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Internationally comparable statistics on Information and Communication Technology (ICT) in education: The role of the UNESCO Institute for Statistics (UIS)

Capacity Building Workshop on Information and Communication Technology in Education Statistics
Sao Paulo, Brazil, 17-18 November 2016

Martin Schaaper, UIS

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Outline

- UIS mandate
- Why measure ICT in education?
- What and how to measure ICT in education
- Data and outputs
- Moving forward

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- Founded in 1999 in Paris
- Relocated to Montreal in 2001
- Located at Université de Montréal
- Mandated to maintain international databases for:
  - Education
  - Science, technology and innovation
  - Culture
  - **Communication and information**

www.uis.unesco.org

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UIS mandate

- Collection and dissemination of cross-nationally comparable data
- Analysis of comparative data
- Development of international classifications/frameworks
- Technical capacity building within countries
- Advocacy for statistics in relation to UNESCO's areas of interest

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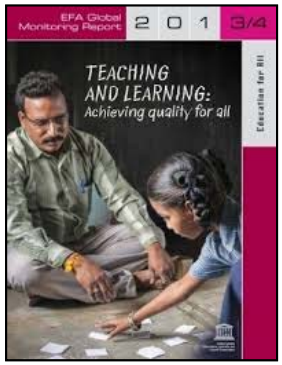
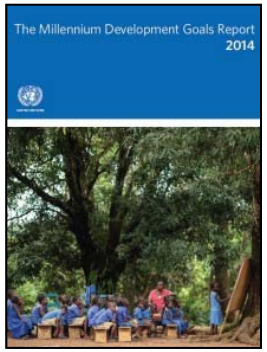
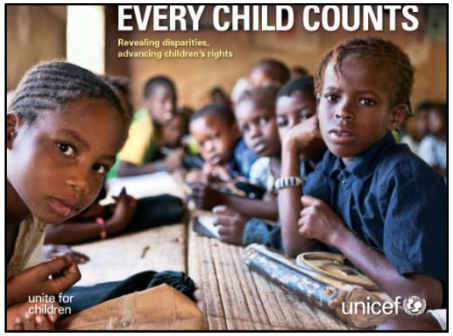
UIS data are widely used for:

- UIS publications
  - Thematic reports
  - Factsheets
  - Information notes
  - Technical papers
- UIS on-line data centre

  Over 1,000 types of indicators and raw data on education, literacy, science and technology, culture and communication from more than 200 Member States and international organizations
- Other international high-profile publications







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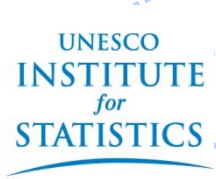
UIS data are used to measure key development issues



Human Development Index

Gender Inequality Index

Education for All

Knowledge Economy Index

ICT Development Index

Global Gender Gap

Global Innovation Index

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Why measure ICT in education?

- Support policy making for ICT in education
- International Commitments and Benchmarking:
  - WSIS (Geneva, 2003) Plan of Action
  - Millennium Development Goals (MDGs)
  - Education for All (EFA) goals
  - Sustainable Development Goals (SDGs) on education and other frameworks for monitoring education
- Regional and national commitments
- Demands from analytical community

Supporting countries in selecting priorities and designing policies

- Data on ICT in education can be used to:
  - Identify gaps in infrastructure (e.g. lack of computers, Internet, etc.) that need to be filled to introduce new paradigms of student learning and teaching as related to educational reform
  - Decide to extend ICT across curriculum leading to expanded skills acquisition, future employability, and lifelong learning
  - Inform decisions on introducing alternative technologies (e.g. radio, television) to ensure equity in education for marginalized remote populations where infrastructure is lacking and
  - Identify teacher training needs and gaps in knowledge and skills

Examples of policies and related indicators

- **Internet capacity:** Fixed broadband is key for enhancing the usage of online resources including open educational resources (OER).
  - **Related indicators: (i)** Proportions of schools with Internet **(ii)** proportions of schools with fixed broadband Internet **(iii)** proportions of schools with mobile broadband
- **Location of computers:** Increasingly educational planners are giving consideration to where computers are placed in schools.
  - **Related indicators: (i)** Proportions of schools with computers located in computer labs **(ii)** proportions of schools with classroom-based computers
- **Deployment levels:** How many computers are needed per pupil for effective learning? Does this differ between educational levels?
  - **Related indicators: (i)** Learner-to-computer ratio

Examples of policies and related indicators *(cont.)*

- **Older generation ICT:** Older forms of ICT are in use to reach remote areas, in particular where more advanced technology or supporting infrastructure are unavailable
  - **Related indicators: (i)** proportion of schools with radio/television for pedagogical purposes **(ii)** proportion of pupils enrolled in programmes with radio/television for pedagogical purposes
- **Building supporting infrastructure:** There is a lack of electricity and Internet connections in many schools precluding the use of ICT
  - **Related indicators: (i)** proportion of schools with electricity **(ii)** proportion of schools with fixed broadband Internet **(iii)** proportion of schools with mobile broadband Internet
- **Teacher training:** What kind of training do teachers need to take advantage of these resources? Teaching computer skills versus learning how to teach using ICTs
  - **Related indicators: (i)** Proportion of teachers trained to teach using ICT **(ii)** proportion trained to teach basic computer skills

International Commitments and Benchmarking (Pre-2015 context)

- Millennium Development Goals (MDGs) Target 8.F
  - "In cooperation with the private sector, make available the benefits of new technologies, especially information and communications"
- Education for All (EFA) goals
  - While not mentioned explicitly in the Education for All goals (EFA), it is argued they fulfill a pivotal role in their achievement including broadening access, eliminating exclusion, and improving quality in education
- Conclusion: ICT not represented adequately in the pre-2015 education monitoring framework

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World Summit on the Information Society (WSIS)

- Held in Geneva (2003) and Tunis (2005) to discuss a broad range of subjects related to ICT for development
- Governments agreed on a set of commitments and actions to foster the establishment of an inclusive information society
- WSIS: Main monitoring mechanism in the pre-2015 context for ICT in education
- In particular, ten targets were identified in the Geneva Plan of Action; two related to education

working together towards 2015

World Summit Geneva 2003 Tunis 2005
on the Information Society
Turning targets into action

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World Summit on the Information Society (WSIS)

- Target 2. **Connect all secondary schools and primary schools with ICTs**
  - 2.1 Proportion of schools with a radio used for educational purposes
  - 2.2 Proportion of schools with a television used for educational purposes
  - 2.3 Learners-to-computer ratio
  - 2.4 Proportion of schools with Internet access, by type of access
- All collected by UIS

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World Summit on the Information Society (WSIS)

- Target 7. **Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances**
  - 7.1 Proportion of ICT-qualified teachers in schools
  - 7.2 Proportion of teachers trained to teach subjects using ICT
  - 7.3 Proportion of schools with computer-assisted instruction (CAI)
  - 7.4 Proportion of schools with Internet-assisted instruction (IAI)
- All collected by UIS

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International Commitments and Benchmarking (Post-2015 context)

- Sustainable Development Goals (SDGs)
  - *Partnership on Measuring ICT for Development* provided a proposal for the inclusion of ICT indicators (WSIS Forum, 2016)
  - *UIS proposed ICT in education indicators for inclusion in:*
    - ✓ ***Goal 4**: Ensure inclusive and equitable quality education and promote life-long learning opportunities for all*
    - ✓ ***Goal 5**: Achieve gender equality and empower all women and girls; and*
    - ✓ ***Goal 9**: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*
- No SDG directly measuring ICT; however it is a cross- cutting theme

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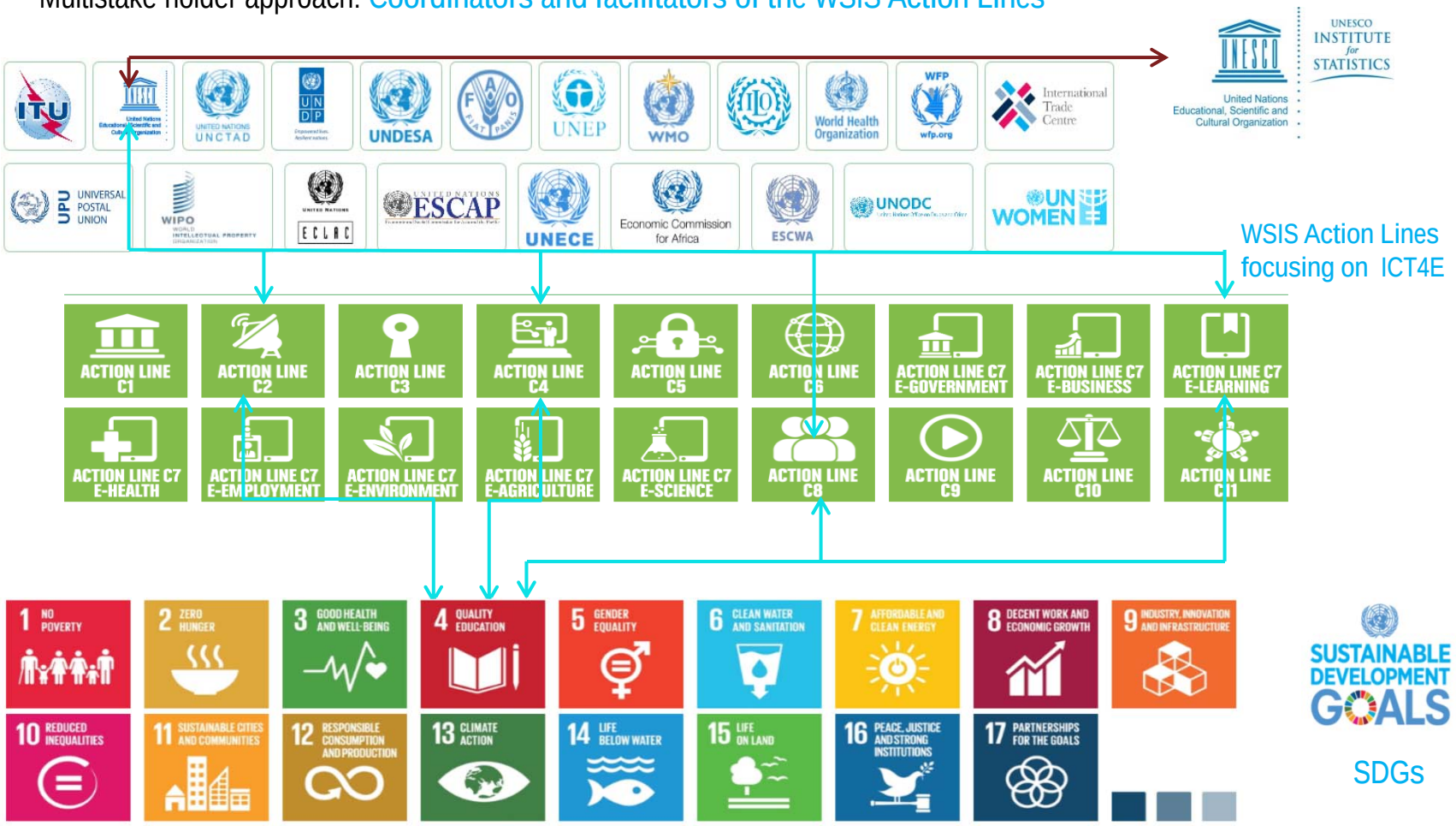
Linkages between WSIS Action Lines and Sustainable Development Goals (SDGs)

Multistake holder approach: Coordinators and facilitators of the WSIS Action Lines



SUSTAINABLE DEVELOPMENT GOALS

SDGs

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Endorsed SDG ICT in education indicators

- **Goal 4**: *Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*

  - ***Target 4a***: Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

    - ✓ **Indicator 4.a.1: Proportion of schools with access to: (a) electricity; (b) the Internet for pedagogical purposes; (c) computers for pedagogical purposes;** (d) adapted infrastructure and materials for students with disabilities; (e) basic drinking water; (f) single- sex basic sanitation facilities; and (g) basic handwashing facilities (as per the Water, Sanitation and Hygiene for All (WASH) indicator definitions)

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Additional potential indicators

- Other thematic indicators include:
  - Schools with broadband Internet
  - Pupil-computer ratios
  - Enrolment in programmes using computers and other ICTs
  - Enrolment in computer skills courses and computing
  - Enrolment/ graduation in ICT related fields (tertiary)
  - Teachers trained to use ICT to support effective teaching and learning

- Develop a better indicator for SDG 4.4
  - By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

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Qingdao Declaration

Item #16:

- *"We commit to developing comprehensive national monitoring and evaluation systems to generate sound evidence for policy formulation on the integration, use and impact of ICT in education…"*

Item #17:

- *"We further recommend that governments and other partners support* ***capacity development in data collection, analysis and reporting at the country, regional and global levels****."*
- *"We request UIS and other partners to support countries in* ***reinforcing and sustaining efforts to establish the appropriate national-level mechanisms and processes****."*
- *"We commit to continue to report* ***accurate and complete data*** *in a timely manner to the UIS, facilitating its mission to* ***build and maintain a global repository for ICT in education data****."*

Item #18:

- *"We recommend that the Global Education Monitoring Report, to be hosted and published by UNESCO, uses UIS core indicators on ICT in education to* ***provide regular global-level monitoring of ICT in education.***

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Regional commitments

Digital Agenda for Latin America and the Caribbean: eLAC 2018

V. Social inclusion and sustainable development

Objective 14: *Strengthen the institutional framework for ICT policies in education and promote the development of programmes that include* ***teacher training, new pedagogical models****, the* ***generation, adaptation and exchange of open educational resources, the management of educational institutions and educational evaluation****.*

UNITED NATIONS ECLAC

eLAC 2018

National commitments

- Uruguay: Plan *Ceibal* provides a free laptop to every child of school age and every school teacher in public schools. *Ceibal* also provides training to teachers, parents and the community at large on the use of computers. Internet access has been one of the main goals.

- Argentina: Plan *Conectar Igualdad* is specifically designed to improve educational equality and reduce Argentina's digital literacy gap. In addition to delivering PCs and other netbooks to secondary and vocational schools, teacher training institutes, and special education institutions across the country, the program provides much-needed infrastructure improvements, professional development for teachers, and new opportunities for economic growth.

- Chile: *Enlaces* is a comprehensive model that includes delivery of technological equipment, connectivity, digital educational content and teacher training to all schools and subsidized secondary schools in the country. One goal is to achieve a ratio of 10: 1 students per computer and 200,000 trained teachers. It includes a number of different programs.

- Brazil: The *PROINFO* programme began in 1996. By 2007 the programme had grown to include other objectives such as the provision of fixed broadband Internet access whereby encouraging the production of digital content. Other programmes also include the UCA Project and the Prouca programme.

- Mexico: *Mexico conectado* is a programme that deploys telecommunication networks that provide connectivity to sites and public spaces such as schools, health centers, libraries, community centers or parks in all three levels of government: federal, state and municipal.

What do we mean by ICT in education?

ICT IN EDUCATION refers to education models that employ ICT to support, enhance and enable the delivery of education. Any, all or combinations of the following types of ICTs are included.

UIS Technical Guide on ICT in education indicators

- Guide to Measuring ICTs in education, which covers core indicators as well as an extended list of 43 indicators comprising:
  - Political commitment
  - Curriculum
  - Infrastructure
  - Teaching staff and development
  - Participation, skills and output
  - Outcomes and impact

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Core ICT in education indicators

Adopted by the United Nations Statistical Commission (UNSC) through the Partnership on Measuring ICT for Development at its 40th session in February 2009

Indicator label	Indicators
ED1	Proportion of schools with a radio used for educational purposes (for ISCED level 1-3)
ED2	Proportion of schools with a TV used for educational purposes (for ISCED level 1-3)
ED3	Proportion of schools with a telephone communication facility (for ISCED level 1-3)
ED4	Learner-to-computer ratio in schools with CAI (for ISCED level 1-3)
ED4.bis	Learner-to-computer ratio (for ISCED level 1-3)
ED5	Proportion of schools with Internet access at school, by type (for ISCED level 1-3) • Fixed narrowband Internet access (using modem dial-up, ISDN) • Fixed broadband Internet access (DSL, cable, other fixed broadband) • Both fixed narrowband and broadband Internet access
ED6	Proportion of learners who have access to the Internet at school (for ISCED level 1-3)
ED7	Proportion of learners enrolled by gender at the post-secondary non-tertiary and tertiary level in ICT-related fields (for ISCED level 4 and level 5- 6)
ED8	Proportion of ICT-qualified teachers in primary and secondary schools (for ISCED level 1-3)
EDR1	Proportion of schools with electricity (for ISCED level 1-3) --- *Reference indicator*

UIS Partners for ICT in education statistics

- UNESCO Institute for Information Technologies in Education (IITE)
- Talal Abu-Ghazaleh (TAG.org) (Jordan)
  - ✓ Arab States
- Korea Education Research and Information Service (KERIS) (Republic of Korea)
  - ✓ Asia, Sub-Saharan Anglophone Africa
- Center of Studies on Information and Communication Technologies (Cetic.br), Brazilian Network Information Center (NIC.br) (Brazil)
  - ✓ Lusophone sub-Saharan Africa & Latin America and the Caribbean
- UNESCO Education and Communication & Information sectors
- Economic Commission for Latin America and the Caribbean (ECLAC)
- UNESCO Bangkok
- World Bank
- Intel Corporation
- Partnership on Measuring ICT for Development (ICT4D)

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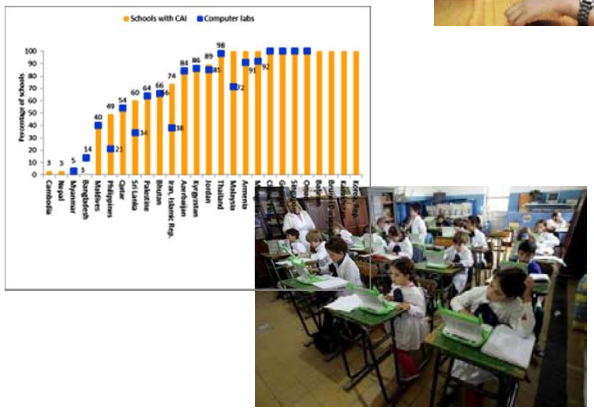
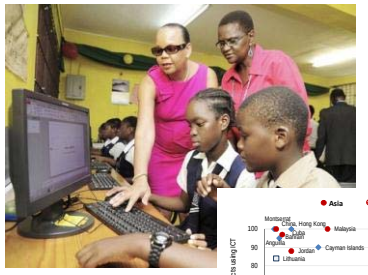
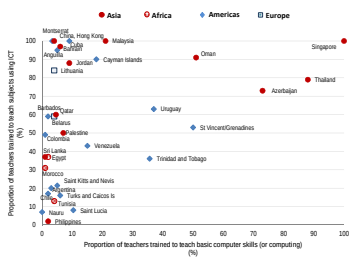
What data says about ICT in education?

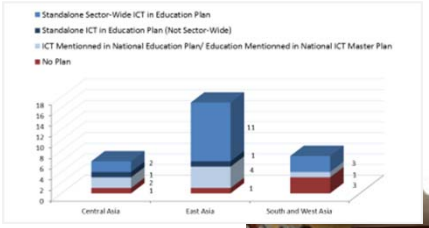
Previous results

Latin America and the Caribbean, Arab States, Asia, and sub-Saharan Africa









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Regional data collections/ Reports

- The UIS has conducted five previous regional data collections between 2010 and 2014 including:
  - Latin America and Caribbean (2010)/ 38 countries
  - Arab States (2011)/ 5 countries
  - Asia (Central, South and West, Eastern, Pacific) (2012)/ 32 countries
  - Sub-Saharan Africa (Francophone and Lusophone) (2013)/ 28 countries
  - Sub-Saharan Africa (Anglophone) (2014)/ 15 countries
- Reports are available online

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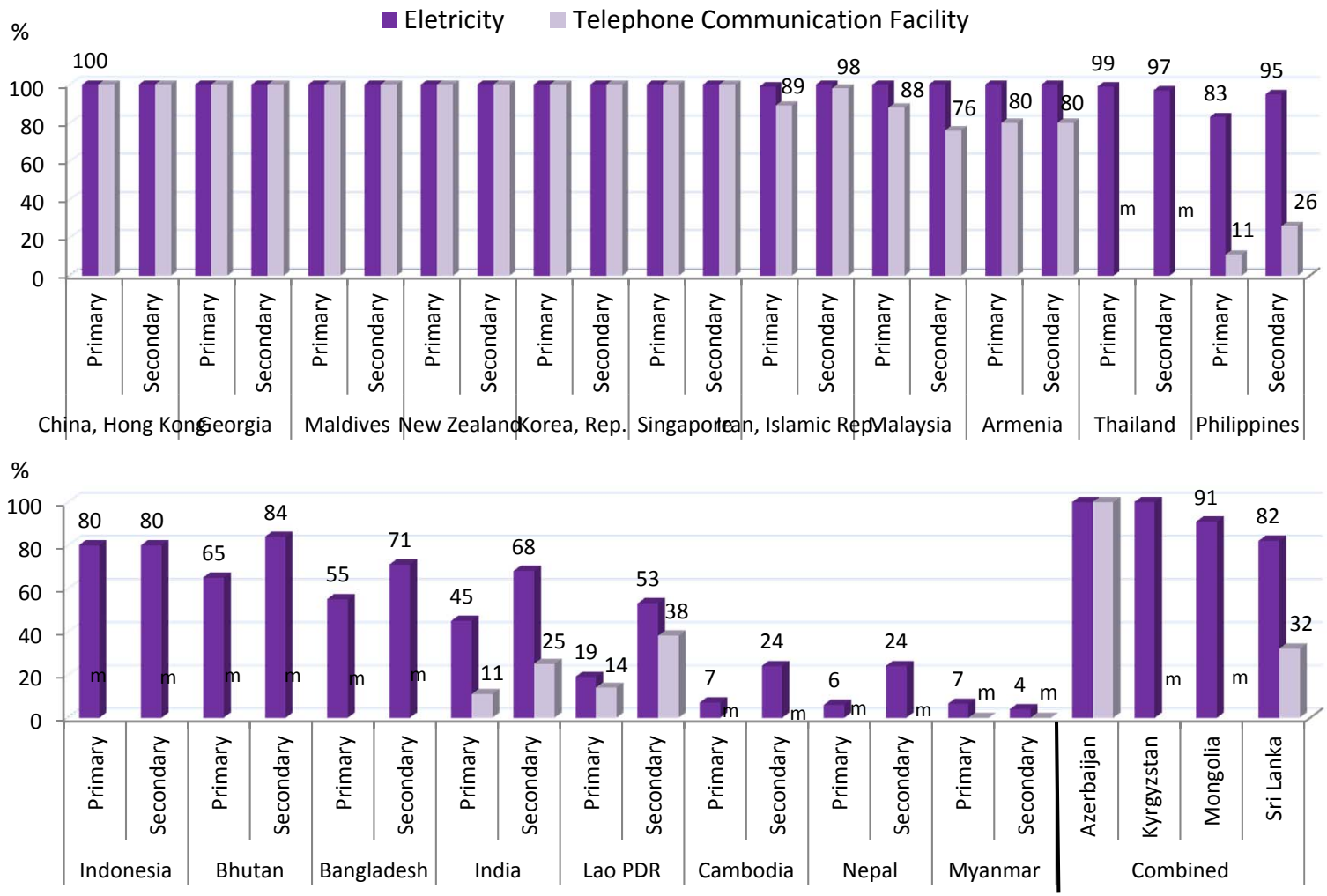
Electricity as a prerequisite for ICT in education

Proportion of schools with electricity and telephone communication facilities, 2012



Source: UIS database

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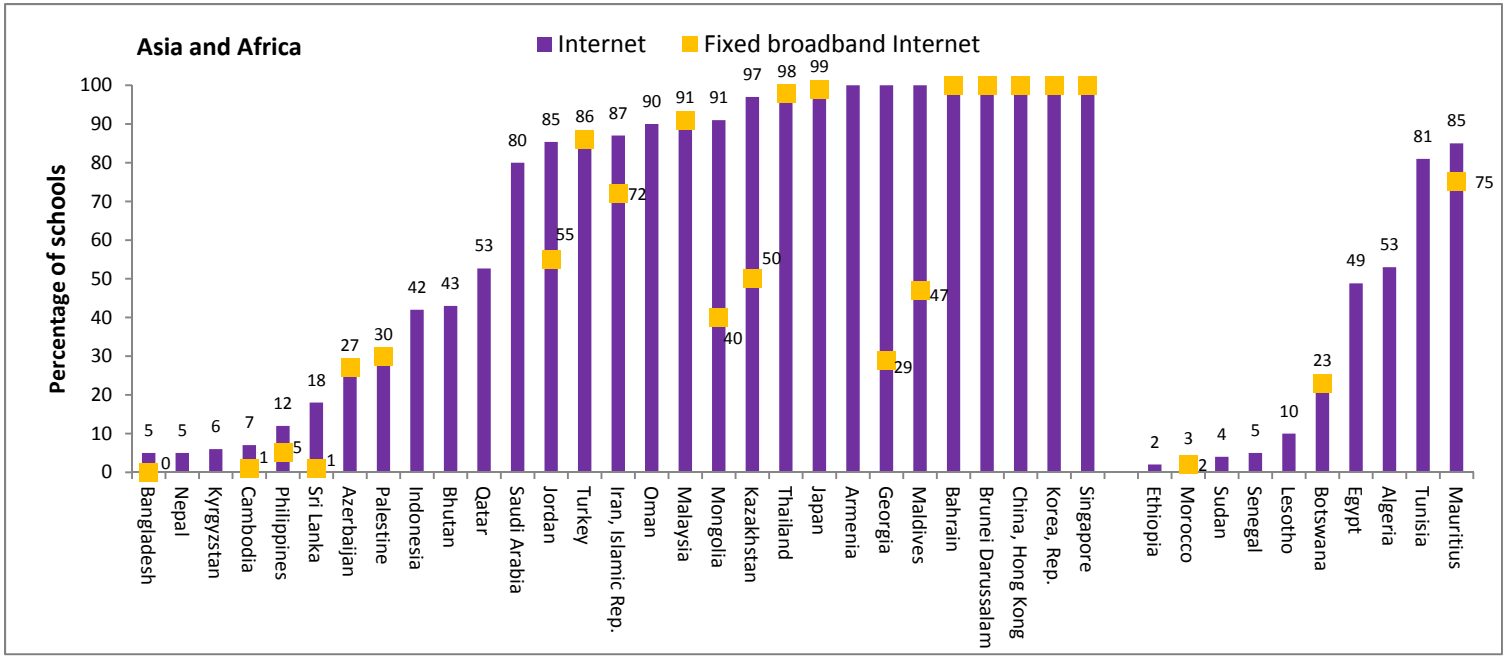
Proportion of educational institutions with Internet access, by type, (primary and secondary) 2012

- 100 per cent of schools have Internet (fixed broadband) in most high income East Asian, Caribbean, and European countries
- Internet connectivity is least common in low income and least developed countries (LDCs) in Asia and Africa
- Fixed broadband Internet varies from all to less than 50% of all Internet connections
- Some evidence of a leapfrogging phenomenon in some LDCs



Source: UIS database

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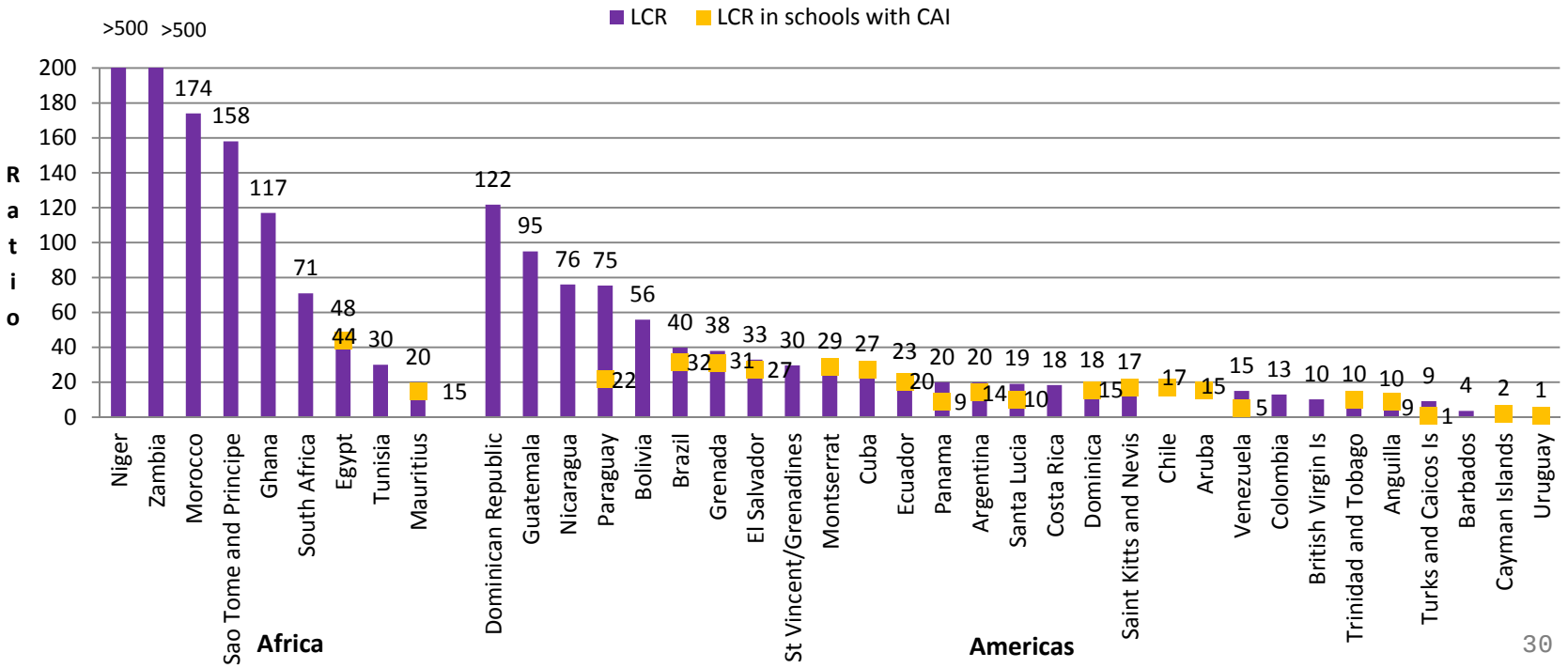
Learner-to-computer ratios (primary and secondary), 2012

- Significant disparities between and within regions
- Highest and lowest reported ratios
- Progress over the decade in developing countries with high level and sector-wide support



Source: UIS database

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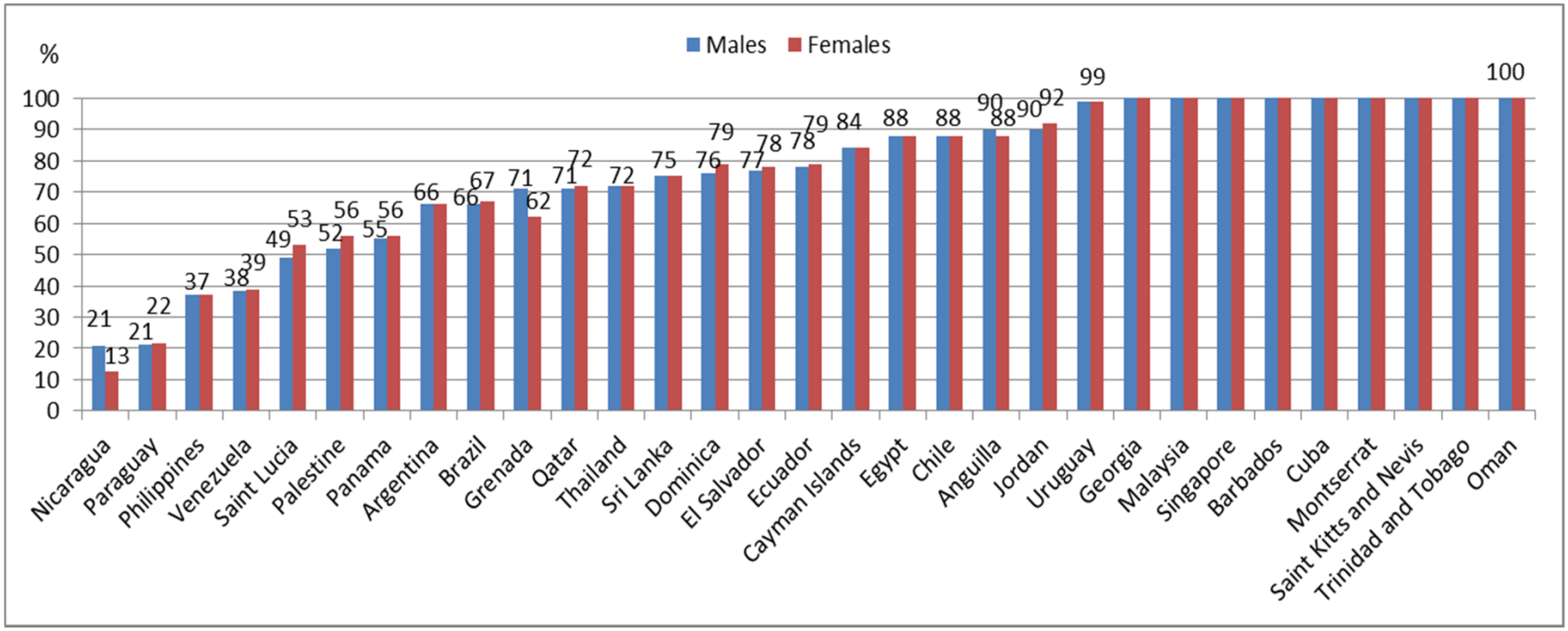
Participation of pupils in programmes with computers for pedagogical purposes, 2012 or LYA



- Based on those enrolled; does not take into account out-of-school children
- Gender difference are marginal if not non-existent
- These data however do not measure usage!

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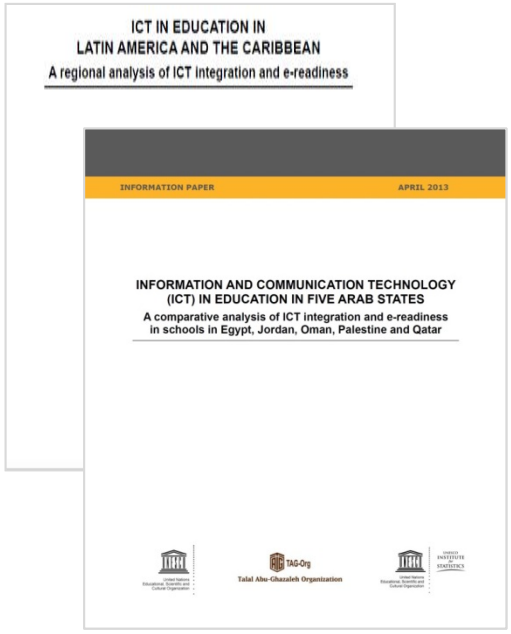
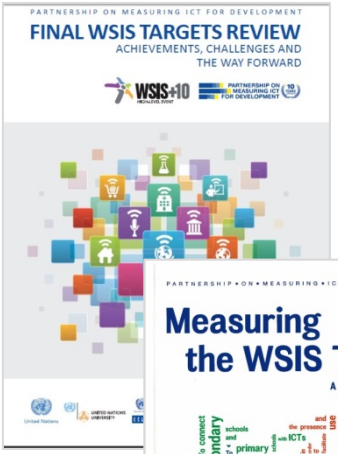
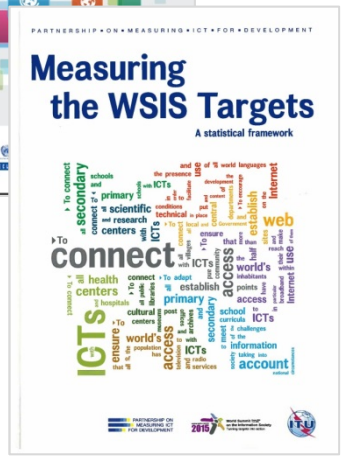
UIS ICT in education outputs

- UIS database on ICT in education statistics
  http://www.uis.unesco.org/DataCentre/Pages/BrowseCommunication.aspx
- Regional reports
- International reports







Summary

- Progress is being achieved in a number of countries; however it is difficult to provide a comprehensive review
- Data is still unavailable for many countries, particularly from the developing world; time series data is also missing making statements about progress limited
- ICT in education is linked to national income; however significant strides have been achieved in a number of developing countries that have strong policies and set targets for ICT in education with high level government and sector-wide support

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Lessons Learned

- International comparability:
  - ✓ Intensity of usage varies substantially between countries
  - ✓ What is meant by teacher training on ICTs? (i.e., training varies between countries)
  - ✓ Broadband, upload and download speeds vary significantly however data on speeds is difficult to obtain from schools,
  - ✓ WSIS should emphasize more disaggregated data such as by sex (e.g. population based indicators) to shed light on the digital divide; or by level of education since most countries target secondary education
- Merging ICTs: Categories have limited life span. Challenges in identifying concepts that have consistency of meaning over time
- More indicators on usage and outcomes required, secondary sources?

Lessons Learned

- Technical advisory panel (Dec 2014) called for broadening as well as sharpening UIS indicators, thus requiring:
  - Redesign for survey of administrative data
  - New list of **core indicators**
  - 1st global data collection (TBD)
  - Capacity-building workshops in 2016 and 2017:
    - ✓ Latin America and Caribbean
    - ✓ Arab States (TBD)

New questionnaire

- Policy, curriculum, teacher training
- ICT infrastructure in schools by level of education
- Students and ICTs by level of education and sex
- Computers allocated to schools by level of education
- Teaching staff and ICTs by level of education and sex

Developing usage surveys

- Open Educational Resources (with UNESCO HQ)
  - Integration of OER in National Education Strategies
  - OER adoption trends and rates in countries
- Aiming to develop impact indicators
- ICT usage in classroom surveys (with CETIC/NIC.br)
  - Global toolkit, including a model questionnaire
  - Covering ICT skills, teachers training, barriers to use, pedagogical use of ICT, etc.

Conclusion

- The data collection strategy is articulated in line with the SDGs, the **Education 2030 Agenda**, international and regional commitments and the work of UIS
- Access/infrastructure is not impact
- Neither is usage
- But these data are still essential
- Much work remains to be done

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Thank you!

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