The UNESCO Institute for Statistics (UIS) ICT in education indicators development initiative: Current status, challenges and prospects

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The UIS global mandate

1. UIS is the official United Nations system’s entity mandated to develop surveys and produce internationally comparable indicators in UNESCO’s areas of competence, namely: education, science & technology, culture, communication and information.

2. UIS enjoys an operational autonomy and a widely recognized professional authority in the collection and dissemination of statistics from EVERY country in the world to facilitate the monitoring of progress of countries towards global policy objectives (e.g. MDGs, EFA, WSIS, UNLD,...)

3. The UIS ongoing ICT in education indicators development initiative forms part of its leadership mandate over the “Task Group on ICT in Education” within the framework of the “Partnership for Measuring ICT for Development (ICT4D)”, the official multi-agencies body established in June 2004 to ensure the statistical follow up of the Action Plan of the two WSIS (Geneva 2003 and Tunis 2005).
The UIS work on ICT in education statistics & key milestones

- UIS proposed an initial core set of 9 ICT4E indicators at the second WSIS in Tunisia (Nov. 2005) on the basis of commonalities in various similar regional initiatives and of a review of major international surveys.


- UN Statistical Commission adopted the UIS proposed initial core ICT4E indicators at its 40th Session, 24-27 February 2009.


- Developed an ICT4E indicators guidebook and survey materials.

- Launch in Rabat (Morocco, May 2009) of the international Working Group on ICT Statistics in Education (WISE) of 25 countries to validate the guidebook and pilot the survey instruments.

- The current inter-agencies coordination meeting in Busan (S. Korea) July 2009.
Major global policy frameworks

Benchmarking and monitoring the following international policy goals and targets:

- WSIS Geneva 2003, Tunis 2005:
  - B6b. to connect universities, colleges, secondary schools and primary schools with ICTs;
  - B6g. to adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances.

- Millennium Development Goals - MDGs
  - Target 18: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.
Few premises behind the UIS approach

- Many studies established that it is illusory to expect meeting the international educational Goals by 2015 (of MDGs, or EFA, WSIS…) by the sole means of the conventional education delivery model.

- ICTs offer a tremendous opening for a rapid and qualitative expansion of lifelong learning opportunities, of new skills supply to the new Information Age Economy etc…

- Yet the focus of all policy-makers and researchers expectations remain on direct measures of impact on learners’ cognitive performance whereas few, elusive, inconclusive, or no hard evidence exist.

- Meanwhile investment in ICTs are relatively costly…; thus inhibiting policy-makers enthusiasm, especially in the developing world where the attainment of key educational goals are virtually impossible without a reformed delivery system…
Few founding evidences behind the UIS approach

A number of recent review exercises revealed:

- an overall lack of standardized definitions of concepts, classification, data collection methodologies, operational survey manual and reference indicators;

- a relatively weak preparedness of many countries statistical systems to generate data on ICTs in education in a comparable manner; and

- a wide discrepancy in the level penetration of ICTs in education due to ICT for education policies that are still at experimental stage in a majority of countries.
Some operational guiding principles

- Maximization of response from all countries regardless capacity constraints by selection of most reasonable and feasible set of core indicators
- Minimization of the data collection burden on national statistical systems by addition a limited new items into existing national data collection instruments, rather than implementation of completely new or resource-driven surveys
- Avoidance of duplication of data collection sources on education within countries (NSOs vs MOEs)
- Sustainability of international data collection efforts by privileging administrative data sources
- Alignment of the core indicators with the state of knowledge on proven benefits of ICTs in education
- Promotion of policy-relevant set of core indicators at global level (MDGs, EFA and WSIS)
The UIS pragmatic and multi-stage approach

1. Develop a practical toolkit to establish a ‘realistic’ set of ICT in education indicators from existing administrative sources to address in a sustainable manner some immediately achievable measurement needs at global and countries’ levels.

2. Pilot-test this set of indicators to determine their methodological soundness and set a common core indicators compulsory for systematic collection by all countries.

3. Setup a technical task group of countries and agencies experts to initiate research agenda and develop methodological modules for more robust usage measurement and impact assessment etc.

4. Invite UNESCO key entities (ED and CI sectors at HQ, IITE, UNESCO Bangkok, IBE and UIS) and partners to pool expertise in order to establish standards and norms based on best practices in ICT usage in education.
The UIS current accomplishment and prospects

1. A methodological guidebook for comparable ICT in education indicators (a living document)

2. An international questionnaire and definitions manual for pilot-test and future rollout to all countries on regular basis

3. A model national for future capacity building activities (to be peer-reviewed and improved by countries)
Current limitations

- Need to consolidate the robustness of definitions and methodologies after pilot-testing.

- Need to refine indicators’ precision over time and enlarge policy relevance of the global core list by its future expansion to measuring:
  - Intensity of use of the ICTs by learners and teachers for educational purposes
  - Progress in ICT skills formation
  - ICTs impact on educational achievements and outcomes in labour market etc.
Challenges: revisit the concept of impact or lift the focus on cognitive performances

<table>
<thead>
<tr>
<th>What are the policy concerns?</th>
<th>Potential areas of ICT indicators development:</th>
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<tbody>
<tr>
<td>Improve conventional teaching and learning processes?</td>
<td>Evidence of the reforming role ICT on the traditional face-to-face education delivery systems (effects of ICT on curriculum delivery modes and contents)</td>
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<td>Enhance the quality of student learning achievements?</td>
<td>Differential success rates of learners in schools with ICT assisted instruction versus students in schools with conventional education delivery system</td>
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<tr>
<td>Expand new skills supply for labour market?</td>
<td>Increased in number and range of ICT related fields of study graduates (ISCDED 4, 5 and 6)</td>
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<td>Enlarge lifelong learning opportunities?</td>
<td>Increased enrolments in ICT-enhanced outreach or on-the-job training programmes and range of certifications in new skills obtained by individuals outside the formal system.</td>
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<td>Manage more efficiently educational institutions?</td>
<td>Increased computer usage and growing presence of ICT-enabled management tools in educational administrations (e.g. EMIS, test-taking interfaces, course delivery software) or for schools’ management (automated self-performance monitoring systems)</td>
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### Challenges: measuring accurately ICT usage intensity

<table>
<thead>
<tr>
<th>Survey</th>
<th>Target population</th>
<th>Respondent</th>
<th>Measure</th>
<th>Variable description</th>
<th>Questionnaire Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress in International Reading Literacy Study (PIRLS) 2006</td>
<td>Grade 4 learners</td>
<td>Learners</td>
<td>Self-reported frequency of use</td>
<td>Ordinal (categorical) variable</td>
<td>How often do you use a computer in each of these places? (Every day or almost every day, Once or twice a week, Once or twice a month, Never or almost never) • I use a computer at home • I use a computer at school • I use a computer at some other place</td>
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<tr>
<td>Programme for International Student Assessment (PISA) 2006</td>
<td>15 year-old</td>
<td>Learners</td>
<td>Self-reported frequency of use</td>
<td>Ordinal (categorical) variable</td>
<td>How often do you use a computer at these places? (Almost every day, Once or twice a week, A few times a month, Once a month or less, Never) • At home • At school • At other places</td>
</tr>
<tr>
<td>Second Information Technology in Education Study (SITES) 2006</td>
<td>Schools that have grade 8 learners</td>
<td>Teachers</td>
<td>Self-reported frequency of use</td>
<td>Ordinal (categorical) variable</td>
<td>In your teaching of the target class in this school year a) How often do your students engage in the following activities? (Never, Sometimes, Often, Nearly always) b) Do your students use ICT for these activities? (Yes, No)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technical respondent</td>
<td>Self-reported frequency of use</td>
<td>Ordinal (categorical) variable</td>
<td>About how often during this school year will students in &lt;target grade&gt; be using ICT for learning in the following subject domains: (Never, Sometimes, Often, Nearly always) • Mathematics • Natural Sciences • Social Sciences • Language of instruction (mother tongue) • Foreign languages • ICT as a separate subject</td>
</tr>
<tr>
<td>Trends in International Mathematics and Science Study (TIMSS) 2007</td>
<td>Grade 4 and Grade 8 learners</td>
<td>Learners</td>
<td>Self-reported frequency of use</td>
<td>Ordinal (categorical) variable</td>
<td>How often do you use a computer for your school work (in and out of school)? (Every day, At least once a week, Once or twice a month, A few times a year, Never) • in mathematics • in biology • in earth science • in chemistry • in physics</td>
</tr>
</tbody>
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Challenges: measuring impact on learners performances?

<table>
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<tr>
<th>Study</th>
<th>Focus</th>
<th>Some findings</th>
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</table>
| E-learning Nordic (2006) | Perceived performance | - ICT has a positive (and moderate) impact on the performance of students as perceived by the teachers.  
- However, headmasters, to a large extent, still do not experience the positive impacts in terms of pedagogical development.  
- Access to technology and teachers’ competence development can both behave as drivers or barriers for the integration of ICT in education. |
| SITES (2006)           | Perceived performance   | - Greater student’s gains in this type of skills are dependent on the amount of guidance and feedback that teachers adopt when they use ICT for teaching.  
- A lack of clear relation between ICT use and the perceived learning gains from ICT use. |
| Impact2 (2002)         | Real performance       | - In most cases, a positive relationship between ICT use and educational attainment.  
- Not statistically significant in some subjects nor evenly spread across all subjects. |
| OECD’s PISA report (2003) | Real performance     | - Students with limited access to computers performed below the OECD average.  
- Students with the shortest experience using computers scored poorly.  
- Students who use computers least frequently at home perform below average.  
- Students with low confidence in their ability to undertake routine tasks on the computer or use internet perform much lower. |
New paradigm shift and new conceptual challenges

- Need to monitor emerging trends in teaching-learning practices and the rapidly evolving skills demand in the Information Age:
  - Tracking new generation of “learners without frontier” or “virtual learners” studying beyond the boundaries of a country or beyond the confines of traditional classrooms (distance education or e-learning statistics)
  - Tracking the differential impact of learner-centric self-tutoring emerging models versus the traditional magister-centric approach on learning achievements (Testing methodologies)
  - Tracking the efficiency on the labour-market of the growing “learner-packaged” skill formation out of conventional curricula or certification path (Tracer studies) => ICT4D
### Summary of the scope of UIS statistical challenges

<table>
<thead>
<tr>
<th>Selected areas of strategic consideration</th>
<th>Stage</th>
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<tbody>
<tr>
<td>Reliability primary data sources</td>
<td>Potentially good</td>
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<tr>
<td>Standardization of concepts and classifications</td>
<td>Work underway</td>
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<tr>
<td>Reference and tested guidelines for internal data quality assurance</td>
<td>To be developed</td>
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<tr>
<td>Reference and tested indicators manual</td>
<td>Underway</td>
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<tr>
<td>Users/advisory groups consultation</td>
<td>In place (could be expanded pending resource availability)</td>
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<tr>
<td>Technical support to data sources</td>
<td>To be planned and resourced with partners</td>
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<tr>
<td>Timeliness and survey periodicity</td>
<td>Subject to internal negotiations and the size of the global demand for such statistics</td>
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<tr>
<td>Bahrain</td>
<td>Palestinian Autonomous Territories</td>
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<td>Egypt</td>
<td>Tunisia</td>
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<td>Jordan</td>
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<td>Morocco</td>
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<td>Estonia</td>
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<td>Belarus</td>
<td>Republic of Korea</td>
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<td>Malaysia</td>
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<td>Argentina</td>
<td>Dominican Republic</td>
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<td>Bolivia</td>
<td>Guatemala</td>
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<td>Costa Rica</td>
<td>Paraguay</td>
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<td>Colombia</td>
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<td>Ethiopia</td>
<td>Rwanda</td>
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<td>Ghana</td>
<td>Senegal</td>
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<tr>
<td>Mauritius</td>
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Response status to the UIS scoping survey

Challenge: what about non-respondent countries status?

Legend
- Not applicable
- Country did not respond (112)
- Country reported no data (14)
- Country submitted data (83)
Status of core indicators availability by country

Out of which countries such as Andorra, British Virgin Islands, Cyprus, El Salvador, Malaysia, Mongolia, New Zealand provided data enabling calculation of all 9 core indicators.
The S-curve

ICT4E and economic productivity

ICT and student achievements

ICT for lifelong learning

Expansion of ICT-related fields of studies

New ICT vocational skills development

ICT-enhanced content development and innovative pedagogy management

Access to and use of basic ICT infrastructure

ICT trained teachers and ICT support staff

Radio and TV instruction, educational software, e-mail etc.

Distance education, virtual/open universities, virtual high schools, virtual laboratories and online simulations, digital libraries etc.

Webcasting, podcasting, video/visio-conferencing, etc.

e-intensity

e-readiness

e-impact

Tracer studies on ICT-skilled students in labor market

Time - Level of education system development - National ICT environment

Information requirements for policy-making
What type of ICT usage is ‘adequate’?

1. Computer, PDAs or Smartphones (connected or not to internet) versus other ICT (radio, television, video etc.), which has unquestionably proven effective for educational purposes?

2. In what **context**? What **organizational reform or adjustment** is needed? Is there a model “one type fits all?” in any environment?

3. For **how long** is ICT usage by learners or teachers ‘optimum’?

4. **Where (home or school)** is ICT usage by learners and teachers more effective?

5. How much financial implication of ICT deployment is “**cost-efficient**” or “optimum”? How does this compare to conventional delivery system?

…”desperate need for documenting ‘what doesn’t work’ and for a modelisation of ‘what works’ into internationally acceptable norms or standards
1. Proportion of ISCED levels covered by existing national policy, plan or regulatory mechanism for ICT in education (for ISCED1-6)

2. Proportion of Grades using ICT-assisted instruction (for ISCED1-3) by subject:
   - Maths
   - Sciences
   - Basic computer skills
   - Languages
   - Arts

3. Proportion of learners enrolled in grades with ICT-assisted instruction (for ISCED level 1-3)

4. Proportion of total government expenditure on ICT in education for current expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

5. Proportion of total government expenditure on ICT in education for capital expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

6. Proportion of total government current expenditure for current expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

7. Proportion of total government capital expenditure for capital expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

8. Average government current expenditure on ICT in education per learner (for ISCED level 1-3, level 4 and level 5-6)

9. Proportion of total current expenditure on ICT in education for private current expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

10. Proportion of total capital expenditure on ICT in education for private capital expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

11. Proportion of total current expenditure on ICT in education for foreign current expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

12. Proportion of total capital expenditure on ICT in education for foreign capital expenditure on ICT in education (for ISCED level 1-3, level 4 and level 5-6)

13. Ratio of non-governmental to government sources of current expenditure for ICT in education (for ISCED level 1-3, level 4 and level 5-6)
THANK YOU