) project was initiated by the Government of India in 1984 to spread computer literacy at the senior secondary school level. Since then, there have been large numbers of government and NGO initiatives on ICT in education.

58 www.worldometers.info/world-population/india-population
59 http://it-taskforce.nic.in
60 www.pib.nic.in
Some of the relevant initiatives are:

- National Knowledge Commission\(^{62}\)
- Sarva Siksha Abhiyan\(^{63}\)
- Rashtriya Madhyamik Siksha Abhiyan (RMSA)\(^{64}\)
- Sakshat Portal\(^{65}\)
- Cisco Education Initiative\(^{66}\)
- Intel Education Initiative\(^{67}\)
- IT@School\(^{68}\)

Some of the flagship initiatives are:

Government initiatives

- **ICT in Schools** was launched in 2004 and revised in 2010. The scheme has now been subsumed into RMSA — the umbrella scheme for expansion and quality improvement in secondary education.
- **The IT@School** project was initiated by the Government of Kerala in 2000 to provide ICT-enabled education in the state and has become the world’s largest simultaneous deployment of FOSS-based ICT education (FOSS = free and open source software).
- The **National Knowledge Network**\(^{69}\) is a state-of-the-art, multi-gigabit, pan-India network providing a unified high-speed backbone for all knowledge-related institutions in the country. The NKN will enable scientists, researchers and students from different backgrounds and diverse geographies to collaborate in advancing human development in critical and emerging areas.
- The **INFLIBNET** (Information and Library Network) Centre\(^{70}\) was started in 1996 to network all of the libraries of higher education institutions in India. Amongst the various activities of INFLIBNET, the UG-Infonet Internet Connectivity programme provides Internet bandwidth to all of the country’s universities.
- **Sakshat** is a portal under NMEICT. The portal comprises: (i) a student’s corner to “support self-learning through virtual classes, and (ii) a teacher’s corner to “provide links to teachers’ empowerment programmes” and “to communicate and share knowledge with teacher/mentor or peer groups in real time and asynchronously.”
- One of the initiatives, the **UGC-Infonet Connectivity Programme**, began in 2002 to network university campuses with state-of-the-art campus-wide networks. Under UGC-Infonet, ten Internet bandwidths were provided to more than 180 universities via fibre-optic leased lines.

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\(^{62}\) http://knowledgecommissionarchive.nic.in

\(^{63}\) www.ssa.nic.in

\(^{64}\) http://mhrd.gov.in/rmsa

\(^{65}\) www.sakshat.ac.in

\(^{66}\) www.cisco.com/web/IN

\(^{67}\) www.intel.com/education/in

\(^{68}\) www.itschool.gov.in

\(^{69}\) www.nkn.in

\(^{70}\) www.inflibnet.ac.in
• The Government of India has taken a big step towards encouraging mobile learning by subsidising students’ purchases of Aakash tablet computers so that they can access the Internet for educational purposes.71
• The IIT Kanpur has launched “Brihaspati” — an in-house designed and developed LMS using open source software to deliver e-Learning programmes and enable content management.
• ERNET provides connectivity to meet the needs of educational and research institutions by hosting and providing relevant information to their users. Research and development and training are integral parts of ERNET activities.
• The AMTRON Project (Government of Assam) offers laptops to students who achieve first division in their tenth board examination (ETMA, 2012). Several other Indian states (including Uttar Pradesh, Punjab and Goa) also offer laptops to students.
• Intel is facilitating the integration of ICT in Kendriya Vidyalaya Sangathan. Intel’s initiatives are aimed at using “ICT as part of the curriculum.”

**NGO Initiatives**

• Eklavya Computer-aided Self-learning is an initiative in Chhattisgarh to provide fully animated multimedia software based on the textbooks for classes 6 to 8; the materials have been loaded onto touch-screen computers, which are kept in the school corridors for easy access by the children.
• The Chalta-Phirta Mobile Bus is a bus fitted with a television screen and equipped with computers, multimedia facilities, a book library, blackboard and toys. It travels around the slum clusters of New Delhi, where children do not have access to education. Each bus has two teachers specially trained to educate children through books, computers, exhibits, films and other media.
• The Digital Empowerment Foundation (DEF) is a not-for-profit organisation dedicated to bridging the digital divide by delivering to governments and corporations consultancy services about providing ICT facilities to rural areas.72
• The Azim Premji Foundation (a not-for-profit organisation) is working to integrate ICT in education at all levels in 14 of India’s states.73
• DELNET74 is a library network maintained by an NGO; it connects more than 5,000 libraries from India and five other countries, archiving more than 20 million pieces of data on books, journals and other information sources.
• ETMA75 is a not-for-profit educational trust that supports government and non-government initiatives in TEL at the school level.

**Private/Corporate Initiatives**

• IL&FS Education and Technology Services Limited (IETS) is in the process of implementing IT solutions for SSA Bihar by setting up hardware, creating curricula, introducing multimedia lessons, and training teachers in IT skills. IETS will also set up and maintain

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71 www.akashtablet.com
72 http://defindia.net
73 www.col.org/PublicationDocuments/eLearning_CWAsia_2013.pdf
74 www.delnet.nic.in
75 www.etma-india.in
computer labs in 200 schools. Each lab will have computers, printers, uninterruptible power supply generators, and computer teachers.

- **One Laptop Per Child** ran a pilot project in a village near Mumbai in which every child was given a laptop; the project was then expanded to several other schools in different parts of the country.\(^76\)

- Microsoft, in collaboration with government bodies, schools and other stakeholders, initiated **Project Shiksha** in an effort to accelerate computer literacy in teachers and students across government schools.

- **TalentEdge** has trained 1,000,000 students in the last ten years.\(^77\)

### Key Agencies/Institutions and Ministries in TEL

- Ministry of Human Resource Development\(^78\)
- Department of School Education and Literacy\(^79\)
- Ministry of Communications and Information Technology\(^80\)
- Department of Telecommunication\(^81\)
- Indira Gandhi National Open University\(^82\)
- National Institute of Open Schooling\(^83\)

The Department of Information Technology, in the Ministry of Communications and Information Technology, is responsible for formulating, implementing and reviewing national policies pertaining to information technology.

### Major Donors

A number of IT companies provide IT in education training, and a few are involved with TEL. The multinational IT companies work mostly through national or state governments, under the companies’ corporate social responsibility programmes. Indian IT companies work with government and private school networks primarily according to the corporations’ business models, so some of their support cannot be regarded as falling within the “donor” category; hence, there are no clear data on their donations for IT training or TEL.

Microsoft conducts professional development programmes for school leaders, using technology to enable students and teachers to develop 21st-century skills. Intel trains teachers and teacher educators in the use of technology.

### Institutions Offering Courses Using Technology and Online Learning

India has one of the largest higher education systems in the world, with more than 36,000 colleges, 700 universities and over 20 million students. India also has a large open and distance education system, comprising national and state open universities and more than 100 dual-mode universities offering

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\(^76\) [www.olpcindia.net](http://www.olpcindia.net)

\(^77\) [www.talentedge.in](http://www.talentedge.in)

\(^78\) [www.education.nic.in](http://www.education.nic.in)

\(^79\) [www.education.nic.in/Elementary/elementary.asp](http://www.education.nic.in/Elementary/elementary.asp)

\(^80\) [www.mtit.gov.in](http://www.mtit.gov.in)

\(^81\) [www.dot.gov.in](http://www.dot.gov.in)

\(^82\) [www.ignou.ac.in](http://www.ignou.ac.in)

\(^83\) [www.nios.ac.in](http://www.nios.ac.in)
courses through distance education. Both the formal and the ODL (open and distance learning) systems offer a very large number of courses through conventional media. There are very few online courses offered by a few institutions, some of which are noted below:

- **The National Institute of Information Technology** (a private IT training provider) offers a number of courses via Cloud Campus’s online platform.
- **Amity University**, India’s largest private university, has developed its own range of online degree programmes.
- **Pearson India** in 2014 entered the realm of online courses with the announcement of a five-year deal with IBM to deliver customised eLearning solutions to more than 22,000 classrooms across India.
- **NPTEL** provides free online courseware in the form of web courses and video lectures. There are approximately 750 courses in various disciplines currently being offered in engineering, sciences, technology, management and the humanities.
- Several other public and private institutions, such as the University of Mumbai, Amity University Online, Birla Institute of Technology and Science, Everonn Education Limited, Tamil Virtual University, Gurukul Online, YCMOU Online, IISc Bangalore, Institute of Management Technology, Symbiosis Centre for Distance Learning, MedVersity, IIT Mumbai, IIT Delhi, Indira Gandhi National Open University (IGNOU) and Punjab Technical University, have undertaken initiatives to promote eLearning in India.

**Institutional Policy for eLearning and TEL**

The Government of India has been actively supporting the eLearning drive to strengthen accessibility. It launched the National Mission on Education through ICT (NMEICT) to leverage the potential of ICT in the dissemination of video- and web-based course content.

**OER Policies and Repositories**

In April 2005, the Ministry of Communications and Information Technology set up the National Resource Centre for Free and Open Source Software (NRCFOSS) in an effort to bridge the digital divide and strengthen the Indian software industry. The National Policy on ICT in School Education (2012) recommended web-based digital repositories to host a variety of digital content, appropriate to the needs of different levels of students and teachers. Whilst not all repositories have adopted open licensing, some of the important repositories are listed below. OpenDOAR presents 68 repositories in India. The Ministry of Human Resource Development’s flagship mission, NMEICT, adopted an open-licence policy in February 2014.

Some of the useful repositories are:

- The Rajiv Gandhi Science and Technology Commission (RGSTC), Maharashtra Knowledge Corporation Limited (MKCL) and the Indian Consortium for Educational Transformation (I-
CONSENT) collaborated on web-based materials — identifying, downloading and editing them to make them suitable for the Indian school system.90

- The Birla Institute of Technology and Science set up a cyber library containing approximately 14,000 books. Students can directly access books from the e-shelves of 290 publishers. The cyber library covers IT Pro, Business Pro, Exec Summaries, Finance Pro, Office Essential and Engineering Pro in a searchable format.91

- The National Repository of Open Education Resources92 (NROER), from the Ministry of Human Resource Development, offers resources for all school subjects and grades in multiple languages. Users can also access videos, audio files, images, documents and interactive modules.

- Shodhganga, created by INFLIBNET, provides an open access platform for theses and dissertations in Indian universities. The INFLIBNET Centre is responsible for hosting and maintaining Shodhganga and making it accessible to all universities and other educational institutions.93

- The National Program on Technology Enhanced Learning (NPTEL) is a collaborative project of the seven IITs and IIScs, funded by the Ministry of Human Resource Development to enhance the quality of engineering education by developing curriculum-based video and web courses.94

- The Eklavya project has developed an Open Source Courseware Animations Repository95 (OSCAR) that provides web-based interactive animations for teaching. The content is available in various Indian languages and distributed over the Internet.

- E-Grid, from the Indian Institute of Information Technology, Kerala, and supported by the Ministry of Human Resource Development, provides subject-specific portals that are developed and maintained by subject domain experts. Currently, this programme offers OER only for science and engineering.96

- The National Institute of Open Schooling,97 which also has an OER policy.

At the higher education level, there are OER policies at IGNOU, Vardhman Mahaveer Open University and Krishna Kanta Handiqui State Open University. IGNOU started the eGyanKosh as a national repository in 2005, and at its 109th Board of Management meeting, in August 2011, it approved a policy to make the materials OER.

**Teacher Training in TEL**

India has 7,720,000 teachers in primary education (2014),98 2,339,072 in secondary education (2011),99 and 1,247,453 in higher education (2012).100 Hence, there are an estimated 11.31 million teachers in the system. By training 1.89 million every year, all teachers can be trained in TEL in six years.

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90 www.hbcse.tifr.res.in/research-development/projects/open-educational-resources-for-schools-oer4s
91 www.i4donline.net
92 http://india.gov.in/national-repository-open-educational-resources-ministry-human-resource-development
93 www.shodhganga.inflibnet.ac.in
94 www.nptel.iitm.ac.in
95 http://oscar.iitb.ac.in/oscarHome.do
96 www.iiitmk.ac.in
97 http://oernios.ac.in/wiki/index.php/Main_Page
**Women and ICT**

There are no policy statements on women and ICT. Women hold the same status as men in ICT training and usage. There are, however, several initiatives in India on ICT for women’s empowerment. Examples include the Self Employed Women’s Association (SEWA, 2004), the e-commerce website India Shop, Swayam Krishi Sangam, The Dhan Foundation, and the UNESCO-sponsored project Networking Rural Women and Knowledge, in Nabanna.

**Students in ICT and Media-Related Courses**

There is no clear disaggregated database on students enrolled in ICT and media-related courses. However, some extrapolation from available data is possible. According to the Seventh All-India School Education Survey, there were 11.44 million students in primary education in 2006.101 There were 21.82 million secondary students (2011–2012)102 and 20 million students in higher education (2012–2013).103 About 16 per cent of students study engineering and technology courses; if ten per cent of those students study ICT-related courses, that is a total of approximately 320,000 students.

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102 [www.ncert.nic.in/programmes/education_survey/pdfs/Enrolment_in_school.pdf](http://www.ncert.nic.in/programmes/education_survey/pdfs/Enrolment_in_school.pdf)
Malaysia

Country Profile

A. Overview

Malaysia is a Southeast Asian country spread across two regions – Peninsular Malaysia and East Malaysia. It has a land area of 329,847 square kilometres. Its borders are defined by maritime boundaries with Brunei, Indonesia, Thailand, Singapore, Philippines and Vietnam. As of 17 May 2015, it had a population of 30,816,641. It has a high literacy rate (average 93.1 per cent; males 95.4 per cent; females 90.7 per cent), compared to the world average of 84 per cent. The official language is Malay (or Bhasa Malaysia).

B. IT Profile

<table>
<thead>
<tr>
<th>Fixed-telephone subscriptions (per 100 persons)</th>
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<th>Active mobile-broadband subscriptions (%)</th>
<th>Fixed (wired)-broadband subscriptions (per 100 persons)</th>
<th>Households with a computer (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.26</td>
<td>144.69</td>
<td>66.97</td>
<td>8.22</td>
<td>65.1</td>
</tr>
</tbody>
</table>


ICT Policy

The National Information Technology Council (NITC) was established in 1994, chaired by the prime minister. The NITC was then reconstituted in 2009 to bring the public–private and community sectors under one umbrella. The national ICT policy covers human capital formation or capacity building, technology niche areas, infrastructure development and institutional support. The NITC’s evolution and changing emphasis indicate the dynamism of Malaysian ICT policy and how it relates to national goals “to transform the Malaysian economy into an innovation-based knowledge economy.”

ICT in Education Policy

Malaysia has a well-articulated national policy on ICT in education, adopted in 2010. This policy aims to leverage ICT as an enabler for education in order to create, promote and sustain the development of a knowledgeable, innovative and creative society, which ultimately supports the national agenda of attaining a knowledge-based economy. The policy envisages the conversion of all schools into smart schools, in a four-wave model: Pilot Phase (Wave 1), 1999–2002, with 88 schools; Post-Pilot Phase (Wave 2), 2003–5, characterised by massive computerisation of all 10,000 schools; Making all Schools Smart Schools (Wave 3), 2005–10; and Consolidate and Stabilise (Wave 4). The four pillars of delivery for the policy on ICT in education have been defined in terms of human capital, budget, digital learning resources and infrastructure.

National Initiatives on ICT in Education

Malaysia’s ICT policy recommends that ICT should be leveraged to scale up the quality of learning across the nation. Hence, there are many initiatives on ICT in education.

104 http://countrymeters.info/en/Malaysia
The following are important ones:

- **BestariNet** has catapulted Malaysia to the forefront of next-generation learning, enabling it to become the first country in the world to connect all of its schools through a single, cloud-based learning platform. BestariNet provides all teachers, students and parents nationwide with personalised login IDs for a cloud-based virtual learning environment (VLE).\(^{108}\)

- The **Teaching of Mathematics and Science in English (PPSMI)** programme aims to increase English language proficiency through English-based mathematics and science classes. The programme has provided schools with 132,649 laptops, 78,333 LCD projectors, 67,439 screens, 63,254 mobile trolleys and 9,662 printers, and has trained over 200,000 teachers in basic ICT skills and the integration of ICT into teaching and learning activities.\(^{109}\)

- The **Smart School Pilot Project** was launched in 1999. At the end of December 2002, there were 87 networked schools (83 secondary and four primary), located in all states. The plan is to cover all 9,000 schools. The pilot applications developed teaching/learning materials (initially for four subjects: Bahasa Melayu, English, science and mathematics). Under the School Computerisation Programme, every school was provided with one to three computer laboratories (20 computers per laboratory), depending on the student population. Smart schools are designed to introduce technology and deliver education more effectively.\(^{110}\)

- The **Universal Service Provision Project** helps to bridge the digital gap between rural and urban schools. The pilot project, involving 220 schools in Sabah and Sarawak, includes the provision of basic infrastructure, including electricity, telephone lines and Internet access, computers, telephones and other related equipment.\(^{111}\)

- The Ministry Of Education instituted a series of online and streaming videos known as **EduWeb TV** in 2008. The curriculum and interactive channels are designed on the basis of the national curriculum. The curriculum channel, with 497 separate learning videos, covers seven subjects for primary schools and 13 subjects for secondary schools.\(^{112}\)

- Educational portals such as **my-e-tutor**\(^ {113}\) and **e-tuisyen**\(^ {114}\) allow people with Internet access to expand or acquire knowledge online, access interactive multimedia tutorials and develop personalised learning programmes.

- The Ministry of Education has developed an **Electronic Book Project**, which stores electronic textbooks and links the user to the Internet.\(^ {115}\)

### Key Agencies/Institutions and Ministries in TEL

The key agencies and institutions are:

- **NITC**\(^ {116}\)
- **Ministry of Education**\(^ {117}\)

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\(^{108}\) [http://1bestarinet.net](http://1bestarinet.net)

\(^{109}\) [https://ppsmi.wordpress.com/tag/ppsni](https://ppsmi.wordpress.com/tag/ppsni)


\(^{111}\) [www.sknm.gov.my/Resources/eForm/Universal-Service-Provision.aspx](http://www.sknm.gov.my/Resources/eForm/Universal-Service-Provision.aspx)


\(^{113}\) [www.myetutor.com](http://www.myetutor.com)

\(^{114}\) [www.e-tuisyen.com](http://www.e-tuisyen.com)

\(^{115}\) [www.ecdl.org/media/UN%20GAID_ICT%204%20DEV_Education.pdf](http://www.ecdl.org/media/UN%20GAID_ICT%204%20DEV_Education.pdf)

\(^{116}\) [www.nitc.org.my](http://www.nitc.org.my)
• Ministry of Higher Education

**Major Donors**

The Multimedia Super Corridor\(^{118}\) (MSC) was created in 1996 through a partnership between the Malaysian government (as the chief architect of the vision) and the private sector (as the main driver for its implementation). The Multimedia Development Corporation is a one-stop shop that manages and markets the MSC.\(^{119}\)

Other donors are:

- Japan International Cooperation Agency (the Networked Multimedia Education System project)
- World Bank (education sector support)
- UNESCO (SchoolNet projects)

**Institutions Offering Courses Using Technology and Online Learning**

Malaysia took the initiative to establish virtual universities. These universities offer blended or hybrid models of virtual education. Some of them are:

- Multi-Media University
- Universiti Tun Abdul Razak (UNITAR)
- Asia e University (AeU)
- Open University Malaysia
- Wawasan Open University

A consortium of 11 public universities, known as METER, was established in 1998 to promote eLearning programmes; this gave rise in 2000 to the Open University Malaysia. The Malaysia Education Online initiative was launched in 2011 has ten institutions partnering to provide eLearning programmes. Students access lectures on CD or online and attend face-to-face tutorials at study centres throughout the country.

**Institutional Policy for eLearning and TEL**

The National Higher Education Policy on e-Learning, launched on 16 April 2011, is aimed at achieving quality higher education and providing equal and fair access to eLearning for the general public (Embi, 2011).

**OER Policies and Repositories**

Most institutions do not have a separate institutional policy on OER, but public institutions have some strategic plans for eLearning. One of the key actions to promote the greater adoption of OER in Malaysia would be for institutions to establish policies encouraging the wider use and reuse of open content.

Wawasan Open University (WOU), in Penang, has developed an OER policy.\(^{120}\) WOU contributes a wealth of OER, available via the Internet through its OER repository.\(^{121}\)

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\(^{118}\) [www.mscmalaysia.my](http://www.mscmalaysia.my)
\(^{119}\) [http://unesdoc.unesco.org/images/0013/001355/135562e.pdf](http://unesdoc.unesco.org/images/0013/001355/135562e.pdf)
\(^{121}\) [http://weko.wou.edu.my/About-this-Repository](http://weko.wou.edu.my/About-this-Repository)
Several OER repositories have been developed by different institutions in Malaysia. For example, Repository@USM\textsuperscript{122} is a multidisciplinary repository available in English and Malay that provides access to the Universiti Sains Malaysia’s research output.

**Teacher Training in TEL**

Official documents indicate the percentage of trained teachers (i.e., those who have received pre-service teacher training) but not the number of teachers trained in TEL. Nonetheless, since smart schools have been operating since 2010, the large majority of school teachers is likely to possess relevant skills and also might have undergone short-term in-service education on TEL.

Malaysia has 232,095 teachers in primary education (2011),\textsuperscript{123} 176,669 in secondary education (2011),\textsuperscript{124} and 56,579 in higher education (2009).\textsuperscript{125} Thus, there are an estimated 0.5 million teachers in the education system (rounded off to compensate for a lack of current data). If 78,000 teachers are trained in TEL every year, approximately 0.5 million teachers can be trained in six years.

**Women and ICT**

Malaysia is gender neutral about ICT training and usage and does not discriminate against women. However, a 2005 study indicated that more than 60 per cent of women respondents were using computers for seven out of the ten job tasks listed. A total of 78 per cent of the respondents used basic systems and 48 per cent used advanced systems. Ninety-two per cent of respondents used systems for administration, 42 per cent for planning and 52 per cent for control (Ndubisi & Kahraman, 2005).

\textsuperscript{122} http://eprints.usm.my
\textsuperscript{125} http://siteresources.worldbank.org/EDUCATIONLP/Resources/Malaysia.pdf
Maldives

Country Profile

A. Overview

Maldives is an island nation made up of about 1,200 coral islands spread over an area of 90,000 square kilometres. Only one per cent of this area is land on which people can live. As of 10 June 2015, the population was 336,697.\(^{126}\)

Maldives is located about 430 kilometres southwest of India. The islands are actually the peaks of a vast submarine mountain range, the Chagos-Maldives-Laccadive Ridge, a volcanic ridge and oceanic plateau extending between the northern and central Indian Ocean.\(^{127}\) Maldives shares maritime boundaries with Sri Lanka, India and the British Indian Ocean Territory.

B. IT Profile

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</tr>
</thead>
<tbody>
<tr>
<td>6.54</td>
<td>181.19</td>
<td>44.10</td>
<td>5.84</td>
<td>59.5</td>
</tr>
</tbody>
</table>


ICT Policy and ICT in Education Policy

In Maldives, the Seventh National Development Plan, 2006–2009, developed by the Ministry of Planning and National Development, was dedicated to expanding the existing ICT levels. The plan highlighted the need to provide computer access for all students, especially at the secondary level, and to develop a national curriculum for primary and secondary education focusing on ICT skills and usage, including Internet skills.

The ICT section of the policy framework also emphasised infrastructure and developing adequate human resources for the ICT sector. The Strategic Action Plan (2009–2013) focused on strengthening the ICT infrastructure and ensuring the affordability of ICT services; however, it made no particular reference to ICT in education.\(^{128}\)

The government hopes to ensure that every secondary school has a computer lab for learning purposes and that each school has sufficient capacity to maintain and operate the computer lab effectively. Already the government has been able to provide computer labs to 60 per cent of secondary schools, and most schools have a technician and a computing teacher.\(^{129}\)

National Initiatives on ICT in Education

Teacher Resource Centres (TRC) in Maldives are equipped with modern technology, such as smart boards, microwave relays and cable Internet equipment. Teachers can use the TRCs to browse the Internet as well as download and develop materials.\(^{130}\)

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\(^{126}\) http://countrymeters.info/en/Maldives

\(^{127}\) http://en.wikipedia.org/wiki/Geography_of_the_Maldives


\(^{130}\) www.infodev.org/infodev-files/resource/InfodevDocuments_890.pdf
Two other initiatives are:

- Maldives Teacher Resource\(^{131}\)
- COL’s VUSSC\(^{132}\)

**Key Agencies/Institutions and Ministries in TEL**

Some of the key agencies and institutions are:

- Ministry of Education
- Department of Higher Education
- Department of Public Examination
- Educational Development Centre
- Centre for Continuing Education
- Ministry of Civil Aviation and Communication
- National Centre for Information Technology
- Maldives National University (MNU)

**Major Donors**

The following donors have played a facilitative role in the development of education and the ICT sector in Maldives:

- **UNICEF** created TRCs with Internet connectivity to integrate the islands’ teachers into global learning communities.
- The **Asian Development Bank** sponsored an Information Technology Development project that encouraged the government to use ICT to make education efficient.

**Institutions Offering Courses Using Technology and Online Learning**

Maldives has been offering distance education courses since 1999 with the establishment of the Centre for Open Learning. However, distance education courses have been offered in a more systematic way since 2010. The Centre for Open Learning at MNU conducts many of the university’s face-to-face courses using a blended mode, whereby more than 80 per cent of the learning is conducted online.

In addition, some face-to-face courses in certain subjects at MNU are also conducted online as per the requirements of those subjects. Most of the country’s private colleges are developing and trialling eLearning. One private college is trialling a cyber-learning campus that will enable students to take up distance learning courses through the cyber-learning campus instead of attending their central campus in the capital city.

The National Institute of Education (NIE) conducts blended learning courses for in-service teachers, in which more than 80 per cent of the learning is conducted online. Some of the public and private schools also use open source course management systems, such as Moodle and Canvas, to support eLearning in their schools, and many of the homework and other independent learning activities are conducted online. Currently, NIE is working with COL to develop learning materials for upgrading in-service teachers.\(^{133}\)

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131 www.edonline.edu.mv
132 www.col.org/programmes/vussc/virtual-university-small-states-commonwealth-vussc
Institutional Policy for eLearning and TEL

There is no separate policy on eLearning or TEL, although MNU offers a post-graduate certificate programme in eLearning to enhance the eLearning skills of the country’s citizens. The programme aims at providing learners with the skills necessary to enable them to handle and launch more eLearning programmes in different subjects.134

Maldives is an active participant in the Virtual University for Small States of the Commonwealth (VUSSC) initiative. The salient features of the initiative are to:

• develop a collaborative network of Commonwealth small states,
• develop capacity in the use of ICT,
• create and share learning material at the post-secondary level, and
• establish a transnational qualifications framework that would enable the transfer of credits and qualifications.

The Government of Maldives considers eLearning an important stimulus to enhance citizens’ living standards, improve digital literacy and help the people of Maldives satisfy their learning needs in the 21st century. Online learning possibilities are being explored by establishing the necessary IT infrastructure on various islands. The Asian Development Bank has provided aid to the Government of Maldives to establish public-use Internet kiosks on atolls (Shareef & Kinshuk, 2004).

Teacher Training in TEL

In 2010, Maldives had 3,592 teachers in primary education135 and 3,487 teachers in secondary education.136 Although the country has several higher education institutions, data on teachers in higher education are not available. The total number of teachers is estimated to be 7,079 – rounded up to 7,500 to include those in higher education. By providing training to about 1,250 teachers every year, Maldives can train all of its teachers in TEL in six years.

134 www.mnu.edu.mv
135 https://openknowledge.worldbank.org/bitstream/handle/10986/17982/686150NWP0Repo00Box369243B00PUBLIC0.txt?sequence=2
136 https://openknowledge.worldbank.org/bitstream/handle/10986/17982/686150NWP0Repo00Box369243B00PUBLIC0.txt?sequence=2
Pakistan

Country Profile

A. Overview

The Islamic Republic of Pakistan is a sovereign country in South Asia covering 796,095 square kilometres. As of 18 May 2015, it had a population of 188,144,040. Pakistan has common borders with Iran, Afghanistan and India, and a southern shoreline along the Gulf of Oman and the Arabian Sea. Literacy in Pakistan ranges from 20 to 80 per cent in the different regions, with an average of 55 per cent.

B. IT Profile

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<tbody>
<tr>
<td>3.50</td>
<td>70.13</td>
<td>10.90</td>
<td>0.61</td>
<td>3.5*</td>
</tr>
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</table>


ICT Policy

A comprehensive ICT Policy and Action Plan was adopted in 2000 and published by the Ministry of Science and Technology. The vision is “to harness the potential of Information Technology as a key contributor to development of Pakistan”; and this vision is further articulated in the plan’s mission and a large number of goals. Strategies have been defined with respect to several areas, including human resource development, IT education and training, telecommunication, databases and platforms.

ICT in Education Policy

The Ministry of Education has developed the following policy documents:

- National Education Policy.
- IT Policy and Action Plan, which provides specific policy statements on, amongst other topics, the use of the Internet for education, and faculty training in IT.
- A separate Ministry of Information Technology was created in November 2002 with the aim of building Pakistan’s IT competency in the 21st century. Pakistan formulated the National Information and Communications Technology Strategy for Education (NICTE) through a consultative process in 2004–5. The policy framework recognises the importance of ICT both as a subject and as an instructional aid. The National IT Policy also flags the need to provide low-priced computers and Internet connectivity to universities, colleges and schools through public–private partnership initiatives.

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137 www.worldometers.info/world-population/pakistan-population
138 www.en.wikipedia.org/wiki/List_of_countries_by_literacy_rate
139 www.unapcict.org/echub/resources/pakistan-information-technology-policy/at_download/attachment1
141 www.ilearnpakistan.org/pdf/National-Information-Communications-Strategy-Pakistan.pdf,
www.educationdev.net/educationdev/docs/p5.PDF
In all the policy documents mentioned above, the Government of Pakistan emphasises innovative, scalable and cost-effective solutions to meet Pakistan’s educational goals.

**National Initiatives on ICT in Education**

Initiatives pertaining to ICT in education are well established in higher education through the ODL systems of Allama Iqbal Open University and the Virtual University of Pakistan. There are no comparable initiatives in school education.

The following are a few major initiatives on ICT in education:

- **ApnaFuture** is an online initiative to help students with using the Web. It provides learning skills along with tips for enhancing vocabulary.\(^{143}\)

- **iEARN\(^{144}\)** is a not-for-profit global network in which teachers and students use ICT in a project-based approach that enhances learning. iEARN CIVICS (Community Voices Collaborative Solutions) has operated in selected schools in Pakistan through the Aga Khan Educational Programme. The project encourages peer-to-peer learning amongst students via collaborative projects, and it provides students with the opportunity to publish their projects on the Web.

- **The Aga Khan Education Service (AKES)\(^{145}\)** is one of the major driving forces behind ICT dissemination in schools. Each Aga Khan school has 20 computers for computing studies, and they are also used for management and language studies. Approximately half of AKES teachers report that they use ICT as part of their teaching. AKES is attempting to help teachers use ICT to achieve more learner-centred approaches.

- The **Intel/Ministry of Education Teacher Training Programme** includes the training of over 80,000 teachers to use technology with their students, and an additional programme for the professional development of education college faculty teachers.

- The **Virtual University\(^{146}\)** has since its inception been based on broadcast television, coupled with comprehensive interaction over the Internet.

- The **Pakistan Education and Research Network\(^{147}\)** is a university-level research-based network with a digital library of online resources to serve as a model for collecting and distributing educational resources.

- The **Punjab IT Labs** project was one of Pakistan’s first “ICT in education” projects. It was initiated by the government in 2008 primarily to overcome the digital divide between public and private schools. The project was completed in November 2009, having equipped over 4,286 schools with three desktop PCs and 12 virtual desktops each.

**Key Agencies/Institutions and Ministries in TEL**

Some of the key agencies/institutions are:

- Ministry of Education and Professional Training\(^{148}\)
- Federal Directorate of Education\(^{149}\)

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\(^{143}\) http://oasis.col.org/handle/11599/611
\(^{144}\) www.learm.org
\(^{145}\) www.akdn.org/akes
\(^{146}\) www.vu.edu.pk
\(^{147}\) http://pern.edu.pk
\(^{148}\) http://moent.gov.pk
• Ministry of Information Technology
• Ministry of Science and Technology
• National ICT R&D Fund
• Pakistan Computer Bureau
• Higher Education Commission
• Allama Iqbal Open University
• Virtual University of Pakistan

**Institutions Offering Courses Using Technology and Online Learning**

The following institutions in Pakistan offer part-time and full-time online courses:

• Pakistan Institute of Computer Sciences
• Aga Khan University
• Allama Iqbal Open University
• Bahauddin Zakariya University, Multan
• COMSATS IIT, Virtual Campus
• Gomal University
• Government College University Faisalabad
• Islamia University of Bahawalpur
• Sarhad University of Science and Information Technology
• University of Engineering and Technology Lahore
• University of Peshawar

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149 www.fde.gov.pk
150 www.moitt.gov.pk
151 www.most.gov.pk
152 www.ictrdf.org.pk
153 www.pcb.gov.pk
154 www.hec.gov.pk/Pages/HBMain.aspx
155 www.aiou.edu.pk
156 www.vu.edu.pk
157 www.picsedu.pk/Default.aspx
158 www.aku.edu/collegeschoolsandinstitutes/ied/pakistan/ Academics/OpenEducation/Pages/Home.aspx
159 www.aiou.edu.pk
160 www.bzu.edu.pk/DLP
161 www.vcomsats.pk
162 www.degu.edu.pk
163 www.gcuf.edu.pk/directorates/distance-learning
164 www.iub.edu.pk/distance_29911.php
165 www.suit.edu.pk
166 www.uet.edu.pk
OER Policies and Repositories

There is no specific policy on OER in Pakistan. Some individuals within the country have urged that all materials developed through public funds should be made freely available to everyone, but this has not been the practice. The OER issue has not been addressed so far, and no policy guidelines have been established.

The country has three key repositories:

- The **AHKRC Digital Library** provides access to various collections relating to agriculture and rural development in Pakistan, including the Akhtar Hameed Khan and Shoaib Sultan Khan Archives in subjects such as agriculture, food science, veterinary science, ecology and the environment.

- **eCommons@AKU** provides open access to the research and scholarly publications of the Aga Khan University. The repository contains resources on biology and biochemistry; mathematics and statistics; physics and astronomy; health and medicine; general arts and humanities; business and economics; education; law; and politics.

- The **Pakistan Research Repository** is hosted by the Higher Education Commission of Pakistan and contains complete copies of doctoral theses produced in the country across a wide range of academic disciplines. The interface is in English. It also contains RSS feeds to alert users to new content.

Women and ICT

ICT education is open to both men and women. Girls are especially urged to participate in ICT day programmes to encourage and showcase their participation. However, whilst men and women are in principle free to pursue their chosen educations and occupations, social taboos and gender stereotypes tend to differentiate “male” occupations from “female” ones. This deprives girls and women of equality in ICT education and ICT-related professions.

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167 [www.upesh.edu.pk/distanceeducation](http://www.upesh.edu.pk/distanceeducation)
169 [www.vu.edu.pk](http://www.vu.edu.pk)
171 [www.ahkrc.org/archives.html](http://www.ahkrc.org/archives.html)
172 [www.ecommons.aku.edu](http://www.ecommons.aku.edu)
Singapore

Country Profile

A. Overview

Singapore, a city-state comprised of a main island and 62 smaller islands off southern Malaysia, is a global financial centre with a tropical climate and multicultural population. Singapore has a population\(^{174}\) of 5.47 million spread over 716.1 square kilometres. The country has impressive literacy figures of 98 per cent for males and 93.8 per cent for females.

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<td>155.92</td>
<td>73</td>
<td>26.03</td>
<td>85</td>
</tr>
</tbody>
</table>


ICT and ICT in Education Policy

Singapore has a national ICT policy. In 1991, the government developed the IT 2000 Plan, which defined five broad themes: developing Singapore into a global centre; improving the quality of life; boosting the economy; linking communities; education; and culture. The plan was to transform Singapore into a high-tech hub. The next policy was InfoComm21, one of the goals of which was to develop the country’s e-capital market. The goals of both policies have been achieved.\(^{175}\)

Singapore has implemented six national ICT master plans since the 1980s. Each master plan is for five years. The ICT in education master plans are strategies to maintain the country’s economic competitiveness and advantage via the development of human capital in schools and throughout the nation. Notably, although the first master plan (MP1) was politically driven, the focus has been on improving education through the use of ICT.\(^{176}\)

The First ICT Master Plan for Education (MP1: 1997–2002) had four overarching considerations, to:

- enhance linkages between each school and the world around it;
- generate innovative processes in education;
- enhance creative thinking, lifelong learning and social responsibility; and
- promote administrative and management excellence in the education system.

MP2 (2003–2008) focused on the pedagogical applications of ICT — in particular, engaging students in learning. MP2 encouraged the effective and pervasive use of ICT to enhance educational processes and structures. The four broad directions and goals of MP3 (2009–2014) are to:

- strengthen students’ competencies for self-directed learning;
- tailor learning experiences according to the way that each student learns best;
- encourage students to go deeper and advance their learning; ICT tools are leveraged to engage students in authentic and meaningful learning activities for deep learning; and

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\(^{174}\) http://countrymeters.info/en/Singapore

\(^{175}\) www1.american.edu/initeb/at1178a/national_policies.htm

\(^{176}\) www.ida.gov.sg
• enable students to learn anywhere, and make use of wireless and mobile technologies to extend learning beyond the physical confines of classroom and structured in-school curriculum time.

In 2006, the Infocomm Development Authority of Singapore’s iN2015 Steering Committee prepared the Intelligent Nation 2015 ten-year master plan.\textsuperscript{177} It devotes a complete chapter to education and learning, with the goal “to foster an engaging learning experience to meet the diverse needs of learners in Singapore, through the innovative use of infoComm.”\textsuperscript{178}

**National Initiatives on ICT in Education**

Between 1995 and 1997, the Ministry of Education initiated a series of pilot projects on the use of IT as a tool for teaching and learning. The three main projects were:

- **Accelerating IT in Primary Schools**, whereby computers were introduced as tools to enhance teaching and learning across the entire curriculum;
- **Student’s and Teacher’s Workbench**, in which the focus was on the development of a rich repository of multimedia resources for science learning; and
- **JCNet** projects for pre-university studies, which explored various Internet-based teaching and learning strategies for junior-college (JC) students.

Some specific initiatives are:

- **Integrated Virtual Learning Environment**:\textsuperscript{179} This is a web-based environment that provides a one-stop interface for teaching and learning within the National University of Singapore (NUS).
- **Nanyang Technological University Wireless Campus (NTU)**:\textsuperscript{180} The NTU campus is now able to provide wireless computing for students and staff, who can access Internet services via mobile devices such as WAP-enabled hand phones and personal digital assistants.
- **FutureSchools@Singapore**: This initiative was launched in 2007 as a key strategy of MP2, and subsequently MP3, to help a small number of schools become technology-enabled future schools (Kampylis et al., 2013).

**Key Agencies/Institutions and Ministries in TEL**

The Ministry of Education and the National Institute of Education have been creating technological, pedagogical and content-driven artefacts to enrich and transform classroom learning.

The key agencies are:

- Ministry of Education — the key driver of the ICT master plan;
- National Institute of Education, which provides initial teacher training; and
- Other institutes of higher education that collaborate with the Ministry of Education, including NTU and NUS.

The Ministry of Education has collaborated with the ICT industry to produce digital learning resources — for example, with Times Media Pte. Ltd. to produce the Active Primary Mathematics CD-ROM series.

\textsuperscript{177} http://unpan1.un.org/intradoc/groups/public/documents/unpan/unpan032993.pdf

\textsuperscript{178} www.ida.gov.sg/Tech-Scene-News/iN2015-Masterplan

\textsuperscript{179} www.cit.nus.edu.sg/ivle-course-management-system

\textsuperscript{180} www.ntu.edu.sg/cits/itnetworking/NTUwireless/Pages/default.aspx
Institutions Offering Courses Using Technology and Online Learning

- NTU\(^{181}\)
- NUS\(^{182}\)
- Singapore Management University\(^{183}\)

Institutional Policy for eLearning and TEL

Whilst no institutional policies on eLearning or TEL could be found through desktop research, institutional commitment to support education though the use of advanced technology is a common trend for educational institutions at all levels, especially those higher education institutions that have been using ICTs extensively. NTU in 2010 developed a five-year strategic blueprint that stated: “To prepare students for the 21st century workforce, NTU’s National Institute of Education, in partnership with the Ministry of Education, will laterally translate new media research into teaching and learning pedagogies, in line with national efforts to transform the delivery of education.”\(^{184}\)

OER Policies and Repositories

The OER movement is not particularly visible in Singapore. NTU signed a partnership agreement with Coursera to offer massive open online courses (MOOCs), with the aim of showcasing to an international audience the high quality of education enjoyed by its students. Through Coursera, more people will be able to take the university’s courses.

NTU’s undergraduates are invited to sign up for the university’s MOOCs\(^{185}\) free of charge and, upon successful completion of the courses, to transfer the credits earned towards fulfilling the requirements of an NTU degree programme.\(^{186}\) The Coursera platform also serves as an important adjunct to the NUS course management system, IVLE.

The NIE Digital Repository\(^{187}\) aims to organise, preserve and facilitate the dissemination of the National Institute of Education’s publications and research output; most of the items are available on an open access basis.

Teacher Training in TEL

The Educational Technology Division (ETD) of the Ministry of Education has provided training on the pedagogical use of technology for teaching and learning. To reach out to more than 25,000 teachers, ETD implemented the training in three phases. In addition, a cascading approach was adopted by seconding trained teachers with relevant ICT skills to ETD as trainers. Using this approach, in three years, all the teachers went through at least 30 hours of core training.

A 2013 Ministry of Education source document\(^{188}\) indicates that there are 15,264 teachers in primary education, 15,486 in secondary education and 3,066 in higher education. Thus, there are 33,816 teachers in Singapore. To provide training in TEL to all teachers, including refresher programmes for those who have

\(^{181}\) [www.ntu.edu.sg/Pages/home.aspx](http://www.ntu.edu.sg/Pages/home.aspx)

\(^{182}\) [www.nus.edu.sg](http://www.nus.edu.sg)

\(^{183}\) [www.smu.edu.sg](http://www.smu.edu.sg)

\(^{184}\) [http://enewsletter.ntu.edu.sg/classact/Nov10/Pages/cn2a.aspx](http://enewsletter.ntu.edu.sg/classact/Nov10/Pages/cn2a.aspx)

\(^{185}\) [www.cit.nus.edu.sg/moocs](http://www.cit.nus.edu.sg/moocs)

\(^{186}\) [www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/MOOC.aspx](http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/MOOC.aspx)

\(^{187}\) [https://repository.nie.edu.sg](https://repository.nie.edu.sg)

already undergone training, Singapore has to train approximately 6,000 teachers annually over the next six years.

**Women and ICT**

Hafkin and Huyer (2007) have noted the dearth of gender-related statistics in ICT data collection; common gender-disaggregated data that are available relate to mobile phone penetration, access to personal computing devices, and Internet usage. Singapore figures as one of the top countries in the world in terms of women using the Internet (47 per cent).
Sri Lanka

Country Profile

A. Overview
The Democratic Socialist Republic of Sri Lanka is an island nation in South Asia. It shares maritime borders on the north-west with India and on the south-west with Maldives. Home to 20.98 million people in an area of 65,610 square kilometres, Sri Lanka is comprised of 50.7 per cent females and 49.3 per cent males. Rural areas contain 83.7 per cent of the population, with the remaining 16.3 per cent inhabiting urban areas. The literacy rate is 92 per cent.

B. IT Profile

<table>
<thead>
<tr>
<th>Fixed-telephone subscriptions (per 100 persons)</th>
<th>Mobile-cellular subscriptions (per 100 persons)</th>
<th>Active mobile-broadband subscriptions (%)</th>
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<th>Households with a computer (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.72</td>
<td>95.50</td>
<td>21.90</td>
<td>1.99</td>
<td>8.2*</td>
</tr>
</tbody>
</table>


ICT Policy

The Government of Sri Lanka first developed a national computer policy in 1983. Since then there have been many draft ICT policy documents. In 2001, the government drafted an ICT policy for the government sector, with the help of the Swedish International Development Agency. A committee was set up to enact a national policy on ICT in 2004, and 2009 was declared the year of ICT. The government’s long-term plan is to improve citizens’ quality of life by leveraging the use of ICT. The Information and Communication Technology Agency (ICTA) of Sri Lanka is the apex body for developing the country’s ICT sector. The agency’s aim is to use ICTs for economic and social advancement by ensuring the proliferation of ICT to every village in the country.

ICT in Education Policy

ICT was introduced in the Sri Lankan education system in 1994. The policy was reviewed in 2002 and realigned with the national policies related to ICT and telecommunications. The National Policy on Information Technology in School Education (NAPITSE) was enacted to impart ICT education to the younger generation and provide a global vision and direction to the nation’s education system. ICT policy implementation has occurred in three stages: 2002–3, 2004–5 and 2006–7.

The action plan focuses on the use of IT (i) for information literacy, (ii) as a tool in learning and teaching and (iii) in education systems management. It also aims at the effective involvement of the school system in the lifelong education of citizens, and it restructures the course model to meet the requirements of ICT.

189 http://countrymeters.info/en/Sri_Lanka
194 www.csdms.in/gesci/pdf/SRILANKA.pdf
National Initiatives on ICT in Education

Following NAPITSE, many ICT in education initiatives have been undertaken, including the following:

- **The National Online Distance Education Service (NODES)** is a national agency that co-ordinates the delivery of online distance education programmes. This is an initiative of the Ministry of Higher Education.195

- **The Sri Lanka Secondary Education Modernization Project (SEMP)** was funded by the ADB to support the government’s strategy for modernising the secondary school curriculum and teaching–learning methodologies. Under these initiatives, target schools were equipped with science laboratories, computer facilities and multimedia units.

- **The One Laptop Per Child (OLPC)** initiative ensures that all school-age children have access to their own personal laptops. The Ministry of Education piloted the OLPC programme with 1,300 laptops from the OLPC Foundation, funded by the World Bank.196

- **SchoolNet**197 is another effort of the Ministry of Education and the ADB to establish a wide area network connecting most of the secondary schools and related organisations, thereby giving teachers access to reference materials, tutorials and other educational programmes. Under its Nenasala Project, SchoolNet has established 590 rural telecentres, or “Nenasalas.” The Nenasala Community Development Task Force manages, conducts and supervises the centres.

- **The Distance Education Modernization Project (DEMP)**, funded by the ADB, is an initiative of the Ministry of Higher Education to increase citizens’ access to tertiary education through a technology-enhanced distance mode. DEMP has initiated the Open University of Sri Lanka Capacity Enhancement Programme (OUSL–CE) to modernise OUSL. The OUSL library maintains a vast database of books and e-journals. In 2006, the Virtual Resource Centre was established to provide online access to the library’s electronic information resources.

- **The e-BIT and Shilpa Sayura Project** is a full-fledged, interactive, online eLearning platform. The ICTA launched the Shilpa Sayura Project198 to create digital content on school curricula in Sinhalese and thereby help students prepare for national examinations in eight subjects, using telecentres.

- **The Intel Teach Program**199 was initiated in Sri Lanka in 2006 to strengthen teachers’ capacity for using technology in the teaching–learning process. The Intel Teach in-service programme is currently conducted in the country’s Western, Central, Uva and Sabaragamuwa provinces.

- **The Nenasa Education Television Telecast**200 is a distance learning program presented to school children by the Ministry of Education, offered through Dialog TV as a corporate social responsibility service from Dialog Axiata. Its objective is to disseminate the knowledge and experiences of outstanding teachers, not simply amongst children but also to the entire island community. There are two Nenasa channels, for grades 10 and 11. In after-school hours, other programmes are telecast.

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195 www.nodes.lk
196 http://wiki.laptop.org/go/OLPC_Sri_Lanka
197 www.schoolnet.lk
198 www.shilpasayura.org
Key Agencies/Institutions and Ministries in TEL

Below is the list of key agencies in TEL, with their website addresses in the footnotes:

- Ministry of Education\textsuperscript{201}
- Department of Examinations\textsuperscript{202}
- National Institute of Education\textsuperscript{203}
- University Grants Commission\textsuperscript{204}
- National Science and Technology Commission\textsuperscript{205}
- Information and Communication Technology Agency of Sri Lanka\textsuperscript{206}
- OUSL\textsuperscript{207}

Institutions Offering Courses Using Technology and Online Learning

The following institutions offer online courses:

- OUSL’s Faculty of Education, in partnership with COL, has launched capacity-building programmes.
- Under DEMP, several online programmes were initiated in 2003.
- Some state universities and professional associations as well as private- and public-sector education institutions offer a number of online degrees; amongst these are the University of Colombo and Rajarata University of Sri Lanka.

The EduLanka\textsuperscript{208} website provides more information on such courses and programmes in Sri Lanka.

OER Policies and Repositories

OUSL has framed institutional policies and strategies regarding the use of OER (Liyanagama & Vidanapathirana, 2012).

Three of the repositories are:

- **OUSL-OER**: A range of learning materials, videos and audio resources can be accessed through OUSL-OER\textsuperscript{209}
- **Lanka Education and Research Network (LEARN)**\textsuperscript{210}: The bandwidth of LEARN — a network connecting all state universities and research institutions in Sri Lanka — has been enhanced from 2 mbps to 10 mbps. The Massachusetts Institute of Technology’s Open CourseWare is linked to the LEARN network.

\textsuperscript{201} www.moe.gov.lk
\textsuperscript{202} www.doenets.lk
\textsuperscript{203} www.nie.lk
\textsuperscript{204} www.ugc.ac.lk
\textsuperscript{205} www.nastec.lk
\textsuperscript{206} www.icta.lk
\textsuperscript{207} www.ou.ac.lk/home
\textsuperscript{208} www.edulanka.lk/component/tag/studentlanka
\textsuperscript{209} http://oer.ou.ac.lk
\textsuperscript{210} www.ac.lk
• OUSL’s Digital Repository\(^{211}\) provides access to the work of the university’s staff and students, including articles, theses and learning objects in English and Sinhalese. The interface is in English and contains RSS feeds to alert users to new content.

**Teacher Training in TEL**

Data on school teachers in Sri Lanka are for the most part out-dated. As of the most recent available years, there were 60,832 teachers in primary education (1997),\(^ {212}\) 103,572 in secondary education (1995)\(^ {213}\) and 5,439 in higher education (2013).\(^ {214}\) Thus, there are an estimated 0.20 million teachers in Sri Lanka. To provide training in TEL to all teachers within six years, Sri Lanka has to train approximately 28,500 teachers every year.

**Women and ICT**

ICT policies and programmes in Sri Lanka are inclusive, without any gender bias; programmes are open to both women and men. However, women’s participation in ICT programmes does not match men’s. Sri Lanka ranks 20\(^{th}\) in the world in terms of the labour force participation gender gap, despite its success in several other development indicators.\(^ {215}\)

Jayaweera, Sanmugam and Wanasundara (2006) submitted a comprehensive report on *Information and Communication Technologies and Gender in Sri Lanka*. The study concluded, “The gender audit of leading institutions and the information that surfaced from the survey of training and employment establishments indicated that disparities had been reinforced rather than reduced as a consequence of lack of awareness of the need to be pro-active in promoting gender equality.” This is a significant challenge to the country’s goals to achieve growth and equity. However, Sri Lanka has taken note of the gender gap. Civil society organisations and governments are developing programmes and advocacy for women’s participation in ICT education and professions. The Higher Education for the 21\(^{st}\) Century Project\(^ {216}\) offers opportunities for ICT skills training to both men and women.

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\(^{211}\) [http://digital.lib.ou.ac.lk/docs](http://digital.lib.ou.ac.lk/docs)

\(^{212}\) [www.unesco.org/education/wef/countryreports/sri_lanka/rapport_2.html](http://www.unesco.org/education/wef/countryreports/sri_lanka/rapport_2.html)

\(^{213}\) [www.indexmundi.com/facts/sri-lanka/secondary-education](http://www.indexmundi.com/facts/sri-lanka/secondary-education)


\(^{216}\) [www.hetc.lk](http://www.hetc.lk)
CHAPTER 4
SUMMARY OF FINDINGS

Technology-enabled learning is gaining momentum all over the world, including in the eight Asian Commonwealth countries, for a variety of reasons. TEL provides access to best of the education programmes offered by some of the world’s most reputable universities and institutions. In addition, learners can tailor and personalise the educational experience according to their personal needs and choices. However, it must be noted that with the massive changes that continue to occur in ICT, TEL is assuming new meanings. Computer-aided classroom-based learning is largely being replaced or upgraded by seamless online learning via MOOCs, OER and repositories.

As the TEL movement has been gaining momentum, COL commissioned this baseline study to assess the current status of TEL in the eight Asian Commonwealth countries. COL carefully specified the parameters of the baseline in the study’s Terms of Reference (see Appendix 1).

This baseline study documented:

- IT profiles of the countries, along with general country profiles;
- ICT and ICT in education policies;
- national initiatives in TEL, including the agencies and donors supporting such initiatives;
- technology-enabled and online courses;
- OER policies and educational repositories;
- the numbers of students in ICT and media-related courses;
- women and ICT in education; and
- teacher education in TEL.

The findings should help COL with designing development intervention in TEL during the next six-year period. The study has special significance because these eight countries, with 1.69 billion people, are home to 75 per cent of the Commonwealth. Hence, for the Commonwealth’s collective growth, these countries need special attention and impetus. As the study has indicated, the eight countries encompass wide disparities in terms of population, land mass, basic education, ICT profile and TEL status.

Bangladesh, India, Pakistan and Sri Lanka host 98 per cent of the population of the eight Asian Commonwealth countries. Wide variation is evident in the various development indicators for these four. Brunei and Singapore are closer to developed countries on many development indicators. Literacy in the eight countries ranges from a low of 55 per cent (Pakistan) to a high of 99 per cent (Maldives). Despite India’s impressive achievement in literacy (74 per cent), her 26 per cent who are illiterate outweigh, in number, those in the seven other countries put together. With the exception of Pakistan (72 per cent), the NER — another indicator of basic education — is at 90 or higher, and Maldives, Singapore and Sri Lanka have achieved 100 per cent.

Table 1 shows the divergence amongst the countries in terms of ICT access. The biggest challenge for TEL is Internet connectivity. Internet usage rates in the eight Asian Commonwealth countries range from a low of 6.50 per 100 persons for Bangladesh to a high of 66.97 for Malaysia. With the development of mobile phones and their extensive reach, especially amongst young people, the hardware issue is relatively settled. India, the largest country in this region, provides an excellent example. There are 9.5 PCs per 100 people in India, but 77.58 mobile phone users per 100. However, only 15.1 of 100 Indians have Internet connectivity — more than have access to PCs but far fewer than have access to mobile phones. Subject to the availability of Internet connectivity, the mobile users (77.58 per cent of the population) could have access to OER repositories and online courses. This is equally true for the other seven countries, although the implications are largest for the four most populated countries.
Table 1. ICT Profiles of the Eight Asian Commonwealth Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Fixed-telephone subscriptions (per 100 persons)</th>
<th>Mobile-cellular subscriptions (per 100 persons)</th>
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<th>Fixed (wired)-broadband subscriptions (per 100 persons)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>0.69</td>
<td>74.43</td>
<td>6.50</td>
<td>0.97</td>
<td>3.9</td>
</tr>
<tr>
<td>Brunei</td>
<td>13.58</td>
<td>112.21</td>
<td>64.50</td>
<td>5.71</td>
<td>50.8*</td>
</tr>
<tr>
<td>India</td>
<td>2.32</td>
<td>70.78</td>
<td>15.10</td>
<td>1.16</td>
<td>9.5</td>
</tr>
<tr>
<td>Malaysia</td>
<td>15.26</td>
<td>144.69</td>
<td>66.97</td>
<td>8.22</td>
<td>65.1</td>
</tr>
<tr>
<td>Maldives</td>
<td>6.54</td>
<td>181.19</td>
<td>44.10</td>
<td>5.84</td>
<td>59.5</td>
</tr>
<tr>
<td>Pakistan</td>
<td>3.50</td>
<td>70.13</td>
<td>10.90</td>
<td>0.61</td>
<td>3.5**</td>
</tr>
<tr>
<td>Singapore</td>
<td>36.35</td>
<td>155.92</td>
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<td>8.2***</td>
</tr>
</tbody>
</table>


Note: Wherever the data were not available from ITU sources, they accessed from other sources, as listed below.
** https://groups.google.com/d/topic/telecom-grid-pakistan/rgzONKD2slw (Pakistan PC/100 persons).
*** https://books.google.co.in/books?isbn=8132100840 (Sri Lanka PC/100 households).

ICT and ICT in Education Policies

All eight countries either have adopted an ICT policy or have accommodated ICT policy in their respective national development plans or master plans. The ICT policies focus on improving people’s standard of life, including through outreach and boosting education quality. India and Singapore have gone steps further to include international agendas such as “creating a global hub” (Singapore) or fostering “international business” for revenue generation (India). Education has been a major consideration in the ICT policies in all these countries. The development of ICT skills has been recognised as necessary for economic growth. ICT skill development, in turn, belongs to the education domain.

All eight countries have ICT in education policies, which have followed national ICT policies. As mentioned above, in some countries the ICT in education policies have been built within ICT master plans or national development plans. All ICT in education policies focus on capacity building within the education system.

The most interesting finding was the time-disconnect between the ICT policies and the developments in ICT in education in the different countries. Sri Lanka introduced computers to schools in 1994, whereas the national ICT in education policy was enacted in 2004 — a ten-year gap. The Indian timeline is also curious. Audio-visual aids in education date back to the mid-1930s, educational television to the early 1970s; computers were introduced to schools in 1984, but the ICT in school education policy dates to 2012 — 28 years later. To date (2015), India has no ICT in higher education policy. Trend analysis of ICT in education in these eight countries does indicate certain commonalities. ICT policy trails ICT initiatives and activities. ICT policies have not led to developments in ICT in education. Further, there is no
evidence that ICT policy has made any difference in terms of changing the actual approaches to TEL or ICT in education, even after the adoption of the policies.

There is a paradigm shift in our understanding of ICT in education, as it moves from offline computing to online information exchange. The emphasis in the new age of ICT in education is on online transactions, and those depend upon Internet connectivity with adequate bandwidth. In the late 1990s, the USA, the UK, Canada and Australia appointed commissions to explore the “Power of the Internet for Learning.” The USA’s Web-Based Education Commission\textsuperscript{217} recommended making eLearning “a centerpiece of the nation’s education policy.” However, in the ICT in education policy documents of the eight Asian Commonwealth countries, Internet connectivity is either missing or receives inadequate mention. Their relatively low Internet user profiles have not been seen as points of serious concern. Hence, the issue of Internet connectivity must be brought to the fore.

For ICT in education policies to succeed, the political will of the countries’ governments must be expressed through strategic plans of action and the provision of adequate financial resources to implement such plans.

**Major Initiatives**

In all eight countries, the thrust of the interventions has been towards ICT infrastructure development, especially access to computing devices. Accessibility continues to be an issue in Bangladesh, India, Pakistan and Sri Lanka. Despite many policy pronouncements and initiatives, universal access to computers and other ICT devices is still a distant dream in these countries, which lag behind the small four on Internet usage as well as access to mobile phones and PCs.

A second major initiative is ICT skills training for youth. This was pioneered by private entrepreneurs, whereas education is largely state sponsored. ICT skills training for teachers, principals and other educational personnel in state-sponsored education has remained low-key. In addition, ICT skills training has not been given an appropriate place in pre-service and in-service teacher training, or the in-service management training of institutional heads. There is no management information system or authentic source of data whereby to estimate the percentage of teachers needing to be trained in appropriate ICT skills. Plus, the discourse on ICT skills training for teachers is restricted to primary and secondary school education; higher and professional education are not being considered.

The most significant issue is the content of the skills training for TEL that teachers receive. Teachers are trained in the same set of skills (e.g., Microsoft Office) as other young people are. Yet, there is a need to define a skill set relevant for teachers – and a meaningful curriculum for teacher training in TEL has yet to be developed. ETMA created an innovative template for in-service training on ICT in education, comprising: (i) accessing OER for textual content, still visuals and video; (ii) content generation by teachers; (iii) ICT-integrated blended learning designs; and (iv) Web 2.0 and social networking for education, suited to teachers’ role specifications. Brunei’s pilot project to train teachers in using eLearning for developing innovative, multimedia learning materials in classrooms is worth examining.

Digital content is one of the prime requirements in non-connected classrooms. Digital content currently available in the market does not provide complete coverage of curricular requirements, and the quality is suspect. More importantly, the lack of a relevant classroom infrastructure keeps digital content away from classrooms. Content generation by teachers that can substantially change their resistance to ICT in education has been successfully tried out, but only at the experimental level. Sri Lanka’s Shilpa Sayura Project, aimed at content generation, deserves in-depth study.

\textsuperscript{217} The final report of the Web-Based Education Commission (WBEC) was published on 19 December 2000; see www2.ed.gov/offices/AC/WBEC/FinalReport/index.html.
Online Education

Online education is picking up in higher and professional education, especially for cross-border delivery. It has yet to gain momentum in school education — for either students or teachers. A study conducted by CEMCA in 2013 indicated that whilst there are over 80 online programmes available in almost all disciplines of knowledge, blended learning is preferred in Asian Commonwealth countries (Pu list, 2013). This report also gives a comprehensive overview of online learning in the Asian Commonwealth, covering institutional practices.

OER and Repositories

Seven out of the eight countries (the exception being Brunei) have developed repositories. Malaysia and India have the most comprehensive repositories, covering school, higher and professional education. Not all of the repositories are OER, as some do not use open licences. Digital libraries and library networks are other important learning resources. India’s DELNET connects 5,223 libraries in five countries within South Asia and contains 2.04 million records. This library connectivity needs to be expanded to cover all major libraries in the eight Asian Commonwealth countries.

Although repositories have been set up and are enriched regularly, there is no measure to gauge their rate of utilisation or their impact on learning outcomes. Also, whilst OER repositories are free for users, they cannot be developed without incurring costs. Hence, periodic evaluation of the utilisation of repositories is necessary and recommended. CEMCA has also developed quality assurance guidelines for OER, which may help repositories assess the quality of the learning materials they are making available.

Agencies

ICT initiatives in education are spearheaded by multiple organisations in different countries. In Bangladesh, the major initiatives are through NGOs, especially large NGOs — such as the Bangladesh Rural Advancement Committee — which have a nationwide footprint. Indian initiatives are largely conducted by private enterprises working in collaboration with governments. Pakistan’s national initiatives are governmental, backed by a large number of external donors (including the ADB, the World Bank and UNESCO).

The UN as well as bilateral and multilateral agencies are supporting ICT in education through grants and donations. Except in the small countries, such contributions are often marginal compared to the total spending on ICT in education. However, donor interventions catalyse the process of ICT integration into education. Such agencies also have access to much larger pools of technical expertise than are generally available within an individual country.

The studied countries exhibit three models in terms of who plays the dominant role in ICT in education: governmental initiatives (Pakistan, Sri Lanka), NGO initiatives (Bangladesh) and private-sector initiatives (India). Whilst none of these models is exclusive, in-depth studies of all three may unveil certain best practices and lead to a management model for ICT in education.

Women, Students and Teacher Training in TEL

All ICT policies and initiatives are inclusive, providing equal opportunities for men and women. However, there is wide gender disparity in ICT use and ICT leadership. This disparity is largely due to the differential rate of female and male participation in education generally and technical and engineering education — including ICT-related courses — specifically. Several scholarly studies have also pointed to role stereotyping as a major factor in women’s lower rate of participation in ICT activities.

http://oasiscol.org/handle/11599/562
There are no disaggregated data for any of the eight countries on how many students are enrolled in ICT and media-related courses. Few countries have disaggregated data on enrolment in engineering and technical education programmes in which students pursue computer and software engineering courses, or enrolment in undergraduate and post-graduate programmes in computer applications. However, young students are increasingly recognising ICT proficiency as a life skill; so, very large numbers of them take short courses from a variety of institutions and training outfits.

Teacher training in these countries generally implies the pre-service education of school teachers and the in-service education of school and higher education teachers. ICT skills do not figure significantly in either pre-service or in-service education. TEL, the way it is meant today — online education, MOOCs, OER — does not figure in the teacher training curriculum. Hence, teachers must be trained in TEL. On the basis of the data available on teachers, about 2.3 million across the Asian Commonwealth need to receive training in TEL.

**A Few Major Issues**

**Policy Framework:** Although all eight Asian Commonwealth countries have adopted, to a greater or lesser degree, ICT policies as well as ICT in education policies, these vary widely. ICT policies need to be reoriented to include TEL. It would be useful to develop a fresh ICT in Education Policy Toolkit to support these countries.

**Global Standards for ICT Skill Training:** ICT skill training takes different shapes in different countries, and even in different training institutions within the same country. Setting up certain common requirements would standardise ICT skills in education and add value for inter-country mobility. The European Computer Driving Licence Foundation’s certification programmes and Microsoft’s skill certification programmes are examples of companies setting global standards in ICT skills training. There is a need to develop a template for teacher training in TEL — both pre-service and in-service. Such a template should be built on teachers’ professional roles in schools, colleges and universities, and the potential application of ICT, especially in teaching-learning and student assessment systems.

**Head Start Programmes:** Although ICT is inclusive, and ICT policies and plans do not discriminate on the basis of gender or socio-economic classes, disparities are visible. Hence, there is a need to create special provisions to make inclusion functional for girls/women and member of deprived classes. Further, the argument in favour of positive discrimination for women and deprived classes should be extended to women teachers and women leaders in education. All of these countries have a wide digital divide between senior and junior teachers: junior teachers are more ICT savvy. But senior teachers cannot be left behind; they need to be rigorously involved in educational transformation through ICT integration in education. Policies, plans and programmes need to be specially devised to address senior teachers.

**OER and Repositories:** As mentioned earlier, repositories have been developed in all of the studied countries except Brunei. Such repositories contain resources on various subjects. As cross-border delivery becomes increasingly common, and learners tend to choose courses and programmes from across the globe, it would be advisable to work on and develop a professional architecture for repositories to help facilitate the cross-country transferability of educational resources. Furthermore, setting up a consortium of repositories across these countries needs to be considered. This would further the aims of “learning together” and “growing together.” However, national policies on OER are missing, apart from the open licensing policy for the NMEICT projects in India. Very few open universities in the Asian Commonwealth have adopted institutional OER policies.

**Management Information System:** Information on ICT in education is strewn all over the Internet. However, there is no source of consolidated information on ICT in education, even at the country level. Developing a management information system that covers online courses and curriculum experts on ICT in education across these countries and beyond is specially recommended. Similarly, there is a need for a management information system on ICT and media-related courses. Intake capacity in such courses will add to the functionality of the ICT in education movement.
**Internet for Learning**: The final but arguably most important issue is Internet access, including connectivity and bandwidth. TEL is comprised largely of online education, eLearning, online consultation and discourses, and the like. Given this scenario, the mainstay of TEL is the Internet. Exercises on exploring the power of the Internet for learning, and on creating a policy around the issue, need to be taken up in the eight Asian Commonwealth countries, especially Bangladesh, India, Pakistan and Sri Lanka. The issue of Internet connectivity should take into consideration bandwidth. This will form the backbone for exchanging data, visuals and other resources.

**Conclusion**

The study has brought into sharp focus the differential concerns, policies, initiatives and implementation strategies with respect to ICT in education in the eight Asian Commonwealth countries. The region displays wide disparities, not only in TEL development but also in planning and management practices around ICT integration in education. The dearth of development in the highly populated countries is of special concern. This baseline study should inform the strategic planning of TEL in the eight Asian Commonwealth countries for the next six years.
REFERENCES


Appendix 1
Terms of Reference

The Commonwealth of Learning (COL) seeks to engage Educational Technology Management Academy (the Consultant) to undertake a desktop study on the review of available documents on the Web and through online/email surveys of stakeholders, for developing a baseline study report for COL in the area of technology-enabled learning in the Commonwealth countries of the Asian region, covering Bangladesh, Brunei Darussalam, India, Malaysia, Maldives, Pakistan, Singapore and Sri Lanka.

Statement of Work

1.1. The Consultant shall be responsible to:

1.1.1. Prepare a baseline study report on technology-enabled learning in the Commonwealth countries of the Asian region, covering:
  1.1.1.1. Country-wide status of ICT in education, including the availability of policies related to information and communication technologies (ICT), ICT in education, open educational resources (OER), etc.
  1.1.1.2. National priorities and initiatives on ICT in education, including the presence of major donors and their activities in the area of technology-enabled learning;
  1.1.1.3. Identification of key agencies/institutions and ministries involved in technology-enabled learning;
  1.1.1.4. Identification of institutions offering courses using technology (especially online learning), and the availability of institutional policy for eLearning/technology-enabled learning
  1.1.1.5. Availability of OER repositories in different subjects, and the identification of gaps in the topics/subjects related to media and ICT skill development;
  1.1.1.6. Estimates of the approximate number of teachers to be trained in the next six years in the area of technology-enabled learning in each of the countries;
  1.1.1.7. Estimates of the approximate number of students studying ICT and media-related courses in each of the countries;

1.1.2. Critically examine the data gathered to prepare the country-wide reports and present consolidated tables as appendices;

1.1.3. Provide links to all policy documents and sources identified and reported in the report;

1.1.4. Prepare the report using the indicative outline given in Annex-1, in about 50 pages, excluding appendices, and use APA 6th edition reference style; and

1.1.5. Provide periodic updates to COL on a regular basis over the term of the contract on the status of the activities undertaken, upcoming schedules and any issues or problems encountered.

The report has become bigger than expected due to the volume of information available on the subject matter; it was important to cover the available information to give a relatively complete picture.
### Appendix 2

**Summary of TEL in the Asian Commonwealth**

<table>
<thead>
<tr>
<th>Country</th>
<th>Bangladesh</th>
<th>Brunei Darussalam</th>
<th>India</th>
<th>Malaysia</th>
<th>Maldives</th>
<th>Pakistan</th>
<th>Singapore</th>
<th>Sri Lanka</th>
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</thead>
<tbody>
<tr>
<td>ICT policy?</td>
<td>Yes 2002&lt;sup&gt;219&lt;/sup&gt; 2015&lt;sup&gt;220&lt;/sup&gt;</td>
<td>In process&lt;sup&gt;221&lt;/sup&gt;</td>
<td>Yes 2012&lt;sup&gt;222&lt;/sup&gt;</td>
<td>Yes 1996&lt;sup&gt;223&lt;/sup&gt;</td>
<td>No. Built into the national development plan.</td>
<td>Yes 2012&lt;sup&gt;224&lt;/sup&gt;</td>
<td>Yes 2006&lt;sup&gt;225&lt;/sup&gt;</td>
<td>Yes 2003 act&lt;sup&gt;226&lt;/sup&gt;</td>
</tr>
<tr>
<td>If yes, see link(s) to source(s).</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ICT in education policy?</td>
<td>No. ICT in education master plan drafted in 2010. See the A2i programme.</td>
<td>Yes&lt;sup&gt;228&lt;/sup&gt;</td>
<td>Yes, at the school level 2012&lt;sup&gt;229&lt;/sup&gt;</td>
<td>Yes 2010&lt;sup&gt;230&lt;/sup&gt;</td>
<td>No. Built into the national development plan.</td>
<td>Yes 2007&lt;sup&gt;231&lt;/sup&gt;</td>
<td>Yes Master Plan 3 (2009)&lt;sup&gt;232&lt;/sup&gt; Presentation on master plans&lt;sup&gt;233&lt;/sup&gt;</td>
<td>Yes National Policy on Information Technology in School Education</td>
</tr>
<tr>
<td>If yes, see link(s) to source(s).</td>
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<sup>228</sup> [www.ibe.unesco.org/curricula/brunei/bx_alfw_2008_eng.pdf](http://www.ibe.unesco.org/curricula/brunei/bx_alfw_2008_eng.pdf)


<table>
<thead>
<tr>
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<th>Singapore</th>
<th>Sri Lanka</th>
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</thead>
<tbody>
<tr>
<td><strong>Year of ICT in education policy. Is revision due?</strong></td>
<td>Master plan 2010 Yes</td>
<td>2010 Yes</td>
<td>2012 No</td>
<td>2010 Yes</td>
<td>N/A</td>
<td>2004–5 Yes</td>
<td>2015 Master Plan 4 in progress</td>
<td>2006–7 Yes</td>
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<tr>
<td><strong>ICT in education policy covers OER?</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>ICT in education policy covers gender issues?</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>National open licence policy available?</strong></td>
<td>No</td>
<td>No</td>
<td>Yes NMEICT(^{234})</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Open licence policy for projects/institutions?</strong></td>
<td>No</td>
<td>N/A</td>
<td>NIOS(^{235}) Krishna Kanta Handiqui State Open University VMOU</td>
<td>WOU (OER policy(^{236}) and open licence policy(^{237}))</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>OUSL</td>
</tr>
</tbody>
</table>

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\(^{234}\) [www.sakshat.ac.in/Document/OER_Policy.pdf](http://www.sakshat.ac.in/Document/OER_Policy.pdf)

\(^{235}\) [http://oer.nios.ac.in/wiki/index.php/NIOS_Copyright_Policy](http://oer.nios.ac.in/wiki/index.php/NIOS_Copyright_Policy)

\(^{236}\) [http://eprint.wou.edu.my/policies.html](http://eprint.wou.edu.my/policies.html)

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<thead>
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<th>Country</th>
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<tr>
<td>Major OER repositories?</td>
<td>N/A</td>
<td>N/A</td>
<td>NROER&lt;sup&gt;238&lt;/sup&gt;</td>
<td>WOU OER Repository&lt;sup&gt;242&lt;/sup&gt;</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>OUSL OER&lt;sup&gt;245&lt;/sup&gt;</td>
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<td></td>
<td>If yes, see the name and the link.</td>
<td></td>
<td>NPTEL&lt;sup&gt;239&lt;/sup&gt;</td>
<td>OUM-OER&lt;sup&gt;243&lt;/sup&gt;</td>
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<td></td>
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<td>NIOS&lt;sup&gt;240&lt;/sup&gt;</td>
<td>Universiti Teknologi Malaysia Open Courseware&lt;sup&gt;244&lt;/sup&gt;</td>
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<td></td>
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<td></td>
<td>Project OSCAR&lt;sup&gt;241&lt;/sup&gt;</td>
<td></td>
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<tr>
<td>Institutions offering online programmes</td>
<td>Bangladesh Open University Ahsanullah University of Science and Technology</td>
<td>Amity University BITS Medvarsity Note: India's University Grants Commission did not recognise any online programme</td>
<td>AeU OUM Universiti Tun Abdul Razak Multimedia University</td>
<td>MNU Centre for Open Learning</td>
<td>Aga Khan University Virtual University of Pakistan University of Peshawar Allama Iqbal Open University University of Nanyang Technological University National University of Singapore Singapore Management University</td>
<td>OUSL University of Colombo</td>
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<sup>238</sup> [http://nroer.in/home](http://nroer.in/home)
<sup>239</sup> [http://nptel.ac.in](http://nptel.ac.in)
<sup>240</sup> [http://oer.nios.ac.in/wiki/index.php/Main_Page](http://oer.nios.ac.in/wiki/index.php/Main_Page)
<sup>241</sup> [http://oscar.iitb.ac.in/oscarHome.do](http://oscar.iitb.ac.in/oscarHome.do)
<sup>242</sup> [http://eprint.wou.edu.my](http://eprint.wou.edu.my)
<sup>243</sup> [http://oer.oum.edu.my](http://oer.oum.edu.my)
<sup>244</sup> [http://ocw.utm.my](http://ocw.utm.my)
<sup>245</sup> [http://oer.ou.ac.lk](http://oer.ou.ac.lk)
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<th>Pakistan</th>
<th>Singapore</th>
<th>Sri Lanka</th>
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</thead>
<tbody>
<tr>
<td><strong>Institutions with policy on eLearning and/or TEL?</strong></td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
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<td><strong>Key national priorities or initiatives in ICT in education</strong></td>
<td>TQI-SEP&lt;sup&gt;247&lt;/sup&gt; Village Computer and Internet Project&lt;sup&gt;248&lt;/sup&gt; A2i programme&lt;sup&gt;249&lt;/sup&gt;</td>
<td>N/A</td>
<td>National Knowledge Network&lt;sup&gt;250&lt;/sup&gt; NMEICT&lt;sup&gt;251&lt;/sup&gt; vLabs&lt;sup&gt;252&lt;/sup&gt;</td>
<td>Malaysia MOOCs&lt;sup&gt;253&lt;/sup&gt; Teaching of Maths and Science in English (PPSMI)&lt;sup&gt;254&lt;/sup&gt;</td>
<td>VUSSC Maldives Teacher Resource website&lt;sup&gt;255&lt;/sup&gt;</td>
<td>iLearn Pakistan&lt;sup&gt;256&lt;/sup&gt; Virtual University of Pakistan</td>
<td>FutureSchools@Singapore&lt;sup&gt;257&lt;/sup&gt;</td>
<td>SchoolNet&lt;sup&gt;258&lt;/sup&gt; NODES&lt;sup&gt;259&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

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<sup>246</sup> www.ugc.ac.in/pdfnews/9647667_notice-DEB.pdf  
<sup>247</sup> www.moedu.gov.bd/old/moe_dehe_TQISEP.htm  
<sup>248</sup> www.grameencommunications.org  
<sup>249</sup> http://a2i.pmo.gov.bd/content/multimedia-class-room  
<sup>250</sup> www.nkn.in  
<sup>251</sup> www.sakshat.ac.in  
<sup>252</sup> http://vlab.co.in  
<sup>253</sup> www.openlearning.com/malaysiamoocs  
<sup>254</sup> https://ppsmi.wordpress.com/tag/ppsmi  
<sup>255</sup> www.edoonline.edu.mv  
<sup>256</sup> www.ilearnpakistan.org  
<sup>257</sup> www.ida.gov.sg/Programmes-Partnership/Store/EdVantage-FutureSchools-Singapore  
<sup>258</sup> www.schoolnet.lk  
<sup>259</sup> www.nodes.lk
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<th>Singapore</th>
<th>Sri Lanka</th>
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<tbody>
<tr>
<td><strong>Institutions</strong></td>
<td>Ministry of Education Bangladesh Telecommunications Company Limited</td>
<td>Development Ministry of Communications and Information Technology Council</td>
<td>Information Technology</td>
<td>Information Technology</td>
<td>Institute of Education</td>
<td>Science and Technology Information and Communication Technology Agency of Sri Lanka</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Estimated number of students enrolled annually in ICT and media-related courses</strong>*</td>
<td>6,000</td>
<td>600</td>
<td>57,000</td>
<td>Data not available</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Estimated number of teachers to be trained in TEL over the next six years</strong></td>
<td>47,000</td>
<td>2,500</td>
<td>1,890,000</td>
<td>78,000</td>
<td>1,250</td>
<td>250,000</td>
<td>6,000</td>
<td>28,500</td>
</tr>
</tbody>
</table>

**Notes:**
N/A = not applicable

* There are no direct sources of data; instead, these figures are extrapolated from data on student enrolment in higher education.

** Data are extrapolated from the number of teachers in the system, as there are no data on training in TEL.