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TECHNICAL ADVISORY PANEL (TAP) MEETING ON ICT IN EDUCATION STATISTICS

SUMMARY REPORT

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Executive Summary

A Technical Advisory Panel (TAP) meeting was held at UNESCO headquarters to discuss information and communication technology (ICT) in education statistics and their role in supporting countries' evolving policy needs. The outcome of the meeting and ongoing discussions will inform the revision of UNESCO Institute for Statistics (UIS) ICT in education methodology in the post-2015 context—with particular regards to a new global UIS survey on ICT in education and a revised list of core indicators.

ICT in education is a rapidly evolving domain. As such experts including national statisticians (e.g. Ministries of Education), representatives from international, regional and national ICT organisations, members of the academic community researching ICT in education, and relevant UNESCO focal points assembled for two days to discuss measurement of ICT in education to shed light on current best practices, as well as anticipated developments. Moreover, the meeting provided an opportunity to promote inter-expert collaboration, leverage synergies, and establish standardization on key activities in the collection of ICT in education statistics. Essential to the mandate of the UIS, the TAP meeting, in summary, facilitated the necessary groundwork to establish a new framework to measure and monitor ICT in education, using internationally comparable statistics, in the post-2015 developmental agenda.

Three thematic papers were commissioned to support discussions during the TAP including (i) the evolving nature of digital technologies and infrastructure, (ii) ICT in education and evolving learning paradigms, and (iii) teacher training and usage of ICT in education. The UIS gathered feedback on the papers with a view to producing its first global survey, which will be disseminated to all UNESCO Member States in the 3rd quarter of 2015. A new set of ICT in education core indicators, along with their corresponding methodology, will also be published in 2015 in the form of a technical guide or brochure. Recommendations and points of concern were noted with the purpose of reviewing, updating and prioritizing the UIS methodology.

Generally, feedback from the TAP called for broadening as well as sharpening the initial set of core indicators, thus requiring a survey redesign with a view to reflecting the current reality of ICT usage in teaching and learning, and anticipating future trends. To ensure the measurement of ICT in education meets policymakers evolving data needs, participants advocated that UIS should consider (i) measuring actual trends in usage by administering school-level surveys to be completed by principals, teachers and/ or pupils, thus representing, a move away from administrative data collections, (ii) adding and/or redefining some key ICT concepts/terms to reflect growth and usage of new technologies (e.g. mobile technologies), and (iii) capturing additional data to measure the digital divide including more data disaggregated by sex, subnational region, socio-economic status, etc. .

Concerns were also raised that a change in methodology, in particular the exclusion of some items, would result in the loss of data currently being collected. Moreover, due to UIS financial, operational and logistical constraints, school level data collections are not currently feasible. As such, relying on administrative data sources continues to be the most viable option for the UIS global survey to produce timely, policy-relevant statistics to support countries select educational priorities and develop effective policies. In the meantime, however, UIS will examine the issue of school-level surveys in partnership with other members of the TAP to begin developing standards for international surveys to be administered to principals, teachers and pupils.

Setting the post-2015 agenda: Goals, targets and ICT in education indicator development

There is growing awareness for the need to measure ICT in education within the greater international development agenda. Setting the post-2015 development agenda on ICT4E, however, involves a number of international agreements including the United Nations' new Sustainable Development Goals (SDGs) on education, the UNESCO education targets (i.e. *Education for All*), and any potentially revised education targets within the World Summit on the Information Society (WSIS). Given this complicated landscape, the international ICT community has an important advocacy role to play to ensure that ICTs are effectively and reliably measured within the formal education system. For example, the international ICT community can help shed light on which indicators are most appropriate to meet various countries' changing policy needs, taking into consideration a number of factors including evolving policy directives, national infrastructure, new developments in ICT, changing pedagogies, demographics, human and financial resources.

Statistical experts, on the other hand, can shed light on which indicators are commonly available and relatively easy to collect. The statistical capacity of countries should be taken into account when collecting data. For example, it was cited that some countries with strong statistical capacity could only monitor about 40% of current (listed) indicators; therefore, there is a need to establish a balance between influencing data collected (i.e. normative effect) and what is currently achievable. Testing the UIS survey in a number of regions for instance has demonstrated high levels of data availability among many middle income economies while ICT in education data are scarcely available in many low income and least developed countries, particularly in Africa and Asia, due to low statistical capacity and/ or to the novelty of collecting such data.

In setting the post-2015 development agenda, statisticians can also help provide invaluable insight on pertinent methodology and the benefits and limitations related to individual indicators to increase data interpretability. While each indicator sheds light on specific dimension(s) of a concept, phenomenon, or model, other dimensions may remain obscured requiring different and/ or complementary indicators to provide other insights or additional information. Typically, a number of indicators measuring a single phenomenon are required to facilitate a full and comprehensive understanding of that which is under examination. While the international statistical frameworks are limited in terms of the number of indicators that will be included, an effort to select indicators that provide a fuller picture is important.

Commissioned Paper #1: The evolving nature of digital technology and related infrastructure for the school sector

This paper and its accompanying presentation focused on a number of issues related to the evolving nature of the use of digital technology in education including clarification of the definitions of key terms such as ICT and an examination of: evolving visions, strategies, curricula and teacher education; learning environments; energy supply; media types; access in terms of expenditure, availability of devices, school deployment patterns (including strategies such as bring your own device (BYOD)); device type and management; technical support; connectivity; network type and access; hosting; digital content, and assessment. It is expected this contribution will have a significant influence on the redesign of the administrative ICT in education survey since it addresses many issues for which Ministries are most likely to collect data on a regular basis in administrative surveys.

Key discussion points and general recommendations

Twining & Davis (2015) proposed a framework including the following ten aspects of practice each of which included one or more dimensions to inform the development of new indicators on ICT digital technology in education:

- (i) Visions, strategies, curricula and teacher education, which included discrete dimensions related to educational vision, and policy, and suggested the need for metrics related to curriculum and teacher education;
- (ii) Environment, which included spatial and temporal aspects (when and where students learn), taking into account shifts in provision of education services (community, traditional, extended (blended types of education services) and virtual));
- (iii) Electricity supply, which included a dimension that incorporated aspects to do with accessibility, reliability and stability of the supply of energy (rather than how it is generated);
- (iv) Media type, which focused on the medium (audio, video/moving images, and hypermedia technology) and level of interactivity rather than the underlying technology (radio, television, computer);
- (v) Access, which included consideration of expenditure, availability of devices, student to computer ratios and location of devices, and suggested a Provision dimension (incorporating location and device density, including bring your own (BYO));
- (vi) Technology model, which considered supporting and assistive technologies, and suggested dimensions related to device type (desktops, laptops, tablets, mobile phones, etc.), control and management of devices, and technical support.
- (vii) Connectivity, which considered access to telecommunications and the Internet, as well as types of school networks, access to school networks, hosting of services, filtering and user login. A shift from bandwidth per school to bandwidth per user was proposed.
- (viii) Funding which highlighted the shift towards parents/caregivers contributing to the cost of digital technology used in schools.
- (ix) Digital content, which included a tool dimension that reflected a shift from using digital technology for content delivery to using it as a creative or meta-cognitive tool.

- (x) Assessment, which flagged the pivotal role of high-stakes summative assessment in driving practice in schools and the need to know about moves towards digital technology-enabled summative testing.

Based on the framework as outlined by Twining and Davis, the following themes and recommendations were discussed in detail during the TAP meeting:

- ***Evolving ICT concepts*** in that the overarching construct of “information and communication technology” is confusing because it is used to refer to teaching about digital technology, teach other subjects with digital technology, and to mean the digital technology itself. Twining (i.e. lead paper author) recommended the following terms be used: Computing, which includes Computer Science, Information Technology and Digital Literacy; ICT, which is the use of digital technology to enhance learning across the curriculum; and digital technology, which is the hardware, software and associated infrastructure. Whilst this was not explicitly discussed in the meeting, given the widespread use of the term ICT internationally it is difficult to imagine how these definitions should be introduced within the current context and at what pace (see Twining and Davis, 2015). In general, participants agreed that ALL definitions require refining to include new developments such as mobile technologies, cloud computing, social media, etc.
- There is an increasing need for ***measuring the usage and impact of ICT in education*** due to a lack of information about what teachers and students are doing with ICT in the classroom and elsewhere in schools. Given the limitations of administrative surveys, it was agreed that more data should be collected at the school level from pupils and teachers using stratified random samples of schools. For example, participants mentioned that questions on the use of multiple devices in schools (e.g. tablets, phones), and by whom (i.e. teachers or students) should be prioritized; others however argued that collecting statistical data at the school, teacher/student level may not be realistic given current constraints. It was suggested that a school level questionnaire should be developed that could be used by Ministries if they so wished. This would allow data to be collected within countries that would enable cross country comparisons. It was also acknowledged that at the moment, administrative data remain important due to its availability and capacity for international comparability.
- ***Electricity and power supply*** was a concept identified for measurement challenges. For example, it was suggested that how the electricity is obtained (solar, wind, etc.) is not so relevant, but what is of importance is whether the power is stable, reliable, robust and sufficient (from the user’s standpoint); as such it was suggested that additional indicators be included measuring stable electricity. The current definition of electricity specifies that a minimum level of electricity for the introduction of ICT should be included. This increasing specificity of the quality of electricity makes data collection increasingly difficult, whereas the simple indicator schools with electricity would result in the greatest number of responding countries.
- Measuring the ***allocation of computers*** for administrative or pedagogical purposes was considered low priority for a couple participants; however it should be pointed out that in many developing countries, significant proportions of computers are allocated to

administrative purposes and thus unavailable for teaching and learning. Moreover, many developing countries are challenged in reporting how computers are allocated. It may therefore continue to be useful to disaggregate computers by allocation strategy (administrative versus pedagogical).

- Indicators to measure the ***school environment and deployment patterns*** (i.e. where is learning and instruction using digital technology happening?) in relation to the emergence of virtual and networked schools should also be considered since they provide useful information on various dimensions of changes in educational practice. It is yet difficult to know how widely available this kind of data is. Information on device location (labs, classrooms, libraries), and distance education (remotely in a virtual environment) can be important for policymakers. It was felt that having data about where devices were located (e.g. % of schools that have labs) would potentially be useful.
- Who provides education? It was mentioned that due to the diversity within schools it wouldn't be practical to collect data related to the ***Provision dimension*** (i.e. community, traditional, extended, or virtual) at ministerial level. It was suggested that a simpler metric about the likelihood that a student had the opportunity to learn virtually might have more utility.
- Requesting data on ***traditional technologies*** (i.e., radio, TV, computer) may not be useful as technologies are constantly evolving. It was suggested that it may be more critical to ask questions about media (i.e., audio, video, interactive media) as portrayed in the model (Twining & Davis, 2015, Table 3.6.1), thus being more student-centric providing more information on the learners' experience. This may be a good model and theoretically sound, but may also result in some significant challenges in application. Perhaps additional indicators on policy on media type could be developed instead.
- ***Learner to computer ratio (LCR)***; while all indicators have shortcomings, this indicator is relatively robust and one of the metrics for which data are most easily available. It was also understood however that the LCR has shortcomings because of a lack of clarity on what a computer device is and its actual configuration and age.
- Proprietary issues related to devices pose a problem in terms of measurement (device density) and ICT in education; ***bring your own device (BYOD)*** policies results in significant challenges when counting computers for calculating learner-to-computer ratios. Moreover, it was suggested that BYOD policies in schools were an effective measure of providing equality in educational opportunity; however, this is clearly not so if several children do not have devices to bring to schools.
- A revised survey and list of core indicators should take account of the ***evolving nature of digital technology*** and emerging trends including mobile technology (e.g. mobile phones, smart phones, tablets, e-readers), interactive whiteboards, open educational resources (OER), free and open source software (FOSS), and MOOCS (Massive Open Online Courses). It is of note that the OECD is updating its list of devices for PISA, and that the ITU telecommunications indicators handbook can also be useful for indicator development (e.g. definition of computer, Internet, broadband).

- **Supporting technologies** were noted that ministries are very interested in the availability of data projectors/ Interactive whiteboards (IWBs); there was a suggestion that data projectors, IWBs, and digital cameras should be added to the device type metrics.
- There is a growing interest in **open educational resources (OER)** and how to measure their usage in schools. However it is also recognised that OER, as a concept, is difficult to define, nor is it well understood by many individuals. As such what specific indicators are needed to better capture the *knowledge sharing* and *knowledge creation* elements of OER? Perhaps rather than a single indicator, a cluster of indicators is required.
- A new survey and indicators should reflect the growing availability of **educational digital content** used in schools and classrooms. Of importance however is that digital content i) consider language and that it is simple to translate, ii) that it has a localised focus, and iii) be engaging and relevant to the learner and the set curriculum. Whilst it was agreed there might be lots of content in English, there exists a huge gap in provision of content that is contextually appropriate in developing countries (not culturally relevant and/or in local languages).
- **ICT support services or technical support** is a concept that will inevitably evolve given the shift towards different types of devices (e.g. tablets) and who owns the technology (e.g. BYOD) in schools. The impact of this shift should be reflected in indicators on ICT support services. While some participants stated that indicators capturing data about technical support (ICT support services) are becoming irrelevant due to BYO orientations, others commented that it would be important to consider technical support in terms of both formal and informal varieties. While both may be important in many schools, should and can this be measured? Whereas standardization of formal services can be somewhat expected across schools, informal services will vary more widely and therefore be more difficult to measure. Other considerations include who is providing ICT support services (teachers, schools technician, externally hired 3rd parties), what kind of support (technical vs curriculum), and what are the incentives for teachers to participate.
- The issue of **connectivity** and how to measure it: per student or by school-level. It was suggested that new surveys ought to include items measuring quality of connectivity, for instance by speed, by upload and/ or download speeds. There was discussion about the current definition of broadband (256 kbit/s) and its continued relevance; ITU mentioned that it may be prudent to move away from the term Broadband and capture Internet speeds maintaining the range of 256 kbit/s for maintaining time series data; bandwidth could also be measured by technologies (e.g. fibre optic, cable, etc.). The focus on download speed was noted as being a potential issue as there was a move towards students being creators as well as consumers of content – when upload speeds become more critical.
- Regarding the **network access dimension**, some participants mentioned that the types of networks present in schools, either for students or teachers, may be of less interest to policy makers, than information on **“hosting”** which includes information on where information data are stored including local servers, websites, Virtual Learning environments (VLE), Cloud computing or Cloud +. However, it was generally agreed that the hosting dimension is not useful for the administrative survey for most developing countries. Another component to this includes who is accessing the information (students, teachers, parents), and whether or not those accessing information have a unique identifier.

- Effectively measuring student skills development (particularly XXI century skills with a shift in focus from learners as consumers to learners as creators) cannot be fully accomplished using paper-based exams, and as such it is important to measure schools implementing ***on-screen assessment***. For example, new indicators that recognise Ministries' increasing focus on high stakes summative assessments (on-screen) should also be considered (school leaving/national exams). Moreover the implementation of unique student identifiers should also be taken into account as it might facilitate the availability of student data.

Additional comments:

- The revised survey and list of core of indicators should be ordered based on priority using the following criteria: policy relevance, construct validity, reliability, and availability.
- Need to be clear that we are not advocating particular practices – we are simply trying to describe (other people may then impose value judgments on those descriptions).
- It will also be important to review all definitions included in the UIS online glossary and update them as needed (e.g. ICT, computer, radio-and television-assisted instruction, bandwidth).
- It was suggested to include more questions related to existing policies on a number of themes including equality, equitable access, long-life learning, funding, technical support (ICT support services), etc.
- While it is good to have a section on policy in the questionnaire, what these indicators cannot track is the extent to which there is disconnect between ministry policy and reality on the ground. This should be included in school and teacher surveys.
- Administration: Do schools use ICT information systems for administrative purposes such as attendance, grade distribution, managing student profiles, teacher absenteeism, etc.?
- It was pointed out that whether a policy was formalized or not was less important than whether it was being implemented. The example of the Philippines was given (they have no written policies re digital technology in schools but three de facto unwritten ones).
- The importance of policies being linked to school inspection and/or other accountability frameworks was flagged up (as a way of getting at whether a policy is likely to be implemented or not).
- How can big data be mined to shed light on ICT in education?
- Including items related to assistive technologies was considered important to inform policy on special needs learning.
- Due to the complexities in collecting education expenditure data, it was agreed that collecting this data might be best achieved in UIS Questionnaire B on educational expenditures.

Revised author's recommendations

Following the TAP the authors revised the recommendations in order to take on the feedback from TAP members. This resulted in 12 suggested sets of questions to include in the revised questionnaire. The final paper describes the authors' recommendations in finer detail; nevertheless, the foci of these are also listed here in priority order:

- High priority
 - Policy (Questions 4.1 A and B)
 - Assessment (Question 4.2.A)
 - Electricity supply (Question 4.3.A)
 - Internet access (Question 4.4.1.A)
 - Network access (Question 4.4.2.A)
 - Provision (Question 4.5.1.A)
 - Device type (Question 4.5.2.A)
- Medium priority
 - Technical support (Question 4.6.1.A)
 - Management Information Systems (Question 4.6.2.A)
- Low priority
 - Expenditure (Question 4.6.3.A)
 - Environment (Section 4.6.4)
 - Digital content (Section 4.6.5)

Commissioned Paper #2: ICT in education and evolving learning paradigms

The following commissioned paper went beyond basic infrastructure focusing on issues related to the evolving learning paradigms associated with the growing use of ICT in education. It aimed to focus more on what pupils and teachers are doing with ICT, rather than focusing on ICT itself. In particular, the paper discussed the following: (i) ICT in education and its evolving mission, methods and core principles; (ii) evolving nature of ICT in education in hastening the emergence of new learner-centered pedagogies; (iii) types of learning activities and usage patterns associated with the use of ICT; and iv) deployment patterns related to ICT in education. While the issue of teachers is covered in detail in the third and final commissioned paper, this paper briefly covers teacher issues in that it discusses i) teachers and various types of teaching tasks and patterns of usage in relation to teaching using ICT in education, and (ii) impact on teacher observable outcomes. Gender was considered as a cross-cutting theme throughout the discussion of both pupil and teacher usage of ICT; as such the need for indicators that are sex-disaggregated or that measure females specifically was acknowledged.

Key discussion points and general recommendations

- Given policymakers' strong interest in the ***usage of ICT in education and its impacts***, the aforementioned paper focuses on the how and how often specific technologies and practices are undertaken by students and teachers rather than only on what technologies are being used and by whom. Since most of these data cannot be collected using administrative surveys in isolation, the development and testing of surveys at the school level completed by principals, teachers and pupils is required. Random stratified sampling techniques should be used to ensure representative samples for data collection without undue burden on administrators.
- Indicators measuring aspects of ICT usage are also very important for policymakers as they shed light on the issue of ***quality in ICT in education***.
- Indicators measuring ***the purpose of ICT devices*** could be included under a section on ICT policy. For example questions on the uses of multiple devices (e.g. tablets, phones), by whom (i.e. teachers or students) should be prioritized.
- In order to develop an effective strategy for collecting usage data, an ***epistemological examination of the nature of learning*** would be beneficial (e.g. construction of knowledge, social construction, productivity measures, ICT skills); one relevant and frequently referenced framework to base indicators on is Bloom's taxonomy of learning domains (i.e. knowledge, comprehension, application, analysis, evaluation and synthesis).
- Consistent with new "learner-centered pedagogies", indicators on ***types of task and learning activities*** should be included. Items should have policy relevance; moreover items require clear definitions and should reflect discrete types of tasks since a lack of specificity would result in ambiguity, weaken data quality, resulting in a general lack of comparability. In contrast tasks should also not be overly specific since this can result in a situation whereby the types of tasks assigned by teachers or engaged in by pupils may be impossible to collect.
- Indicators ***measuring learning tasks in specific curricular areas*** were also emphasized as this may have important benefit for policymakers in a number of countries. For example policymakers might emphasize ICT in some curricular areas more than others (e.g. science versus creative writing), particularly if certain types of ICT are deemed to have specific additional benefits for a specific part of the curriculum.

- Several **metrics for measuring intensity of ICT use**, as well as the inherent challenges, were presented. Participants suggested indicators measuring instructional time or duration (e.g. number of days, hours), frequency (i.e. once a week, once a day, etc.) based on self-reporting be included. In order to increase data reliability due to inaccuracies in self-reporting, surveys completed by both pupils and teachers can be used in tandem. Due to the difficulty in estimating duration or frequency, a better metric could be the “proportion of your school time doing XXX”. In developing indicators on the usage of ICT in education, the survey should also take into consideration implications of age or educational level.
- Indicators are needed that measure ICT usage in **technical and vocational education and training (TVET)** programmes as the current survey does not disaggregate between general programmes in secondary education and those in the TVET stream.
- Participants alluded to some reports suggesting that student **engagement with ICT outside of school** may actually be more important than student engagement inside school; while it was acknowledged that both contexts can undoubtedly have impact on ICT skills, the fact of ICT exposure outside of the classroom emphasizes the importance of quality engagement in the school environment. However as other agencies collect such data in household surveys, UIS needs to avoid duplicating data collection efforts.
- Indicators on the inclusion and usage of **various new technologies and “learning platforms”** (e.g. mobile phones, social networks) should be included. Surveys that are developed for the school level should consider a number of elements related to infrastructure and evolving technologies that were detailed in the context of Commissioned Paper #1.
- There are shared concerns about incorporating a general indicator on **open educational resources (OER)** in surveys since there is a general lack of understanding of what OER entails; a cluster of indicators that “unpacks” the concept of OER might be more useful in data collection as well as to drive awareness and uptake. For example, there is a need to develop indicators that capture teachers’ knowledge construction and sharing of OER, including (i) how teachers are using OER repositories, and (ii) creating new sharable content (i.e., authoring and re-publishing).

Additional comments:

- **Indicators related to usage should stipulate types of ICT tools.** However it was also recognised that this depends on the policies one is trying to inform. For instance, it may be warranted to use generic terms like ICT and digital technologies in certain contexts, but to be more specific in terms of the tools used elsewhere.
- **Government expenditure data**, irrespective of where the item ultimately is incorporated, could be disaggregated according to the following **dimensions of teachers' professional development**: (i) administrative training, (ii) enhancing learning with ICT and (iii) using OER in teaching.
- Impact of **cost of the Internet** on usage could be measured.
- Indicators to measure **on-screen assessments** should also be captured.
- In terms of impact, presenters recommended to include items related to **whether there exists a unique pupil identifier** since it will help in understanding the state of the documentation system that connects impacts to students as well as how they are documented.
- A participant discussed different methods of surveying the use of ICT in schools including:
 - (i) use of **multi-level instruments** – school level and administrative;
 - (ii) **stratified random sampling** to ensure data are representative, reduce work load, and ensure feasibility of the multi-level survey;
 - (iii) examining **learning behaviours in ICT versus non-ICT based classrooms**;
 - (iv) using **school level reports**;
 - (v) survey learning and teaching activities and **usage patterns across the curriculum**—not just in certain subjects.
- Overall, items presented in a survey should make a clear distinction between **pedagogical and basic technological competence in the use of ICT**.
- While the focus of this technical advisory panel (TAP) is to examine methodology at the primary and secondary levels, participants also recommended for the development of ICT in education indicators in **higher education**, since the point of ICT in education is to increase the focus, quality and productivity of the entire educational system of a country and region.

Commissioned Paper #3: Teacher training and usage of ICT in education

This final paper focused on exploring how to improve the data collection on teacher related indicators within the context of ICT in education. Given that the paper concentrates on both teachers' training and their use of ICT in teaching, this paper can inform both the redesign of the UIS ICT in education administrative survey, and the development of school-level surveys covering ICT usage that are completed by principals, teachers and/ or pupils. More specifically, the paper discussed a number of issues pertaining to teachers: i) evolving concepts such as ICT-qualified teachers, ii) the various dimensions of professional development including pre-service and in-service training, (iii) teacher usage of ICT in education, and (iv) the use of ICTs to train teachers at a distance (i.e. distance education programmes or courses). Gender was considered as a cross-cutting theme throughout; as such the need for indicators that are sex-disaggregated or that measure females specifically was acknowledged.

Key discussion points and general recommendations

- Align indicators to components of **UNESCO's competency framework for teachers**, making use of UNESCO's three identified levels: technology literacy, knowledge deepening and knowledge creation.
- **Examine evolving definitions related to teacher training and usage.** For example some additional development could be included in terms of the definition of ICT-qualified teachers and different sub-categories of this concept including:
 - Training for teachers to use ICT to attain pedagogical objectives;
 - Training for curriculum/ content development or to make use of OERs;
 - Teacher training for student assessment;
 - Incentives for teachers to use technology;
 - Access to ICT and the Internet outside the classroom;
 - Availability of ICT tools at school, availability of mobile tools;
 - ICT for administration.
- **Include indicators on use of ICT tools by teachers** in the management of the classroom, in administrative responsibilities, in training and professional development, and outside school.
- Redesign the survey and develop indicators to differentiate between **pre-service and in-service training** regarding ICT, including ongoing professional development to maintain teachers' ICT skills.
- Include indicators on **incentives for teachers to use ICT** in the classroom.
- Indicators of teacher training should capture **ICT training that is pedagogically oriented** and not simply oriented towards using a particular device (technology-oriented).
- Include indicators on teachers who currently **use digital curriculum and assessment**.
- Include indicators that address training on and use of **assistive technologies** for children with special needs.
- Indicators related to the **evolving ICT landscape and new technologies** are important to consider from a teacher perspective including social media, open educational resources, mobile learning platforms, electronic whiteboards, etc.

- A consideration of teachers vis-à-vis “**communities of practice**” can be better incorporated in models of professional development; this may include items to capture cascading training models, mentor-based training, and teaching practice components.
- Indicators to capture **distance education deployed via mobile devices for professional development** can be considered.
- **Availability of ICT tools** provided in schools and of mobile tools provided by schools or through BYOD strategies should be captured. It is recognised that BYOD models for teachers can make measurement of available devices more challenging.

Additional comments:

- The survey can also consider incorporating:
 - sex-disaggregated data; and
 - certification standards.

CONCLUSIONS

This report represents the key ideas and recommendations resulting from the 2-day Technical Advisory Panel (TAP) meeting on information and communication technology (ICT) in education statistics at UNESCO headquarters, 9-10 December 2014. This meeting assembled both ICT in education statisticians and advocates from international, regional and national levels in order to shed light on the evolving policy needs of governments and to make recommendations on new indicators required to support countries in developing policy related to ICT in education in the post-2015 context. Moving forward, UIS needs to redefine terms and concepts, hone current survey items, and modify and/ or develop new indicators. Indicator priority should be driven by policy relevance, data availability, data quality (e.g. reliability and validity) with special attention to maintaining the integrity of previously collected ICT4E statistics.

Administrative data, which has formed the backbone of the UIS ICT in education data collection strategy since its inception in 2009, remains an important component of the “way forward”. However, strong demand from policymakers and the ICT in education community for data on usage and impacts of ICT in education require new strategies that go beyond current data collection efforts. In addition to the redesign of the UIS administrative survey, UIS intends to work with its partners, many of whom are members of the TAP, to begin work standardizing the design of school level surveys to gather additional data on the specific nature of how ICT is being used by both pupils and teachers.

The TAP will continue to play a role in shaping the development of new surveys on ICT in education and will be consulted during 2015 to provide feedback and comments on drafts to ensure that new instruments reflect the ideas conveyed during the TAP meeting. More specifically, the TAP will be consulted to ensure that surveys reflect countries’ evolving policy needs; moreover that surveys reflect all regions of the world, both developed and developing economies, and conform to the ICT landscape at different educational levels and sectors. Verification that surveys are methodologically proficient to capture the digital divide existing between girls and boys, and females and males is also a key concern.

The process of survey redevelopment will begin in February 2015, after which consultation of the TAP, UNESCO colleagues, and representatives from Member States will follow. The final administrative survey will be disseminated globally in September 2015. School-level surveys on usage (to be completed by pupils, teachers and/ or principals) will be an ongoing exercise in 2015. While UIS has no plans to begin a systematic data collection at this time, UIS and its partners will strive to standardize survey methodology, which countries can thereafter adapt and use in their data collection activities. They can also be increasingly used by regional partners including UNESCO regional bureaux in their technical support initiatives.