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Leveraging Information and Communication Technologies to Achieve the Post-2015 Education Goal
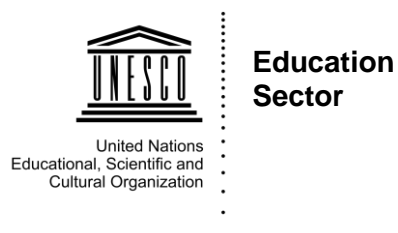

Report of the
International Conference on
ICT and Post-2015 Education

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Leveraging Information and Communication Technologies to Achieve the Post-2015 Education Goal

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UNESCO

United Nations
Educational, Scientific and
Cultural Organization

**Education
Sector**

CONTENTS

1. INTRODUCTION

The International Conference on ICT and Post-2015 Education was organized by UNESCO, the Ministry of Education of the People's Republic of China and the Chinese National Commission for UNESCO. It was hosted by the Municipal Government of Qingdao in Qingdao City. The aim of the conference was to create an interface between the education and ICT sectors to discuss how ICT can be leveraged at scale to support the achievement of the post-2015 education targets.

The conference was attended by more than 500 participants from 82 countries. Official delegations included 29 Ministers, 10 Vice- or Deputy Ministers and seven State Secretaries or Ministers, and 10 representatives of United Nations agencies and international organizations. Some 32 representatives of leading companies from the ICT sector, as well as eminent international researchers and practitioners and 100 representatives from China were also in attendance.

The objectives of the conference were to:
1. convene inter-sectoral debate for defining the role and value of ICT in the post-2015 education agenda;
2. take stock of sector-wide strategies for leveraging ICT to ensure equitable and inclusive quality lifelong opportunities for all;
3. develop follow-up action plans and reinforce partnerships.

To meet these objectives, the conference organized high-level debates on key issues that ICT for education policies need to address. It also gathered views from policy-makers, researchers and the wider industry. The conference covered five major themes: (1) scenarios and enablers of ICT-enhanced future education; (2) effective use of ICT for quality learning; (3) inclusive and relevant lifelong learning; (4) universal access to quality content; and (5) monitoring, evaluation and funding.

The key output of the conference was the adoption of the Qingdao Declaration, which provides Member States with policy recommendations for harnessing the power of ICT to address current educational challenges, and to ensure equitable quality education and lifelong opportunities for all.

This report is divided into six sections, including an executive summary, an outline of the keynote speeches, an overview of the high-level debates, summaries of thematic discussions, and an analysis of the main ICT in education trends, as well as the Qingdao Declaration.

2. EXECUTIVE SUMMARY

The conference convened high-level debates to discuss how ICT can be leveraged to achieve the targets of the post-2015 education agenda, combining the views of policy-makers, academics and the private sector. The main trends identified during the conference were as follows:

- Keynotes: In their speeches, representatives of UNESCO and the People's Republic of China reaffirmed the need to transform education to achieve equitable and inclusive quality education and lifelong learning by 2030. ICT constitutes a transformative tool that is likely to spark systemic changes. They also highlighted that political commitment as well as international cooperation and collaboration are essential to leverage the potentials of ICT in transforming education.

- Scenarios and enablers of ICT-enhanced future education. On this theme, ICT was recognized as an enabler of future lifelong learning and life-wide learning by allowing people to learn anytime, anywhere, anyway and with any content they may need. In particular, ICT can integrate learning and working. ICT can be used to develop critical thinking skills and other competencies needed to work in an ICT-rich environment. Unleashing these potentials will require well-planned policies and strategies, together with a robust assessment of ICT's impact on learning outcomes, in order to guide the various stakeholders (including the private sector) and help them participate in, and contribute towards, the planned ICT in education activities. Affordability, both in terms of upfront investment and maintenance of infrastructure, was also raised as an important concern for many countries.

- Effective use of ICT for quality learning: A consensus was reached in this session that national ICT in education strategies and master plans need to be framed within a context of aiming for better learning processes and outcomes. Accordingly, public and private provision of infrastructure and services should be aligned with content development to facilitate the achievement of broader educational objectives within a national framework. Assessment plays a crucial role in ensuring effective use of ICT for quality learning – harnessing technology to support tests as well as adapting the nature of the tests according to the needs of an ICT-rich environment are among the key trends. Systematic monitoring and evaluation need to be embedded in the national master plans. Empowering teachers to rethink teaching and learning remains the main challenge. To empower teachers, the following solutions are highlighted: (1) reinforcing institutional capacity of teacher training institutions and schools; (2) continuously developing teachers' pedagogical and digital competencies; and (3) integrating ICT into the curriculum and assessment arrangements.

- Inclusive and relevant lifelong learning: On this theme, participants reached the consensus that skills development and lifelong learning are among the post-2015 education priorities, and that the omnipresent digital devices and online content are powerful levers to: (1) expand access to both formal and non-formal learning opportunities in order to reach out to more learners; (2) multiply learning pathways and diversify learning approaches through various platforms and resources to attend to different teaching and learning needs; and (3) enable blended learning and learning in changing environments. In order to validate these potential benefits, stakeholders need to promote quality assurance systems and to improve recognition and validation of online learning, especially within non-formal education.

- Universal access to quality content: The participants reaffirmed that, in the technology-rich era, what is missing is not devices, but a lack of content development (United Nations Millennium Report 2005). It was shown that the availability of Open Educational Resources (OER) has increased significantly in recent years, although the quality of these resources varies. OER may widen the knowledge divide unless governments adopt OER in a holistic manner, encompassing policy, infrastructure, capacity building (especially teachers) and support for open licenses. Open content would add value only if the quality of the resources is assured. Consequently, standards and quality assurance mechanisms need to be agreed and adopted when launching OER projects.

- Monitoring, evaluation and funding: It was recognized that simply measuring the infrastructure and access of ICT is inadequate to ensure the effectiveness of ICT in education programmes. Impact evaluations, such as data collection on ICT usage in the classroom, are also required in order to adequately assess the effect of these programmes.

The key output of the conference was the Qingdao Declaration. This document was endorsed by Ministers of Education, high-level government officials, representatives of United Nations (UN) agencies, civil society organizations, teacher organizations, as well as other development partners, members of academia, and the private sector. The Declaration contains statements on how to unleash the full potential of ICT in terms of: (1) access and inclusion in education; (2) open educational resources and open solutions; (3) quality learning; (4) lifelong learning pathways; (5) online learning innovations; (6) quality assurance and recognition of online learning; (7) monitoring and evaluation; (8) accountability and partnership; and (9) international cooperation.

3. KEYNOTE SPEECHES

The conference included keynote speeches by Ms Irina Bokova, Director-General of UNESCO; Ms Liu Yandong, Vice Premier of the People's Republic of China; and Mr Yuan Guiren, Minister of Education of the People's Republic of China.

Ms Irina Bokova recalled in her speech that the international community had affirmed the centrality of education to peace and sustainable development, and said that UNESCO had been coordinating the international education community to formulate a new and universal global education agenda for 2030. The proposal on the post-2015 education agenda had been endorsed by over 130 Education Ministers at the World Education Forum held in Incheon one week before the Qingdao Conference, including the following overall goal: to ensure equitable, inclusive and quality education for all and to promote lifelong learning opportunities. The Director-General said that the new development agenda would be transformative, placing new demands on education. In order to achieve the vision of equitable and inclusive quality education and lifelong learning, innovative approaches were needed and the education community must continually leverage ICT to promote and scale up innovation.

Turning to the role of ICT, she said that it must be a means to empower all women and men and to foster equality, justice and dignity for all. These could not be bolted onto education. Rather, they must be built in, they must be integrated, leveraged, harnessed, and monitored. According to Ms Irina Bokova, the goal must be to ensure that change is driven by women and men, not forced upon them; and such changes should work to bridge gender divides, not widen them. She encouraged the audience to think big and to integrate ICT into

curricula, school environments and teacher training. She added that we must promote new information and media literacy, as well as the creation of relevant multilingual content.

Ms Liu Yandong, Vice Premier of the People's Republic of China, read a message from Xi Jinping, President of the People's Republic of China, in which he stressed that "in response to the development of ICT, human society has a common key mission to advance educational reform and innovation, to develop a networked, digitized, personalized and lifelong education system, to construct a learning society where 'anyone can learn anywhere and anytime', and to develop a large number of "human resources with creativity." The President expressed China's commitment to promoting the use of ICT in education and to ensuring all Chinese people can access quality educational resources and learn anywhere and anytime. In particular, China is dedicated to narrowing the digital divide as well as promoting the innovative development of ICT in education in order to promote equity in education. He also expressed China's willingness to engage in international cooperation and to explore sustainable approaches to the development of education.

In her speech, Ms Liu Yandong further outlined the potentials of ICT in transforming education, including (1) overcoming the limits of time and space and providing an effective way to narrow learning divides and promote equity in education; (2) fostering a "two-fold revolution", meaning transforming both teaching and learning and therefore promoting resource sharing and improving education quality; (3) building "schools without fences" and multiplying learning pathways for EFA goals and lifelong learning opportunities; and (4) converging vast knowledge and resources, and providing an important platform for human civilization to pass on and update across the generations. In this context, she referred to the impressive progress that China had made in the field of ICT in education, which could be summed up as "Three Universal Accesses and Two Platforms". The "Three Universal Accesses" refer to: (1) universal access to broadband for all schools (74% of schools have been connected to the internet, and 73% of schools have been equipped with multimedia classrooms); (2) universal access to quality resources for all classes; (3) universal access to online learning spaces for all students and teachers (64,000 teaching sites in remote areas have gained access to digital educational resources; 4 million children in the countryside have been provided with access to qualified education in their hometowns. In addition, the National Open University had been able to offer 33,000 online courses). The "Two Platforms" refer to: (1) an educational resources public service platform to create the largest "supermarket of digital education resources" in China; and (2) an education management public service platform to provide a basic database covering all students, faculties, primary schools, secondary schools, and universities, assigning each student a unique enrolment number and providing information on tests and enrolment, students' archives and study experiences, and employment services.

Drawing on China's experience, she put forward the following recommendations in order to make ICT in education initiatives successful: (1) support top-level design for the national ICT in education strategy, integrate the ICT in education policy into the overall national education development strategies and develop up-to-ten-year corresponding action plans. (2) ensure concerted action by setting up inter-agency coordination teams and through a countrywide network of supporting institutions; (3) expand the channels of participation for all stakeholders, including companies, schools and teachers; (4) promote application-oriented approaches, encourage teachers to innovate teaching practices through ICT, support students' personalized learning and inquiry-based learning, and make "class-based, regular and widespread" use of ICT the "new normal" of e-learning in China.

The Government of China had launched its national strategy to harness the Internet, which would accelerate the use of ICT to transform education in China. The vision that the Government of China had set for 2020 was to build an e-learning environment that would ensure universal access to high-quality education resources for all; to provide a digital service system that enables the learning society; and to realize the goal of universal access to broadband internet for all schools at all levels and of all types.

Finally, Ms Liu Yandong presented participants with four proposals for seizing the emerging digital opportunities:

- Capture the major trends and attach greater importance to the role of ICT in education systems.

- Based on human rights and needs of learners, promote in-depth integration of ICT into education systems, and in teaching and learning processes. Stress that ICT is just the means whereas the development of education is the end; ICT cannot be a substitute for teachers. Innovation is needed in the way ICT is used, in order to enhance personalized learning and peer learning between teachers and students.

- Strengthen collaboration and sharing of resources, continuously expand the coverage of high-quality educational resources. She called on participants to break down barriers to open information, eliminate digital divides, expand usage and coverage of digital services, continue to optimize regulations and public policies, and enhance the governance of the Internet to ensure the safe, equal and healthy application of ICT.

- Stress the principle of knowledge-sharing and move towards a new era that underscores the inheritance and development of human civilization, promoting deep interaction between different civilizations through inter-cultural platforms empowered by the Internet

In the last keynote speech, Mr Yuan Guiren, on behalf of the Ministry of Education of the People's Republic of China, presented ICT in Education as a Driver for Modernizing Education: Practice in China and Lessons Learned. He said that life in the information age had made the world realize that education could not be modernized without applying ICT in education. He

pointed out that for China in particular, advancing the use of ICT in education was not only required to respond to the challenges of the present era; it was also the best entry point and focal point to address the major issue of imbalanced growth of education, to promote equity in education, and to improve its quality and efficiency, thus giving it special significance.

In 2010, the Government of China released its medium and long term national ICT in education master plans, which stated explicitly that ICT would have a historic impact on the development of education and called for a strong emphasis on ICT in education.

Firstly, in order to realize the scientific and orderly development of ICT in education, China has developed a holistic and top-down approach. The Ten Year Development Plan for ICT in Education 2011-2020 was formalized in 2012. It states that by 2020, all adults will have access to quality education resources in an ICT-enabling environment, an ICT support service system for the learning society will take shape, and all regions and schools at all levels will have broadband internet access. In order to achieve the vision, the government has put forward its initiative to build "Three Universal access and Two Platforms", as outlined above.

Secondly, in order to considerably enhance Internet coverage and transmission capacity, China has accelerated its drive to upgrade infrastructure, including the China Education and Research Network (CERNet) and China Education Broadband Satellite (CEBSat), which are the two main education networks. At the same time, China is committed to making full use of existing public information transmission resources to accelerate the rollout of Internet access for all schools.

Thirdly, in order to enhance the impact of ICT in education and teaching, China has placed a strong focus on developing quality digital educational resources. In particular, China has launched the "one teacher, one quality lesson, and one class one quality teacher" initiative, which has led to the creation of quality digital teaching resources for 3.26 million teachers. In tandem, the Chinese Government has encouraged higher education institutions to develop MOOCs, and private companies to develop basic digital resources to supplement formal educational materials.

Fourthly, in order to enhance the modernization of education governance, China has promoted ICT in education administration through the establishment of a national data centre and the implementation of the national service system for education decision-making. China has also set up a national data centre supporting the administration through a unique online identity number for each student, each teacher, and each school.

Fifthly, in order to promote the widespread application of ICT in teaching, China has carried out full-scale capacity training for teachers. China has launched a capacity improvement project targeting primary and secondary school teachers' capacity to use ICT, helping them to integrate ICT into their teaching. ICT training for education administrators has also been stepped up, so as to enhance their ICT leadership capability.

Mr Yuan Guiren concluded that China would continue to work to provide equal access to ICT, enhance capacity-building for teachers to adopt ICT, and establish ICT-based lifelong learning systems and a learning society. At the international level, China is ready to strengthen exchange, cooperation, and mutual learning with countries around the world in the area of ICT in Education, to ultimately reshape the future of world education and to lay the foundations for global prosperity.

4. HIGH-LEVEL DEBATE: SCENARIOS AND ENABLERS OF ICT-ENHANCED FUTURE EDUCATION

The main goal of the debate on "Scenarios and Enablers of ICT-Enhanced Future Education" was to hold a forward-looking debate among education and ICT industry leaders on how ICT trends will potentially reshape key aspects of the education system, and how policy enablers and ICT innovations should be intertwined in national and institutional policies in order to achieve post-2015 education targets. The debate was divided into two consecutive panels, each involving panellists in both education and ICT. Panellists included Ministers of Education from different countries (Bahrain, Cuba and Rwanda), private sector representatives (China Telecom, HP, Intel, and Wei Dong Group of China), and representatives of UNESCO and the OECD. The debate opened with a presentation given by Mr Qian Tang, Assistant Director-General for Education, UNESCO, on the result of the overall goal for the post-2015 education agenda that was agreed in the World Education Forum held in Incheon, Korea, during the week before the Qingdao Conference. The consensus, which was easily reached, pointed out the need to focus future efforts on quality and equitable education for all, a task in which the use of ICT can be instrumental. The consensus on the post-2015 education goal provided the debate with a concrete context.

The key messages emerging from the discussion were the following:

(1)   The scenarios of ICT-enhanced transformation of education will result in, among many other impacts, the creation of global communities of teachers and learners and ICT-enabled lifelong and life-wide learning. In particular, ICT can integrate learning and working, and develop skills needed to work in an information-rich environment. The increasing application of big data to education was also noted, which is believed to be instrumental not only in monitoring and assessment but also to facilitate a more personalized education.

(2)   Quality has to be at the core of the use of ICT in education. It is by empowering teachers that technology will become a relevant tool for the transformation of education. This is why learning and the improvement of the quality of learning through innovative approaches must always be central in the use of technology in education. What matters is how to improve the learning experience, both in the classroom and outside.

(3)   Governments must be in the driving seat. It is when governments establish fundamental principles and a clear policy framework that the private sector can contribute with the provision of relevant products and services and avoid redundant investments. ICT in education master plans are used as strategic planning instruments to introduce ICT in education.

(4)   Notwithstanding the progress made, there is a big gap between promises and reality. Technology has not yet delivered on its promises. A robust assessment of the impact of ICT on learning outcomes is required.

(5)   Affordability is also an important concern for many countries, in particular the upfront infrastructure investment and maintenance costs. There is tension between the ICT in education Master Plans, which are usually programmed from a mid/long-term perspective, and the rapidly changing ICT market. Given the complexity of providing appropriate ICT solutions, governments need to set priorities and ensure they are implemented.

(6)   The representative of the industry sector pointed out that much more could be achieved if open standards were used across the board. Many investments, as well as projects, lack sustainability because of their lack of compliance with open interoperability standards.

PUBLIC-PRIVATE PARTNERSHIPS IN ICT FOR EDUCATION

Reports compiled by the United Nations and World Bank show that public-private partnerships (PPPs) can play a vital role in mobilizing the scale of resources required for financing and building ICT infrastructure, developing applications and locally relevant content, as well as developing the human capacity required for harnessing the full capacity of ICT tools. UNESCO and the World Economic Forum highlight six general principles relating to the necessary conditions for a successful PPP:

- The need to begin with a clear definition of needs.
- The importance of all stakeholders owning the initiative.
- A conscious focus on impact.
- The existence of strong regulation and accountability.
- An emphasis on sustainability, and
- Effective monitoring and evaluation that feeds back into the revision and development of the initiative.

As highlighted by the World Economic Forum in its report on the Global Education Initiative (GEI)[1] 2003-2011, the notion of PPPs needs to be expanded by incorporating civil society and transforming them into multi-stakeholder partnerships. Moreover, and based on its experience, the World Economic Forum presents four core principles for catalysing action-oriented, issue-based multi-stakeholder partnerships:

- Senior-level political ownership is critical in providing the long-term stability and the vision that stakeholders require in any multi-stakeholder partnership initiative.

- Adherence to the plans of national education sectors ensures that an initiative can be aligned with the government's day-to-day activities and administration, as well as the activities of the bilateral and multilateral donor community.

- Maintaining overall programme management and keeping stakeholders aligned and informed are crucial tasks that cannot be underestimated, both in terms of resources and the technical skills required.

[1] For more information: http://www.weforum.org/reports/global-education-initiative-retrospective-partnerships-education-development-2003-2011

5. THEMATIC DISCUSSION

Conference presentations and discussions were organized according to four main issues: (1) effective use of ICT for quality learning; (2) inclusive and relevant lifelong learning; (3) universal access to quality content; and (4) monitoring, evaluation and funding. To cover each issue, several topics were addressed through a plenary session and a set of focused parallel sessions on specific themes.

5.1 EFFECTIVE USE OF ICT FOR QUALITY LEARNING

This session aimed to share effective policies and innovative practices with regard to how national, institutional and school strategies should be aligned to provide system-wide support for teachers' effective pedagogical use of ICT, thus optimizing the benefits of ICT for quality of learning. Specific issues to be addressed under this sub-theme included (1) Transforming teacher education programmes, (2) Transforming schools to create open learning environments, and (3) Transforming learning in order to mainstream innovative pedagogies:

The session included presentations by representatives from the public sector (Ministry of Education in Norway, South Korea, and Uruguay) and academia (Open University of the United Kingdom). The experience-sharing and the discussion during the session provided an overview of the main issues that governments face when developing, implementing and assessing their national strategies. The major highlights from the session were as follows:

Master plans and national strategies must be framed in the context of the quest for better learning processes and outcomes. Implementing separate plans that focus only on the ICT infrastructure or only on digital content is not an effective approach. Master plans that support the achievement of broader educational objectives can be more instrumental and strategic.

Digital devices and content are the prerequisites for successful ICT in education initiatives. Governments should develop sustainable business models to align the provision of products and services by the private sector within the national policy framework. In this respect, the economics of ICT policies in education really do matter.

Assessment can play a crucial role. Although some countries have integrated digital skills in their national curriculum as new learning outcomes, what really matters is the ability of the government to make strategic use of assessment. The cases of Norway and Uruguay showed that such strategies should include not only using technology to support tests but also adapting the nature of the tests according to the expected new learning outcomes and the ICT-rich environment where the skills are to be applied.

The main challenge today is how to empower teachers. Technology can only support the transformation of education by empowering teachers to rethink what is being taught and how. UNESCO has consistently supported the principle that any master plan should allocate sufficient budget resources to teachers' professional development in order to provide pedagogical suggestions for transforming teaching methodology with ICT.

Equity must be an overarching principle. All the countries whose experiences were discussed showed a strong emphasis on equity, either from the perspective of how resources are distributed or of how schools benefit from them.

Systematic monitoring and evaluation must be embedded in the national master plans. The case of South Korea in particular showed how well-planned pilot testing and evaluation could result in better informed policy-making, as was the case when the digital textbooks initiative was adjusted in response to the pilot test results.

During the session on Transforming Teacher Education Institutions, the UNESCO-Chinese Funds-in-Trust (CFIT) project that is being implemented in eight sub-Saharan African countries (Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Ethiopia, Liberia, Namibia, United Republic of Tanzania and Uganda) was introduced by representatives of the Ministries of Education from some of the beneficiary countries. The topics discussed can be grouped into three key points summarized below.

Firstly, through the CFIT project, several challenges to enhancing the capacity of teacher training institutions have been observed and addressed. Resistance to technology (and continuous training) on the part of some teachers was identified as an issue in some countries. In order to overcome this obstacle, a reward system was introduced including providing allowances and career promotion opportunities. Technical difficulties such as unstable Internet connections and limited equipment, especially in rural areas, have also proved a major obstacle. The CFIT project has been able to create some satellite training centres closer to rural areas, so that teachers can be trained there.

Secondly, the CFIT project was aligned with countries' national priorities in order to maximize its impact. Recognizing that teachers are the most important element in enhancing education quality, the project enables participating countries to scale up their plans for improving teacher training. ICT can also reach teachers in rural areas while providing a more flexible channel.

Thirdly, experience showed that country ownership and leadership is the key to success, as it ensures both effective implementation and sustainability of the project.

THE CFIT PROJECT: ICT TO IMPROVE THE QUALITY OF TEACHER TRAINING

One of the challenges to improve the quality of teacher training is to ensure that the institutions providing initial teacher training become pioneers in the use of ICT, in particular by improving trainer equipment and skills.

The UNESCO project "Enhancing Teacher Education for Bridging the Education Quality Gap in Africa" therefore aims to transform the learning methods in the teacher-training institutes, notably by introducing the use of ICT. Financed with help from the Chinese Government, it was launched in November 2012 after the Global Education for All Meeting. Eight countries are taking part: Congo, Côte d'Ivoire, Ethiopia, Namibia, Liberia, Uganda, Democratic Republic of the Congo and United Republic of Tanzania. While the project takes different forms depending on the country, it essentially involves providing teacher trainers with equipment and capacity building resources, and innovates by setting up a regional network to encourage the exchange of experiences among participating countries.

So far, the CFIT project has successfully trained over 400 educators across eight countries in Africa, through the use of over 20 training modules made available online for distance learning. In total, over 700 pieces of equipment have been installed for the CFIT training scheme.

For more information: http://www.unesco.org/new/en/education/themes/education-building-blocks/teacher-education/quality-teacher-training-in-africa

On the theme of Transforming Schools to Create Open Learning Environments, Ministry of Education representatives from China and Singapore presented their ICT programmes and initiatives, together with several international organizations (ALECSO, GESCI). During the presentations, the value of designing systemic and consistent policies was once more emphasized. In terms of goals and strategies, the need to differentiate between enabler goals (related to infrastructure, teachers and principals) and outcome goals (related to students) was exemplified. In addition, the need to ensure an ethical and responsible use of ICT was also discussed. The presenters indicated that appropriate whole-school strategies make a significant contribution to a supportive ecosystem for innovative ICT practices in schools.

Regarding the professional development of teachers, speakers presented successful strategies, including: collaboration, peer learning and knowledge sharing, and formal acknowledgement, recognition and certification of teacher training. In addition, the use of OER, MOOCs (Massive Open Online Courses), Mobile Apps and cloud computing were highlighted as examples of open solutions for providing educational services, including teacher training courses. A reference in this respect was made to the UNESCO ICT Competency Framework for Teachers.

THE ICT COMPETENCY FRAMEWORK FOR TEACHERS

While the use of ICT varies according to the discipline being taught, the learning goals adopted and the pupils themselves, it is nevertheless important to establish the guiding principles for the use of ICT in teaching. This is the goal of the "ICT Competency Framework for Teachers" (ICT CFT) devised by UNESCO, which sets out the many ways in which ICT can transform education. This framework provides attractive, rapidly evolving learning environments, blurring the boundaries between formal and informal education and encouraging teachers to

devise new teaching methods. In doing so, it forces a reassessment of the aptitudes and competencies required by pupils in order for them to become active members of the knowledge society and knowledge-based economy.

The Framework places emphasis on the skills required by teachers in order to make ICT an integral part of how they practice their profession. It also aims to offer support in drawing up national standards and policies in this area. It is built around three stages of learning: technological literacy (in which pupils use ICT to learn more effectively); in-depth knowledge (in which pupils acquire more in-depth knowledge in the disciplines they study at school and subsequently apply this to practical problem-solving); and knowledge creation (in which pupils, as citizens and future economic players, create new knowledge in order to build more harmonious and prosperous societies).

For more information: http://www.unesco.org/new/en/unesco/themes/ICT/teacher-education/unesco-ict-competency-framework-for-teachers/

During the session on Transforming Learning to Mainstream Innovative Pedagogies, presenters (Chinese universities, Intel, the Minister of Education of Morocco, and the OECD) outlined initiatives and projects that apply ICT in teaching and learning. Key points of significance were raised from the session:

ICT per se does not lead to better learning outcomes. It has been noticed that the more ICT are used without appropriate pedagogical methods, the more it leads to superficial learning.

ICT are tools that have the potential to empower teachers to teach differently and to develop innovative pedagogies. Teachers play an important role; consequently, empowering them to use ICT both in classroom settings and in professional development is the key to implementing pedagogical innovations. This justifies the emphasis on teacher training in ICT and certification of teachers in ICT competency, as these training and certification programmes play important roles in enhancing the quality of education.

In terms of transforming teaching and learning, ICT has the potential to: (i) connect teachers; (ii) connect learners; (iii) reschedule learning (people decide what and when to learn); and (iv) widen the pedagogical repertoires by expanding access to content and supporting collaboration for knowledge creation with learners as active participants. ICT can amplify innovative teaching practices; for example, hands-on pedagogies in game development and experiential learning. ICT-enabled inter-disciplinary and new pedagogical approaches, development of emotional skills, innovations such as Bring Your Own Device (BYOD), gaming-based learning, bringing open problems to the classroom (science curiosities), and inquiry based learning present new styles of learning and help learners stay more engaged and achieve better results (for example, in science and maths). It has been noticed that children use more and more ICT outside the classroom rather than inside; strategies are therefore needed to capture their attention in school and help them use ICT more for learning rather than for entertainment.

ICT is also transforming education delivery modes. The creation of cyber learning spaces provides an important interface between teachers and students, contributing to co-construction and sharing of quality teaching and learning resources, and ultimately to a thorough overhaul of teaching methods. Innovations inspired by practitioners or entrepreneurs can have a positive impact on education delivery, but the impact of ICT on educational delivery remains sub-optimal due to premature policies and implementation strategies as well as the poor pedagogical and instructional design of some online courses.

ICT is not only transforming the way students learn, but also what they should learn. Skills demands are changing constantly. The current digital revolution will generate new tasks and jobs that demand new skills. Applying the ICT of the twenty-first century to a twentieth-century education system does not yield good results, so teachers need to be aware of the potential of ICT to develop twenty-first century skills. Success is not only what people know but also what people can do with what they know. Lifelong skill development leads to continuous success and self-empowerment. There should be a shift in the learning paradigm, with the lifelong learning pathway starting in schools and extending throughout one's life, backed by investment in building continuous learning opportunities.

In terms of supportive strategies, access, quality and equality must be intermeshed. The digital divide remains a challenge, with students living in under-served communities being excluded from quality education. Students' access to ICT and to relevant digital skills matters. Learners who perform better academically tend to develop strategies to use ICT more effectively. Teachers need to be active agents, not just in terms of implementing innovations but also in designing them. Mainstreaming innovation is a matter for all schools, not just a few. Although pedagogical innovation has taken place sporadically, mainstreaming innovative pedagogies in the classroom and beyond is not yet a reality. Multi-stakeholder partnerships are needed if countries are to achieve large-scale, sustained transformation of teaching and learning with ICT.

MOBILE LEARNING

Mobile learning involving the use of mobile technology, either alone or in combination with other ICT, enables learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others and create content, both inside and outside the classroom. Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school systems and improved communication between schools and families.

It was predicted that in 2013, e-education would account for only 1% of total education spending worldwide, or around US $34 billion (GSMA, 2012). The main potential area of growth is likely to be fuelled by mobile technology. A report by GSMA and McKinsey & Company estimates sales of up to US $70 billion for mobile

operators, US \$38 billion for products and services in mobile education, and US \$32 billion for smartphones and tablets in the 2020s. The 2015 GSMA report also indicates that a total of 3.6 billion unique mobile subscribers had been identified by the end of 2014, while an additional one billion subscribers are expected by 2020, taking the global penetration rate to approximately 60%. Furthermore, this growth is set to be greater in developing countries, as the market in mobile-education is expected to increase by 50-55% over that period in Latin America, Asia and the Pacific, Africa and the Middle East.

For more information: http://www.unesco.org/new/en/unesco/themes/ ICT/m4ed/

5.2 INCLUSIVE AND RELEVANT LIFELONG LEARNING

The presentations on and discussions of "Inclusive and relevant lifelong learning" were organized to cover three themes: advancing equity in education, building lifelong learning pathways, and empowering women and girls.

During the plenary session which was organized in the form of a Ministerial-level Roundtable, representatives of the Ministries of Education from different countries (Afghanistan, Bangladesh, China, India, Japan, Niger, Russia and South Africa), as well as the heads of ALECSO and UN Women, presented their views on the potential benefits along with the challenges of ICT in this area.

Generally speaking, the Ministerial-level policy makers reaffirmed ICT's role in the post-2015 education agenda. ICT should play a more important role in addressing access, equity and quality issues in education, particularly in addressing equity through the use of distance and blended education modalities (i.e. synchronized classes, MOOCS, centres for distance learning, video lectures, e-learning spaces and mobile learning). Comprehensive ICT in Education plans should be developed to mainstream ICT use at all educational levels, in all settings, and for all groups, including girls and women, illiterate adults, and people with disabilities. In that context, reference was made to UNESCO's New Delhi Declaration on harnessing ICT for people with disabilities, which was adopted in November 2014.

ICT FOR PERSONS WITH DISABILITIES

According to the World Report on Disability compiled by the World Health Organization and the World Bank, in 2010, 15% of the world's population was estimated to be living with a disability. This figure represents over a billion people. In addition, there is a close link between poverty and disability. However, ICT have the potential to make significant improvements in the lives of these persons, allowing them to enhance their social and economic integration in their communities by opening up the range of activities available to them.

The International Day of Persons with Disabilities has been celebrated on 3 December every year since 1992, in order to promote an understanding of disability issues and to mobilize support for the dignity and well-being of persons with disabilities. It also seeks to increase awareness of the benefits of including persons with disabilities in every aspect of life.

UNESCO is one of the United Nations agencies that promotes and supports the Convention on the Rights of Persons with Disabilities, adopted in 2006. The United Nations Convention represents the universal framework, which reaffirms that all persons with all types of disabilities can enjoy all human rights and fundamental freedoms.

Based on its long-term advocacy of ICT use to promote access to knowledge for persons with disabilities, UNESCO convened an International Conference entitled From Exclusion to Empowerment: The Role of ICT for Persons with Disabilities, which was held from 24 to 26 November 2014 in New Delhi, India. The conference adopted the New Delhi Declaration on Inclusive ICT for Persons with Disabilities: Making Empowerment a Reality.

In the Declaration, UNESCO and the Conference participants called upon the World Community, governments and all stakeholders in the field of education (practitioners, technical experts, funders and administrators), particularly the corporate sector operating in the field of ICT, to synergize resources to leverage ICT to make empowerment of persons with disabilities a reality.

For more information: http://www.unesco.org/ict-disability/

Regarding the priorities of post-2015 education, skills development and lifelong learning were mentioned as priorities in post-2015 education, particularly for developing and least developed countries. Lifelong learning, which can be defined in various ways, involves learning and skills application throughout life, both in formal and informal settings. ICT-enhanced lifelong learning offers a second chance to girls and women and helps bridge the gender gap. ICT provides female and illiterate adults with flexible learning opportunities (learning anytime and anywhere), brings them rich digital resources and improves the efficiency and relevance of learning for these special populations.

Regarding quality, how to use and incorporate ICT in pedagogy was identified as the main issue. Presenters indicated that the core of ICT is not infrastructure, but rather deeper integration of these technologies in teaching and learning and systematic innovation. In this regard, the need to develop teachers' digital competencies, as well as empowering and incentivizing them to use ICT, were listed as major challenges. Furthermore, they highlighted the availability of high quality digital resources as a critical component in quality education and lifelong learning. The use of ICT for improving educational management and governance was also discussed.

Finally, sounding a note of caution, the presenters warned that ICT use is not a panacea for every problem. There are schools that adopt ICT intensively but still either perform poorly or fail to properly monitor and evaluate learning outcomes.

EDUCATION MANAGEMENT INFORMATION SYSTEM (EMIS)

Information is key to managing, planning and evaluating an education system. During the education management process, the education management information system (EMIS) should inform the different actors and partners about the state of the sector, its internal and external efficiency, its pedagogical and institutional operation, and its performance, shortcomings and needs. A solid information system should not only aim to collect and store data and process information, but also help in the formulation of education policies, their management and their evaluation. Like any therapy, a plan must be based on a precise, exact diagnosis if it is

to be effective. Problems should be identified through detailed, critical analysis in order to be able to propose solutions.

The definition of objectives, strategy choices and policy decisions should be based on objective data. Many countries have an education database based on school censuses and/or ad hoc surveys. However, the relevancy and quality of data are yet to be improved in most cases.

In 2013, UNESCO launched a new version of OpenEMIS, a generic open source Education Management Information System (EMIS) software package that countries can use with no conditions or restrictions. OpenEMIS, which can run offline on desktop computers or on the web and on mobile devices, facilitates data collection, processing and analysis, in order to support the dissemination of education system data. It is designed to be easily and quickly adapted to the needs of information producers and users at national and sub-national levels. It manages a broad range of information: data on student enrolment, teachers, non-teaching staff, classes, textbooks, infrastructure, finances and learning outcomes. In order to meet the requirements of different countries, OpenEMIS can handle both individual and aggregated (census) datasets for pupils, teachers and non-teaching staff. OpenEMIS also provides seamless integration with DevInfo, the database system endorsed by the United Nations for tracking countries' progress towards the Millennium Development Goals and other national priorities.

The OpenEMIS initiative is led by UNESCO and is backed by a strong technical support team that is ready to assist countries with all aspects of national implementation. The OpenEMIS initiative encourages national-level capacity development and aims to help countries upgrade their local skills to enable them to manage the system. UNESCO is partnered with the Community Systems Foundation to assist with technology transfers and EMIS deployment strategies, capacity development and technical support.

For more information: http://www.unesco.org/new/en/education/themes/planning-and-managing-education/policy-and-planning/emis/; www.openemis.org

In the breakout session on the theme of "advancing equity in education", Ministry of Education representatives from different countries (Cambodia, China, Madagascar and Pakistan) and UNESCO/IFAP (Information for All Programme) presented their ICT in education policies and initiatives.

The panellists discussed equity challenges in national, regional, and international contexts as well as ICT solutions to combat those problems. While equity was reflected differently in different countries, a consensus was reached that ICT could help advance equity by democratizing access to information and knowledge, developing human capacities and establishing adequate legal and regulatory frameworks to ensure access to information.

Among others, examples of harnessing the potentials of ICT to advance equity were shared around the following areas: (1) ICT had narrowed the gender gap and provided educational opportunities for females in male-dominated societies. Mobile phone initiatives in particular had had a tremendous impact on female literacy learning, by sending daily text messages and monthly evaluations to females who otherwise had no access to formal schooling. (2) ICT had provided education to geographically challenged regions. For example, students in remote areas, rural settings, and places without qualified teachers in Madagascar had been

provided with tablets to learn language and science. (3) ICT had helped empower secondary education while most educational initiatives target primary education. ICT had been used as a tool to create new career options for secondary school students through programmes with well-planned monitoring and evaluation. (4) ICT had been used to offer quality formal, informal, and non-formal education to disabled students. The Information for All Programme, one of UNESCO's intergovernmental councils, has implemented the i2Lab, which seeks to promote self-education, self-accommodation and independence and has contributed towards user empowerment. This is of enormous benefit to persons with and without disabilities and has a positive effect on learning outcomes.

Taking the specific contexts of developing countries into account, several strategies had been adopted to ensure that the use of ICT would not lead to more equity issues. Such strategies included: (1) distributing devices; (2) implementing solar panels to bridge the energy source inequality gap; (3) providing access to ICT for teacher training institutions for future teaching activities; and (4) delivering education information based on local challenges such as desertification, unemployment, and HIV and AIDS.

With regard to better-developed communities that use ICT in order to ensure that equity produces a different landscape, the policy is often developed and implemented as part of a wider development plan. For example, the Smart City of Qingdao (China's first Smart City Open Service Platform, launched in 2013) has included the construction of digital smart schools and digital learning centres in communities that aim to service all of the city's people.

Guiding principles for the use of ICT to advance equity in education included: (1) democratizing access to information and knowledge; (2) developing human capacities; and (3) establishing adequate legal and regulatory frameworks to ensure equitable access to information.

In the breakout session on "Building Lifelong Learning Pathways", Ministry of Education representatives (Mozambique), higher education institutions (Open Polytechnic of New Zealand and Open University of China), and the private sector (Bosch Rexroth, FESTO Didactic) presented and discussed their initiatives and programmes for technical vocational education and lifelong learning.

The discussion had drawn insights from three vectors: policy, institutions and the industry. On accelerating the achievement of education targets by 2030 from a lifelong learning perspective supported by ICT, the discussion helped examine pressing issues and opportunities to maximize the benefits of technologies.

A consensus was reached that lifelong learning is seen as a continuum; it is a pathway for both young people and adults, providing them with the transition from school to work and life. It covers formal/non-formal education, and informal or workplace-based settings. Scaling up lifelong learning provision must include recognition of non-formal/informal learning needs. However, in many countries, learning pathways are constrained by institutional and recognition arrangements.

ICT represent a new window to integrate many areas of development to building lifelong learning pathways:

(1)   ICT-enhanced methods of teaching and learning in both formal and non-formal settings will not only expand or increase the number of learning provisions and the number of beneficiaries; they will also reach out to more as yet unreached people groups. Online content development also needs to be strengthened. For example, in Mozambique, the increase in mobile subscriptions (from 3 to 6 million currently) has improved outreach in traditionally unreached areas such as rural communities.

(2)   ICT-enhanced online learning programmes diversify learning through multiple platforms and mixed learning models while enable learning in different environments. For example, both China Open University and the Open Polytechnic of New Zealand are supporting blended online learning to transfer knowledge and skills to a range of learners (academic, professionals, and vocational students).

(3)   Online platforms also improve the relevance of the programme to the labour market and individual professional development, and diversify career options and pathways for young people and adults to move up the qualifications ladder. It is particularly relevant to the needs of the industry to address skills mismatch issues. Bosch Rexroth gave an example of expanding vocational training in the industrial environment through apprenticeship programmes and developing a talent pool that was better suited to development of the sector. FESTO trains and prepares the workforce for new technology so that workers can embrace and adapt to technological change rather than be confined to a specific product-based training. However, it was also pointed out that TVET teachers need experience in industry to be more familiar with the industrial environment.

Quality assurance and the recognition of online qualifications remain challenges even for institutions that are trying to provide qualification-based training. The governments of some countries are not yet ready to recognize online qualifications or certifications. Given this lack of willingness on the part of some public systems, online learning provision needs to be endorsed by reputable institutions in order to address the acceptability/recognition concerns of online certifications, or to be systematically linked to formal / national qualifications frameworks in order to inform the process of systematically measuring, monitoring and evidencing. The debate must continue until the right model is found for benchmarking quality assurance and improving employer recognition of online certifications.

The principle of "leaving no one behind" should also guide policies and practice concerning the building of lifelong learning pathways. The cost of technology should not further exclude participants from the non-formal

and informal sectors. A strong synergy is needed between the industry and institutions to ensure the effective integration of ICT and the creation of skills-based and workplace-based learning experience for teachers and students alike.

The breakout session on "Empowering Women and Girls" brought together Ministry of Education representatives from different countries (Ghana, Nepal and Ukraine) and international organizations (Graduate Women International and UN Women). These presentations highlighted the challenges faced by women and girls, including: (1) stereotypical gender roles; (2) the lack of physical arrangements for girls in schools; and (3) the lower priority given to investing in the education of women and girls when resources are scarce. As a result, female participation in education is lower than that of men in many developing countries. Female participation in ICT-related activities is also considerably lower than it is for males.

Referring to opportunities to address these issues, the presenters mentioned that extra support, including financial, is needed to encourage girls to go to school. Relevant actions include: (1) encouraging training of female teachers in Science and Mathematics to scale up female participation in STEM; (2) adapting educational environments, materials and methods to be gender sensitive and gender transformative, so as to break the 'traditional' gender stereotype; and (3) promoting projects to increase female participation in communities, politics and other social leadership positions.

Some best practices were shared, including:

- Providing extra support, including financial, to encourage girls to go to school.
- Scaling up female participation in Science and Mathematics and focusing on training female teachers in these disciplines.
- Using ICT to provide distance learning — a more flexible approach for females to learn — but face-to-face education is still necessary in order to understand the needs of female learners.
- Developing an educational environment, materials and methods that are not only gender sensitive, but also gender transformative — to break the 'traditional' gender stereotype.
- Promoting projects to increase female participation in communities and politics.
- Starting to educate women by focusing on numeracy that meets their daily needs.

Recommendations arising from the session:
- Social and political mobilization is crucial to ensuring gender equality. If there is a political will, there is a solution.

- Men should be players in supporting the empowerment of women, e.g. the 'He for She' programme of UN Women.

- The gap in opportunities and living conditions between those who have and do not have access to ICT should be addressed. We should ensure that both women and men and the young and older people have equal access to ICT.

LEVERAGE MOBILE TECHNOLOGIES, EMPOWER WOMEN AND GIRLS

Education empowers women and girls. It provides them with the ability and knowledge they need to steer their own lives. When girls receive education they marry later in life; have smaller and healthier families; gain the skills they need to enter the labour market; recognize the importance of healthcare and seek it for themselves and their children; and know their rights and gain the confidence to insist on them. The virtuous ripple effect of education for girls is so far-reaching that former UN Secretary General and Nobel Prize winner Kofi Annan called it the single most effective tool for development.

However, access to education is still unequal across gender lines. The 2013/14 EFA Global Monitoring Report summed up the situation unambiguously: Worldwide, girls are more likely to miss out on primary education than boys and are afflicted by the 'most extreme cases of inequality in secondary education'. These disparities result in disproportional literacy rates for males and females. Globally, two out of every three illiterate adults are women.

Although not a panacea, mobile technology is a promising vehicle for improving education, thanks to a proliferation of educational content that is tailored for use on widely-owned mobile devices. The mobile phone provides an affordable means of maintaining literacy skills and obtaining information, and has great potential for reaching marginalized girls and women and providing them with access to further learning and development. At the same time, women in developing countries face unique challenges when it comes to using ICT to unlock educational opportunities. This is partly a problem of access. In low- to middle income countries a woman is 21 per cent less likely to own a mobile phone than a man, and the divide is similar for Internet access. Nearly 25 per cent fewer women than men have Internet connectivity in developing countries and this gap rises to nearly 50 per cent in some regions.

The past decade has seen an explosion in the number of programmes that successfully utilize mobile devices to expand and improve educational opportunities available to women, especially in developing countries where gender inequalities are most severe. More specifically, UNESCO is exploring how gender-sensitive content and training, literacy support, and skills development can advance education for women and girls.

UNESCO'S Mobile Phone Literacy project was launched in 2011 with support from the United States. The main goal of the project is to empower women and/or girls through education via innovative mobile technology-based learning and information programmes. The retaining and improvement of literacy skills of neo-literate women and girls is of particular interest, though not the exclusive aim.

During 23-27 February 2015, UNESCO and UN Women co-organized Mobile Learning Week 2015, which focused on Leveraging Mobile Technologies to Empower Women and Girls. Mobile Learning Week 2015 brought together more than 500 policy-makers and practitioners to share experience on how the increasingly ubiquitous, affordable and powerful mobile technology – from basic handsets to the newest tablet computers –

can be leveraged to accelerate high quality education for women and girls, especially those living in disadvantaged communities.

For more information: http://www.unesco.org/new/en/unesco/themes/ ICT/m4ed/empowering-women-and-girls
http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/pdf/MLW_2015_CONCEPT_NOTE1.pdf

5.3 UNIVERSAL ACCESS TO QUALITY CONTENT

The session on "Universal access to quality content" was designed to identify the key institutional strategies needed to promote the development and sharing of high quality digital content, promote open educational resources (OER), and unleash the potential of online learning to foster knowledge creation. Presentations and discussions covered three areas: creating and sharing content; MOOCS and other online learning innovations; and recognition of online learning.

The plenary session included presentations from Ministry of Education representatives (Bahrain), and three international organizations – the Commonwealth of Learning (COL) the International Council for Open and Distance Education (ICDE), and UNESCO.

The lack of content was identified as one of the barriers to the successful implementation of ICT in education policies. Furthermore, it was acknowledged that mechanisms for ensuring the quality of content have not yet been well established, including for OER.

Open content would add value only if the quality of the resources is guaranteed. Open Educational Resources have been adopted by an increasing number of countries, including more developing countries, to solve the problem of a lack of learning materials. Country-level examples include moving from policy to practice (e.g. Antigua, Barbuda, India, Mauritius, and South Africa), and open textbook movements (e.g. Canada and the Eastern Caribbean (www.carribeanoer.org). Other noteworthy trends include multi-lingual OER and OER that are integrated in MOOCs. "OER must not be seen as a product alone but as a process, facilitated by technology in which various types of stakeholders are able to interact, collaborate, create and use materials and pedagogical practices, that are freely available, for enhancing access, reducing costs and improving the quality of education and learning at all levels" – Professor Asha Kanwar, President and CEO, the Commonwealth of Learning.

The disparity in access to OER, and to digital OER in particular, is one of the issues involved in addressing the digital divide between the developed and the least developed nations. Teachers' ability to reproduce and re-use OER also remains a challenge. In this context, presenters highlighted the risk that OER could potentially widen the knowledge divide, in the absence of comprehensive public policies that encompass infrastructure, capacity building (especially of teachers) and support for open licences. In addition, it was recommended that OER policies should be developed to complement existing education policies and to contribute to achieving established education goals, rather than working in isolation. The national strategy for OER developed by Bahrain provided an example of how a comprehensive national OER policy can be developed. Under its

initiative for Digital Empowerment in Education by 2030, the Government of Bahrain has established an OER team and created a policy and master plan for adopting OER with support from UNESCO. The OER policy and master plan encompasses raising awareness of all stakeholders, capacity building for teachers and developers and managers of OER, as well as upgrading of infrastructure, quality assurance mechanisms, implementation strategies, and monitoring and evaluation methods. The OER policy was first implemented in 2014.

On the theme of access to learning content of higher education (HE), the presenter from the International Council of Open and Distance Education (ICDE) said that the demand for HE by 2030 is likely to double, based on the most recent (2013) enrolment data provided by the UNESCO Institute for Statistics. Open and distance learning (ODL) has a crucial role to play, not just in expanding the scale of HE, but also in supporting personalized and open higher education. Some 40% of students in the United States have taken part in one or more online courses. In Europe, 3 million students are enrolled in distance learning programmes. A meta-analysis by the United States Department of Education (2009/2010) shows that "students who took all or part of their instruction online performed better, on average, than those taking the same course through face-to-face instruction". A holistic model of distance learning should be based on a systematic design of services (staff capacity), products (curriculum design, course design, and course delivery) and management (strategic planning and development). The quality of online courses needs to be integrated with the institutional quality assurance framework of higher education.

OPEN EDUCATIONAL RESOURCES (OER): AN OPPORTUNITY TO ENHANCE THE QUALITY OF EDUCATION

When access to school textbooks is limited, these teaching and learning resources, either in the public domain or put into circulation under an open licence (making them free to use, adapt and distribute), represent an opportunity to improve the quality of education, to facilitate political dialogue and to share knowledge. This is, however, subject to the condition whereby teachers have the necessary skills not only to use them, but also to turn them into resources and to share them. For this reason, UNESCO encourages the development of such resources by the means of the Paris OER Declaration that was released in 2012, among other approaches, to which it is a signatory. This Declaration encourages Member States to contribute to raising awareness and use of these resources, creating environments that foster the development of information and communication technologies, and promoting open licences, especially for educational materials produced with public money.

For more information: http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-is-the-paris-oer-declaration/

The session on "Creating and Sharing Content: OER and Digital Textbooks" included speakers from Ministries of Education (Antigua and the Republic of Korea), higher education institutions (Central China Normal University) and UNESCO.

There are now unprecedented opportunities to personalize learning and to secure better learning outcomes using various applications and openly available content. The vital importance of the 3C's for ubiquitous learning

was reaffirmed: connectivity, capacity of teachers to use technology, and content. It is crucial to involve stakeholders if a digital textbook initiative is to succeed. The Digital Textbook initiative of South Korea has designed interactive functionalities to support active self-regulated personalized learning, including Enriched Learning Materials (glossary, multimedia materials, assessment items, supplementary/advance learning materials), Learning Support/Facilitation Functions (Note taking, memo, bookmark, hyperlink, hypermedia functions), and Interaction & Link Functions with Various Information Resources (communication and sharing through community service, link to diverse external learning material database). The Digital Textbook is hosted by a Learning Platform. Students are provided with a broadband connection to Wireless Internet and a mobile device (30 devices per class). To build teachers' capacity to harness the potentials of the Digital Textbook, the government has been training teacher-leaders in the use of digital textbooks, operating teacher learning communities, and developing and distributing collective and online training programmes. Even in a developed country such as South Korea, the Digital Textbook initiative also faces the challenges of policy and budget sustainability, copyright issues, standardization, school readiness, and the digital divide between regions.

It was stressed that people must not remain mere consumers of content, but must also play an active role in content development, and become the producers of content. Adopting OER reduces artificial barriers to content in terms of language, affordability, copyright, and cultural relevance. Capacity building for teachers on "Creating Your Own" (CYO) content will further their pedagogical innovation and knowledge creation. Some countries, including Antigua, have started to develop and use open textbooks. It is important to evaluate the real impact of OER and the role of 'openness' on the quality of learning, to analyse the cost-effectiveness of open textbooks and to develop a sustainable business model for open textbooks.

The session on "MOOCS and Other Online Learning Innovations" was presented by representatives from the Fijian Ministry of Education, higher education institutions (Beihang University, China) and the private sector. The presenters agreed that MOOCs is an emerging and continuously evolving concept. Because of its diversity, there are misconceptions about MOOCs.

Regarding the effectiveness of MOOCs, presenters said that although these courses already seem to form part of the landscape of technology-supported higher education, there is a lack of evidence regarding their real pedagogical value or their relevance for developing countries. It was also noted that the current implementation of MOOCs seems to focus more on content dissemination, and rather less on learner engagement and interaction. This concern is consistent with the recent discussion within the research community regarding the approaches needed to make MOOCs more interactive, social and personalized.

In terms of MOOCs' potential impact on equity, it was pointed out that most end-users tend to be well-educated and from developed countries. In developing countries, MOOCs are not open at all. MOOCs can be free of cost for participants but there are some entry barriers that make MOOCs barely attractive to end-users in developing countries, namely: equipment, broadband connectivity and, last but not least, the necessary skills to

succeed in a MOOC. The potential of MOOCs to address inequalities of access between countries is therefore debatable.

MOOCs impose a high demand on learners' self-directed learning skills. Currently, attrition rates in MOOCs are high with less than 10% of students completing courses. There were some concerns that current forms of MOOCs are more available and accessible to privileged students with good self-directed learning skills. How to motivate learners with no or limited self-directed learning skills remains as a challenge when promoting MOOCs.

There is not enough international cooperation on MOOCs. In addition, although many universities in developing countries have devoted considerable effort to developing their own MOOCs, the MOOCs dominating the market are still those produced by the developed countries. In light of this, it would be helpful to explore how MOOCs for development could result from a successful North-South or South-South cooperation.

In the session on "recognition of online learning", representatives of higher education institutions (Hamdan Bin Mohammed Smart University, UAE; Universidad Carlos III Madrid, Spain) and international organizations (UNESCO Institute for Information Technologies in Education) addressed the issue of quality assurance of online learning. They pointed out that the shift of learning modes and learning outcomes has become evident both in academic courses and in online course provisions. This feature must be reflected in the assessment, recognition and validation of qualifications as well as in quality assurance arrangements. The example presented by Hamdan Bin Mohammed Smart University provided a framework for building lifelong learning pathway for different types of learners, including casual (those who simply access open education for added learning value); committed learners (those who intend to obtain diploma/certifications on a modular, short-term based course); concentrated learners (those who seek fully-fledged qualifications i.e., bachelor, master's) and continuing learners (individuals who strive to make an impact on society).

They suggested that recognition of online learning should be aligned with national qualification systems for greater acceptability. Furthermore, they said that mechanisms for monitoring, measuring and validating learning outcomes must be strengthened and ensured. For example, adopting an e-Learning Quality Framework based on an on-going multi-dimensional assessment and improvement process is a practical approach for quality assurance of online learning.

In addition, they argued that the involvement of stakeholders in recognition of online learning is essential to improve the credibility, value and currency of qualifications acquired through online programmes. It was

pointed out that ICT, national frameworks and stakeholders (e.g. employers) all help to shape the assessment and recognition mechanisms that are now being implemented.

An additional impact of MOOCs and online learning using open platforms is that they provide opportunities to collect and analyse big data, and to form a better understanding of learning experiences and related outcomes. In return, results from the big data must inform the design of new online programmes and contribute to the development of appropriate assessment tools.

5.4 MONITORING, EVALUATION AND FUNDING

The session on "Monitoring, Evaluation and Funding" was designed to examine the indicators and methodologies that can be used to monitor the impacts of ICT on the achievement of post-2015 education targets, and how the funding for ICT in education initiatives can be sustained. This session was attended by representatives of higher education institutions (Beihang University, China), research organizations (Shanghai Academy of Educational Sciences), international organizations (UNESCO Institute for Statistics) and the private sector (HP Cloud, China).

The presenters stressed the relevance of monitoring ICT in education policies for tracking progress in achieving educational goals set in the post-2015 education agenda. Moreover, they reminded delegates that it is not enough to measure infrastructure and access to ICT, while data on ICT usage in classroom settings is urgently needed. It is also important to measure usage and impacts of ICT, to better understand how learning is taking place (balancing between inputs (e.g. hardware, content), process (e.g. how they are being used) and outputs (e.g. learning outcomes and behavioural changes)). The ICT in Education Indicators developed by the UNESCO Institute for Statistics (UIS) demonstrated how the data on infrastructure and access to ICT in education can be collected. UIS also stressed the need to measure ICT usage in classroom settings and is working on this pillar. HP's initiative of National Education Technology Assessment (NETA) demonstrated how the private sector can contribute to the assessment, including surveying the use of ICT in schools through various indicators such as learning outcomes, access, teachers' readiness, and school visits.

Emerging opportunities presented by the rise of "big data" were also addressed. The EMIS of China provided an example of using big data to evaluate the education system at different levels, to support decision-making, and to assist with forecasting.

As the number of students using Internet-enabled devices increases, the safety of children online needs to be included in a measurement framework. Another indicator that needs to be considered is the uptake of online distance education (going beyond MOOCS).

There are many aspects to measure, but resources are limited. Finding a sustainable financing model for the monitoring and evaluation process is crucial. Consequently, collaboration between national governments, international organizations, the private sector and NGOs is essential.

Finally, presenters addressed the issue of funding. The governmental budget is an important source of funding, but there is also a need to mobilize additional funding from the private sector. In relation to supporting the constant upgrade of technology, the issue concerning who should share the costs of the upgrading of the "gadgets" should be addressed. The discussion on the funding issue emphasized again the importance of collaboration between national governments, international organizations, the private sector and NGOs.

6. MAIN TRENDS

During the conference, the potential for using ICT as a means of expanding access to quality education, promoting individualized learning, fostering transformation in the classroom, and developing new literacies of students and teachers was highlighted and appreciated. Presenters also noted that well-defined frameworks and explicit strategies are needed to guide the participation and contribution of different stakeholders, including the private sector. The key role of ICT in education policies as strategic instruments was recognized, and the importance of gradual implementation and pilot testing was stressed.

Throughout the conference, a number of achievements, challenges and recommendations were presented and discussed. Within this context, emerging trends can be identified as follows:

Regarding the aim of improving access and inclusion, the main trend emerging from the conference was the use of distance learning as an alternative delivery mode to advance equity of education, particularly via the provision of virtual lessons, connecting students from remote schools, and sharing high-quality lessons that have been developed and delivered by master teachers. However there are prerequisites to realizing this goal, including the availability of a reliable Internet connection, especially in remote locations. It was emphasized that providing an Internet connection is simply the first step. Connectivity has to be good enough to support fluent online synchronous video communication on a regular basis.

Regarding this trend, the potential benefits of using open educational resources and open solutions were discussed in several sessions. However, there is also a consensus that the lack of content remains one of the main barriers to the successful implementation of ICT in education policies.

In this scenario, one recommendation that emerged from the conference was that in order to take advantage of the many opportunities associated with open resources and online learning in general, standards and quality assurance mechanisms need to be agreed and adopted, especially for monitoring, measuring and validating learning outcomes. It was also suggested that policies regulating the development and the use of these resources should be designed to add value to existing education policies and to contribute to meeting the education goals, rather than to function as an isolated, additional policy document.

Regarding the aim of improving the quality of learning, notwithstanding significant progress in many areas, the lack of competencies of students and teachers to effectively use ICT for learning and teaching was a shared diagnostic. To tackle this situation, in addition to recommendations already mentioned in the session above, an emerging trend is the development of strategies based on the use of virtual communities and social networks. However, related results are not yet available.

The classification of the impact of ICT, presented by Professor Peter Twining during the Conference, was useful to see how ICT could change and transform education. This classification includes three-levels of integration in terms of ICT's impact on the curriculum (what to teach) and (how to teach): Level 1 "Support": Pedagogy fundamentally remains unchanged while ICT increases the efficiency and effectiveness of teaching practices; Level 2 "Extend": Curriculum/pedagogy are different, but these changes can realistically take place without ICT; Level 3 "Transform": Curriculum/pedagogy are different, and these changes can take place with ICT. In the post-2015 era, a consensus has been reached that ICT should be harnessed to transform teaching and learning, moving beyond the efficiency and effectiveness driven-approaches seen in many ICT integration cases.

In addition, a number of presenters implied that the use of technologies involves a risk of widening the digital divide, due to the differences in ICT skills and information literacy among students and teachers. This situation could be exacerbated if the use of online learning systems for the professional development of teacher and student learning become widespread without having the adequate skills in place.

The way in which these skills are taught can become a significant equity issue, since international evidence shows that student performance in the more advanced uses of ICT is linked to their socioeconomic status and academic performance, among other contextual factors. Accordingly, recommendations for the development of guidelines and resources for teaching these skills could be considered. In addition, the evaluation of these types of skills is an area that deserves attention,[1] particularly the design, piloting and implementation of instruments to assess the digital skills of students (i.e. information literacy).

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[1] See for example, the International Computer and Information Literacy Study (ICILS) implemented by the IEA in 2013.

MEDIA AND INFORMATION LITERACY

Empowerment of people through Media and Information Literacy (MIL) is an important prerequisite for fostering equitable access to information and knowledge and promoting free, independent and pluralistic media and information systems. Media and Information Literacy recognizes the primary role of information and media in our everyday lives. It lies at the core of freedom of expression and information – since it empowers citizens to understand the functions of media and other information providers, to critically evaluate their content, and to make informed decisions as users and producers of information and media content.

Information Literacy and Media Literacy are traditionally seen as separate and distinct fields. UNESCO's strategy brings together these two fields as a combined set of competencies (knowledge, skills and attitude) necessary for life and work today. MIL considers all forms of media and other information providers such as libraries, archive, museums and Internet, irrespective of the technologies used. A particular focus will be on training teachers to sensitize them to the importance of MIL in the education process, enable them to integrate MIL into their teaching and provide them with appropriate pedagogical methods, curricula and resources.

UNESCO's mission is to engender media and information literate societies through a comprehensive strategy which includes preparation of the model Media and Information Literacy Curriculum for Teachers, the facilitation of international cooperation, development of Guidelines for Preparing National MIL Policies and Strategies, articulation of a Global Framework on MIL Indicators, setting up a MIL University Network, articulation of and establishment of an International Clearinghouse on MIL in cooperation with the United Nations Alliance of Civilizations, and provision of Guidelines for Broadcasters on Promoting User-Generated Content and MIL.

For more information: http://www.unesco.org/new/en/communication-and-information/media-development/media-literacy/mil-as-composite-concept

A complementary theme present throughout the conference was the need to develop the digital competencies of teachers. Despite the variety of teacher training strategies implemented by governments and agencies over the last decade, a comparative analysis of the incentives for teachers to acquire these competencies is still required. Policy-makers could, for example, look to incorporate ICT competencies into teacher appraisal systems.

Another trend emerging from the conference was the use of ICT to support lifelong learning pathways. In this regard, there was general recognition of the potential of ICT to multiply opportunities for reaching out to more learners; to scale up access to formal and non-formal education; to diversify learning through multiple platforms and resources; and to explore different teaching and learning styles, mixed learning models and the importance of different learning environments. To harness these opportunities, the recommendation was to advance quality assurance systems, as well as recognition of online qualifications and non-formal education settings. An example of how this can be achieved is through building strong synergies between industry and institutions, creating skills-based and workplace-based learning experiences for teachers and students, and aligning the recognition of online learning with national qualification systems.

From an innovation perspective, the most obvious emerging trend was the increasingly widespread availability

of online learning platforms that facilitate the use of adaptive systems for evaluation and learning. This development facilitates the use of adaptive tests in formative evaluation efforts, as well as the collection and analysis of "big data" to enable personalized learning, particularly via online systems. The impact of adaptive systems on students, teachers and other actors in the system is an area that deserves further attention. Finally, monitoring and evaluation of ICT in education policies was a transversal theme throughout the different sessions. The general conclusion was that measuring infrastructure of and access to ICT needs to be complemented with ICT usage data. In line with previous recommendations, it was further suggested that stakeholders should consider incorporating the assessment of digital literacy of students and teachers as a core component of the evaluation system.

7. QINGDAO DECLARATION

1.   We, Ministers responsible for Education, high-level government officials, representatives of civil society organizations, teachers' organizations, United Nations (UN) agencies and development partners, and members of academia and the private sector, have gathered at the International Conference on Information and Communication Technology (ICT) and Post-2015 Education from 23 to 25 May 2015 in Qingdao, the People's Republic of China, to affirm our collective understanding of how to unleash the full potential of ICT for education and for achieving the Sustainable Development Goals (SDGs). We thank UNESCO, the Government of the People's Republic of China, the Qingdao Municipal Government and the Shandong Provincial Government for convening this milestone event.

2.   We reaffirm the new vision of Education 2030 articulated in the Declaration adopted at the World Education Forum 2015 in Incheon, Republic of Korea, with access, equity and inclusion, quality and learning outcomes – within a lifelong learning perspective – as the key pillars. We are convinced that equitable and inclusive access to quality education for all across life is an imperative for building sustainable and inclusive knowledge societies, and as a key means of implementation to achieve all of the SDGs.

3.   Inspired by a humanistic vision of education based on human rights and social justice, we further affirm that the remarkable advances in ICT and the rapid expansion of internet connectivity have made today's world increasingly interconnected, and rendered knowledge and familiarity with ICT essential for every girl and boy, woman and man.

4.   To achieve the goal of inclusive and equitable quality education and lifelong learning by 2030, ICT – including mobile learning – must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more efficient service provision.

ACCESS AND INCLUSION

5.   Technology offers unprecedented opportunities to reduce the long-existing learning divide. The application of ICT is essential if we are to deliver on our commitment in the Incheon Declaration to non-discrimination in education, gender equality and women's empowerment for sustainable development. We commit to ensure that all girls and boys have access to connected digital devices and a relevant and responsive digital learning environment by 2030, irrespective of their disabilities, social or economic status, or geographic location. In striving to achieve universal access to basic education and skills development, we recommend that all education stakeholders recognize enrolment in quality-assured online courses as an alternative or complementary mode to face-to-face programmes of study.

6.   We stress the value of ICT-based solutions in ensuring that, in the wake of a conflict or natural disaster resulting in the destruction of schools or universities or in the impossibility of normal operations, the right to education is enforced. We therefore invite governments, international organizations, non-governmental organizations and technology providers to cooperate in designing and implementing, quickly and efficiently and whenever they are needed, the most suitable solutions.

OPEN EDUCATIONAL RESOURCES AND OPEN SOLUTIONS

Open Educational Resources (OERs) provide education stakeholders with opportunities to improve the quality of, and expand access to, textbooks and other forms of learning content, to catalyze the innovative use of content, and to foster knowledge creation. We commit to developing sector-wide strategies and capacity building programmes to fully realize the potential of OERs to expand access to lifelong learning opportunities and achieve quality education.

7.   We recommend that stakeholders facilitate access to Open Access (OA) Journals in Education for teachers, researchers and learners, and fully evaluate the potential of Free and Open Source Software (FOSS) and Open Standards for the development of ICT solutions, including for learners with disabilities and for promoting learning in the first language.

QUALITY LEARNING

8.	We commit to developing well-informed long-term policies and strategies to unleash the potential of ICT to achieve greater quality in education and transform learning. We recognize that there is a need to redefine learning outcomes and the way in which we organize and assess learning if we want our education systems to prepare lifelong learners — both children and adults — to thrive in networked knowledge societies and succeed in economies that are increasingly reliant on technology.

9.	We recognize that the ability to leverage ICT for learning is no longer a specialized skill; it is foundational to success in today's societies. We therefore acknowledge the need to integrate basic ICT skills and information literacy into primary and secondary education curricula. We support the adaptation of learning assessments in order to reflect the use of ICT and its impact on learning and on outcomes.

10.	Successful integration of ICT into teaching and learning requires rethinking the role of teachers and reforming their preparation and professional development. It calls for promoting a culture of quality in all its aspects: staff support, student support, curricula design, course design, course delivery, strategic planning and development. We will therefore ensure that teacher training institutions are equipped and prepared to use ICT adequately to expand the benefits of training and professional development programmes to all teachers, and to act as the vanguard for technology-supported innovations in education. We also commit to providing teachers with system-wide support for the pedagogical use of ICT, to incentivize teacher innovation, and to develop networks and platforms that allow teachers to share experiences and approaches that may be of use to peers and other stakeholders.

LIFELONG LEARNING PATHWAYS

11.	We reaffirm that lifelong learning is the guiding principle to enhance individuals' knowledge, skills and competences for work and life. We recommend that ICT be used to deliver education and training, including technical and vocational education and training, in both formal and non-formal settings, at all times and in all places, as it can improve and diversify learning pathways, improve quality, and further reach vulnerable and underserved groups including rural youth and adults, women and girls, out-of-school youth, and people with disabilities.

ONLINE LEARNING INNOVATIONS

12.	While we are aware of the challenges linked to quality assurance, pedagogical effectiveness and certification, we recognize the benefits of well-organized online learning courses for learners, institutions, systems and society at large. Online learning, including in the form of Massive Open Online Courses (MOOCs), has the potential to build new learning pathways towards tertiary education and lifelong learning. We therefore recommend that governments, institutions and other stakeholders further consider and harness the opportunities brought by online learning innovations.

13.	We recommend that efforts be made to explore the potential of 'big data' for enhancing online learning in order to inform our understanding of students' behavior and learning, and to improve the design and organization of online courses. In this context, governments must develop policies and systems to ensure secure, appropriate and ethical use of data, including safeguarding the privacy and confidentiality of students' personally identifiable information.

QUALITY ASSURANCE AND RECOGNITION OF ONLINE LEARNING

14.	We consider quality assurance and recognition as crucial and interlinked elements for enhancing the relevance and credibility of online learning, and for supporting lifelong learning and professional progression and mobility. We call for the establishment of transparent quality assurance measures of online learning that support reliable, valid and credible assessment.

15.	We recognize the potential of innovative ICT-based approaches in certification and assessment, including competency, portfolio, online badging and peer assessment, as tools that can broaden routes to employment, fulfilment and achievement of qualifications by all learners. We call for fair and transparent recognition of learning outcomes and qualifications acquired through online learning. We encourage Member States and other stakeholders, including education and training providers, to use ICT to promote recognition, validation and accreditation of the knowledge, skills and competencies acquired through informal and non-formal settings, and to build bridges between formal, non-formal and informal learning.

MONITORING AND EVALUATION

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, in order to enhance the management of education systems, ensure accountability, and understand the key roles that ICT increasingly plays in the transmission of knowledge, the acquisition of new skills and competencies, and in the development of values and attitudes that are relevant to the building of sustainable and peaceful societies.

17.   We further recommend that governments and other concerned partners support capacity development in data collection, analysis and reporting at the country, regional and global levels. We request the UNESCO Institute for Statistics (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 work and advancing its mission to build and maintain a global repository for ICT in education data.

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.

ACCOUNTABILITY AND PARTNERSHIP

19.   We encourage governments, industry partners and all other education stakeholders to join forces and share resources to create equitable, dynamic, accountable and sustainable learner-centred digital learning ecosystems.

20.   We recognize the growing importance of multi-stakeholder partnerships for successful ICT in education policies, based on cooperation between governments, industry partners, civil society organizations – including teachers' organizations – and academia.

21.   We call for further consultation and dialogue between governments and the private sector to design scalable innovative funding mechanisms to secure the financial resources needed to unleash the full potential of ICT for learning, in line with the 2030 education agenda.

INTERNATIONAL COOPERATION

22.   We invite UNESCO to explore the feasibility of three activities in support of international cooperation in the field of ICT in education, in line with Education 2030:

1. an international fund to assist developing countries, with special focus on the least developed countries, to use ICT to achieve their national goals in education;
2. a global network of expertise and knowledge-sharing on ICT in education, including the specialized Institutes and Centres under the auspices of UNESCO, which would serve the needs of three different user communities – namely policy-makers, researchers and teachers; and
3. a clearinghouse of good practices and lessons learned on technology-supported innovations in education.

Both Incheon and Qingdao Declaration say that:

Information and communication technologies (ICTs) must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision.

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