

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION IN FIVE ARAB STATES

A comparative analysis of ICT integration and e-readiness
in schools in Egypt, Jordan, Oman, Palestine and Qatar



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Introduction

More than ever, the advent of the knowledge economy and global economic competition compel governments to prioritise educational quality, lifelong learning and the provision of equal opportunities for all. Education policymakers widely accept that improved access to information and communication technology (ICT) in education can help individuals to compete in a global economy by creating a skilled work force and facilitating social mobility. They emphasise that ICT in education has a multiplier effect throughout the education system, by enhancing learning and providing students with new sets of skills; by reaching students with poor or no access (especially those in rural and remote regions); by facilitating and improving the training of teachers; and by minimising costs associated with the delivery of instruction.

Beyond the rhetoric, and of equal if not greater importance to policymakers, are basic questions about the role that ICT plays in basic educational outcomes, including retention and learning achievement. There are those that argue that ICTs are merely a delivery mechanism for teaching and learning, while it is the foundational pedagogy which matters (Clark, 1983; 1994). Others, however, contend that computers and other ICTs may possess properties or affordances that can directly change the nature of teaching and learning (Kozma, 1991; 1994; Dede, 1996). For instance, it is believed that ICT can help to bring abstract concepts to life using images, sounds, movement, animations and simulations. In any case, a better understanding of ICTs and their impact on student outcomes are priorities in all countries, regardless of level of economic development.

1. ICT in the Arab States

In the Arab States, national network upgrades, teledensity improvements, enhanced national connectivity, and the gradual introduction of new Internet Provider (IP) delivery technologies are creating a favourable environment for the uptake of ICT. However, much progress remains to be made, and this is truer for some countries more than others. With small populations and high investments in their national networks, the Gulf States have matched or outperformed international standards in ICT infrastructure, whereas geographically larger countries in the region often remain underserved.

The social movements that arose in 2011 in the Arab States have demonstrated the potential of ICT to play a catalytic role. Arguably, the *Arab Spring* ranks among the most significant informal ICT-assisted “learning” phenomena in 2011, whereby thousands of youth used social media – accessed via their mobile phones – as a space for self-identification, self-assertion, contestation and mobilisation around democracy, human rights and civil liberties (UNESCO, 2012a). The potential for significant change in education and ultimately in society, however, vary within the region. For example, while a number of countries in the Gulf region have achieved relatively high rates of ICT access in schools, the high costs of obtaining communication technology services, the limited number of computers in the education sector, and high levels of technological illiteracy in other countries represent significant barriers to access ICT in education when compared to international rates (Oman, 2011).

2. Why do we measure ICT in education?

For almost four decades, education policymakers have been formalising all-inclusive ICT policies as part of educational renewal and reform. At the international level, policy for integrating ICT for development was first formulated in the Millennium Development Goals (MDGs) Target 8.F, which states that “in cooperation with the private sector, make available the benefits of new technologies, especially information and communications” (United Nations, 2000; United Nations, 2012).

Furthermore, the World Summit on the Information Society (WSIS), held in 2003 and 2005, resulted in a clear commitment by governments to foster the achievement of an inclusive information society. To this end, the WSIS Plan of Action identified ten targets to be achieved by 2015 – two of which are related to education. These include Target 2: Connecting all primary and secondary schools to ICT, which is a precondition to Target 7: Adapting all primary and secondary school curricula to meet the challenges of the information society (Partnership on Measuring ICT for Development, 2011) (see **Box 1**). The UNESCO Institute for Statistics (UIS) plays a vital role in helping to benchmark country progress within the WSIS framework by collecting statistics and calculating internationally comparable indicators related to ICT in education.

Lastly, while ICT is not mentioned explicitly in the *Education for All* goals, it is arguable that they play a pivotal role in achieving these goals, including broadening access, eliminating exclusion, and improving quality (UNESCO, 2000).

Box 1. WSIS targets on education and related indicators

Target 2. Connect all secondary schools and primary schools with ICT

1. Proportion of schools with a radio used for educational purposes
2. Proportion of schools with a television used for educational purposes
3. Learner-to-computer ratio
4. Proportion of schools with Internet access, by type of access

Target 7. Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances

1. Proportion of ICT-qualified teachers in schools
2. Proportion of teachers trained to teach subjects using ICT
3. Proportion of schools with computer-assisted instruction (CAI)
4. Proportion of schools with Internet-assisted instruction (IAI)

Source: Partnership on Measuring ICT for Development, 2011

Beyond helping countries benchmark progress, internationally comparable data published by the UIS also play a fundamental role in helping policymakers select priorities and adopt policies related to ICT in education. For instance, policymakers can use UIS data to inform decisions related to: i) national capacity and/or infrastructure levels for integrating new ICT instructional strategies in schools; ii) the types of ICT currently being neglected and/or emphasised; iii) whether or not ICT-assisted strategies are evenly distributed across sectors; iv) whether girls and boys are equally exposed to ICT in education; v) the types of support mechanisms currently in place or the lack thereof; and vi) the relative level of teacher training provided in relation to the demands placed on teachers to teach and/or use ICT in the classroom.

3. Current state of the international framework on ICT in education statistics

Despite the growing demand for ICT in education statistics globally, the most well-known international sources of education statistics lack basic information about ICT policies in education. For developed countries, neither the Organisation for Economic Co-operation and Development (OECD) nor the European Commission have a comprehensive set of indicators that include all three components of inputs, processes, and outcomes related to ICT—although they both are increasingly improving the dataset to include, for instance, assessments of student performance in digital skills. In fact, the OECD's Programme for International Student Assessment (PISA) dataset remains the most reliable source of information on access, use, and outcomes in this domain, despite its limitations in terms of geographical coverage, reliability, and its inadequacy regarding current classroom practices (OECD, 2010; 2011; Scheuermann, Pedró, & European Commission, 2009).

For developing countries, the situation is even more challenging. UIS and UNESCO has recently begun some regional initiatives intended to provide at least a comparative worldwide perspective of access to computers and the Internet in schools, while the World Bank's System Assessment and Benchmarking for Education Results (SABER) initiative and the Inter-American Development Bank are currently focusing on a compilation of detailed information about technology policies in education, mostly from a qualitative perspective. Unfortunately, neither of these initiatives has yet produced a comprehensive global assessment.

4. Methodology: E-readiness as a framework for quantifying ICT in education

Considerable strides have been made in the last decade to harness the power of ICT to help meet many development-related challenges, including those related to educational reform and development. Nevertheless, many countries in the Arab States continue to lag behind richer countries to fully implement ICT in their education systems.

E-readiness (electronic readiness) is a measure of the degree to which a country is prepared to partake in electronic activities and, thus, benefit from ICT in education (Dada, 2006). E-readiness may be measured by a number of ICT in education indicators based on data collected in the UIS questionnaire on ICT in education.

The UIS has been tasked with benchmarking and monitoring the integration of and access to ICT in education, by establishing internationally comparable and policy-relevant indicators. This project has been coordinated by the UNESCO Communication and Information Sector (CI), in close cooperation with the UIS, and with the support of the UNESCO Education Sector. In March 2012, CI conducted a data collection, using the UIS questionnaire on ICT in education in the Arab States to support the UIS regional survey rollout strategy. Funding was provided in part by ~~Talal Abu-Ghazaleh Organization (TAG Org)~~. The UIS was responsible for data analysis and producing the report, in consultation with CI and the UNESCO Education Sector.

This report assesses ICT integration and e-readiness in education systems of five countries of the Arab States region: Egypt, Jordan, Oman, Palestine¹ and Qatar. The results will lay the foundation for conducting a fully comprehensive data collection across the entire region.

¹ The data collected from Palestine include the West Bank but not Gaza. Given the different population densities of the two regions, as well as other demographic differences, data published for Palestine are not representative of the current situation regarding ICT in education in Gaza.

Moreover, this analysis will serve as a basis for comparison and future planning. These indicators can assist with a country's ICT advancement and development efforts by identifying areas where additional efforts are needed. For example, minimum levels of infrastructure are needed before ICT-assisted instruction can be implemented. This includes electricity, and in the case of Internet-assisted instruction, a basic Internet connection. Moreover, indicators related to teacher preparedness and capacity to instruct effectively using ICT provides more guidance for planning purposes.

The following analysis generally follows a progressive model for the integration of ICT and the essential infrastructure required for its successful implementation. As such, this report starts by examining the policy and curricular aspects of ICT in education as fundamental to building a culture of ICT use in education. This is followed by an analysis of basic infrastructure required to support ICT-assisted instruction, including electrical and Internet connectivity, numbers of computers, and existence of computer laboratories and ICT support mechanisms. The report then reviews institutional capacity for providing programmes aided by different forms of ICT, including radio, television, computers and the Internet, contrasted with enrolment data in such programmes to measure participation rates of both girls and boys in programmes offering ICT-assisted instruction. Lastly, the report examines teacher preparedness including relevant training for teaching basic computer skills (or computing) and on how to use ICT in the classroom.

The UIS data collection instrument and this report focus on primary and secondary education. Additionally, *Country Profiles* are annexed to this report (see **Annex I**), which summarise all publishable data. The survey instrument used during this data collection is also annexed to this report (see **Annex II**).

5. Integrating ICT in education through policy and other formal commitments

Educational policymakers are in a unique position to bring about change. This is illustrated in a study of 174 ICT-supported innovative classrooms in 28 countries (Kozma, 2003). In 127 cases, there was an explicit connection between the innovation and national policies that promoted the use of ICT (Jones, 2003). But while the introduction of ICT policy is necessary for change, it is not sufficient to result in its implementation or impact (Tyack and Cuban, 1995). Policies can, of course, fail to succeed and this happens when: i) they are viewed as mere symbolic gestures; ii) when teachers actively resist policy-based change that they see as imposed from the outside without their input or participation (Tyack and Cuban, 1995); iii) when they do not have explicit connections to instructional practice (e.g. focus on hardware rather than their relationship to pedagogy); iv) when they do not provide teachers with an opportunity to learn the policies and their instructional implications; and v) when there is a lack of programme and resource alignment to the policies' intentions (Cohen and Hill, 2001).

While some policies may fail, identifying those countries that have current active ICT in education policies and/or other types of formal commitments including plans, regulatory provisions or a regulatory institution or body is important for assessing a country's effort to implement ICT in education and embark on educational reform. Data show that all five countries possess each of the aforementioned definitions of formal commitments to ICT in education at primary, lower secondary and upper secondary levels of education. In other words, not only have each of these countries written a policy and plan for the integration of ICT into education, but these countries have also created regulatory provisions and regulatory institutions (or bodies) to ensure that ICT-assisted educational reform takes place and advancement toward established objectives is monitored and evaluated.

While some policies are more successful than others, the case of Jordan has been analysed and discussed widely in international literature as it is recognised both in the Arab States and internationally as a leader in developing its ICT infrastructure and promoting ICT as a tool to improve human capital, foster economic development and reduce poverty (UNESCO, 2011a). Policy documents related to ICT in education have continuously evolved and been systematically updated, including the *National Education Strategy* (2004) and an overall policy framework for 2007-2011, which was recently updated for 2009-2013 (UNESCO, 2011a). Jordan has systematically set in place a regulatory system through the National Centre for Human Resources Development (NCHRD) to monitor all activities in its reform programme – the *Education Reform for the Knowledge Economy (ERfKE)* which will be expanded during the next phase scheduled for 2009-2015. This key agency has played an important role in researching ICT applications in basic and secondary education.

In contrast, the implementation of a policy for the use of Open Educational Resources (OER) is lagging behind overall, given that just two out of five countries (Jordan and Qatar) have declared having national policies for the use of OERs. The term OER was coined at UNESCO's 2002 Forum on Open Courseware and designates "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions (OECD, 2007; UNESCO, 2002; 2012b). Moreover, while policy in the area of OERs is an important precursor for implementation, the broadband requirement of OER along with well-established and developed ICT infrastructure, leads to substantial constraint for implementation in a number of countries. While OER is typically perceived by many policymakers as an ICT tool that falls within the realm of post-secondary and tertiary levels of education, it will continue to have policy relevance for the development of primary and secondary education as ICT evolves at an exponential rate, both in terms of technological capacity and coverage becoming more widespread across regions and education levels.

6. ICT in education curriculum

In the Arab States, the implementation and use of ICT in education often lags behind other social and economic spheres, including communications, employment and commerce. In fact in many countries in the Arab States, children and youth learn more about how to use various ICT tools informally outside of the school system. The example from Egypt whereby youth efficiently used mobile devices and the Internet to communicate during the *Arab Spring* is an example of mass usage of ICT that surpasses current capacity within the educational system and schools.

Nevertheless, as the integration of ICT in education rises, and participation and transition rates to higher levels of education increase, children and adults will increasingly need to acquire different forms of digital literacy beyond basic computer skills to participate in several of life's spheres. Learners will need to develop digital literacy, not only for its own sake but also to support their education throughout secondary, post-secondary and tertiary levels. The early integration of ICT into primary and secondary curricula through formal recommendations is therefore vital and moreover acts as an important lever for ensuring the introduction and implementation of ICT into educational institutions and classrooms.

Regarding the inclusion of basic computer skills (or computing) in curricula, Jordan, Oman and Qatar state that they have specific objectives or courses at all three levels of primary, lower secondary and upper secondary education. This policy approach is, however, not the case in Egypt and Palestine, where specific objectives or a course covering basic computer skills or computing are lacking in primary education and begin in lower secondary education continuing

at the upper secondary level. While many children in Egypt and Palestine may be learning informally how to use ICT, children who are the most disadvantaged economically or geographically will likely continue to be deprived.

In addition to targeted teaching of basic computer skills (or computing), ICT can also be used to teach other subjects to enhance student learning while providing additional learning opportunities about using ICT tools themselves. National policies and plans may be very explicit about recommendations for ICT-assisted instruction focusing only on certain subjects and/or at certain levels, while other countries may have a more generalised and comprehensive set of recommendations for ICT-assisted instruction to be implemented across the entire national curriculum at all levels of education. Oman, a country that extends the use of ICT in all areas of the curriculum and at all levels, states in its education policy that, since meaningful learning takes place within contexts in which students are familiar, it is vital that learning experiences associated with ICT should not be isolated from other studies, but rather, the knowledge, skills and values associated with computer use need to be integrated into all subject areas (Oman, 2008).

The inclusion of recommendations for ICT-assisted instruction in the national curriculum of countries participating in this study appears to be relatively diverse ranging from heavily integrated across subjects in Jordan, Oman and Qatar to relatively infrequent use in Egypt where recommendations specifically target only specific subjects at certain levels. For example, **Table 1** shows that Jordan and Qatar include recommendations to use ICT in all subjects for every grade in primary through to upper secondary education (Jordan, 2011; McKinsey and Company, 2005).

Focusing on the integration of e-content and e-learning practices into several subject areas, Jordan's Education Initiative (JEI) has been a source of innovation in extending ICT across the curriculum for all grade levels (i.e. Grades 1 to 12) (UNESCO, 2011a). The JEI used 100 public schools (called "Discovery Schools") where JEI products were piloted prior to a national launch by the Ministry of Education. Of equal importance for ICT integration, in 2004 the ministry issued a Curriculum and Learning Assessment Framework, which guided the rewriting of curricula in all subjects for all grades between 2004 and 2008. Alongside the JEI, this framework provided the basis for the development of a broad programme of e-learning content which is now in full application and ongoing development.

In contrast to countries where ICT usage is heavily spread across curricula, recommendations for the use of ICT in Egypt are scattered across subjects and levels of education. Egypt provides recommendations for use of ICT in at least one grade in the sciences at all levels of education and at least one grade in second languages for lower and upper secondary education.

Meanwhile, Palestine lies between these two groups of countries. The country has recommendations to use ICT in all grades at all levels for the acquisition of second languages. There are also recommendations for at least one grade at all levels of education in mathematics, sciences, written communication (languages) and arts.

Table 1. Recommendations for ICT-assisted instruction in national curricula, 2011

		Mathematics		Sciences		Written Communication (Languages)		Second Languages		Arts	
		Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade
Egypt	Primary				√						
	Lower secondary				√				√		
	Upper secondary				√				√		
Jordan	Primary	√		√		√		√		√	
	Lower secondary	√		√		√		√		√	
	Upper secondary	√		√		√		√		√	
Oman	Primary	√		√		√		√			√
	Lower secondary	√		√		√		√			√
	Upper secondary	√		√		√		√			√
Palestine	Primary		√		√		√	√			√
	Lower secondary		√		√		√	√			√
	Upper secondary		√		√		√	√			√
Qatar	Primary	√		√		√		√		√	
	Lower secondary	√		√		√		√		√	
	Upper secondary	√		√		√		√		√	

Notes: Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012.

Source: UIS database.

7. Infrastructure to support the integration of ICT in educational institutions

Electricity and telecommunication facilities

To support teaching and learning processes, as well as to improve overall education management, a variety of ICT-assisted instructional approaches have been implemented over the years, ranging from the use of radio or television to computers, Internet and other technologies. However, whatever the combination, the integration of ICT into schools requires electricity (e.g. grid/mains connection, wind, water, solar or fuel-powered generator, etc.) that is regularly and readily available. While this is not always strictly the case for radio, which can be operated using batteries, television, computers and the Internet require a much more stable energy source.

Nonetheless, alternative forms of ICT are currently being introduced to several developing countries with less than adequate electrical infrastructure. For example, the rugged, low-cost XO computers – which are purchased from *One Laptop per Child* (OLPC) by national governments – use significantly less electricity than standard laptops relying on an array of batteries, solar power panels and human-powered generators to function. Palestine has been a significant participant in the XO project, deploying 4,000 computers in the West Bank and 6,000 in Gaza. Through networking and fundraising, OLPC intends to eventually provide a laptop to all children in Palestine and in schools operated by the United Nations Relief and Works Agency in the Middle East (OLPC, 2013).

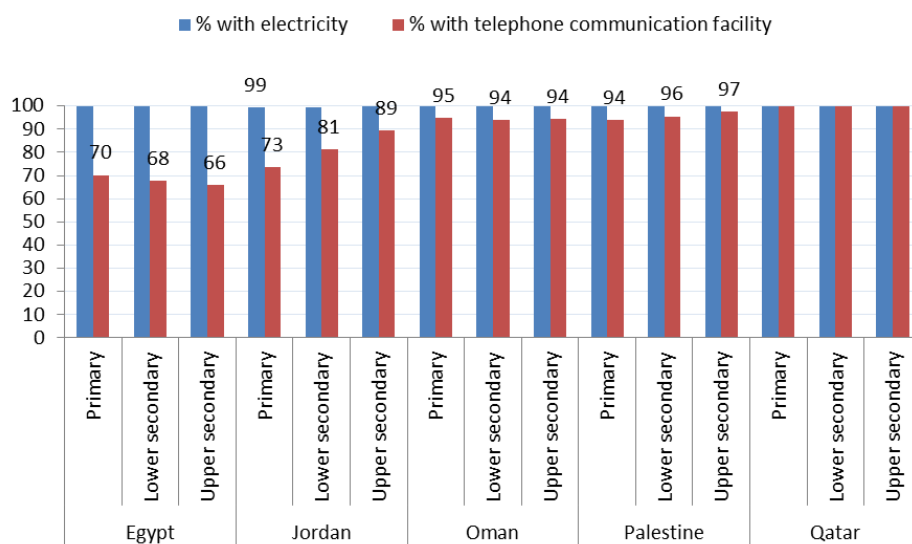
In order to gauge national commitment to ICT in education, measuring the share of schools with electricity and a telephone communication facility (defined as a fixed telephone line, cable connection, mobile phone or other sustainable communication technology that connects a school's terminal equipment (e.g. telephone set or facsimile machine) to the public switched

telephone network and which is intended for pedagogical or administrative purposes) provides information on institutional capacity.

According to **Figure 1**, electricity is almost universally available in primary and secondary schools in Egypt, Jordan, Oman and Palestine, and in every school in Qatar. This suggests that the basic electrical infrastructure is generally in place to integrate ICT in the classroom; where ICT is lacking, it is not necessarily attributable to the absence of a power supply.

The existence of telecommunication facilities in schools is slightly less frequent. While the majority of schools have a facility in both Oman and Palestine, shares are lower in Egypt and Jordan, which have large rural areas. In Jordan, for example, 73% of primary educational institutions have a telephone communication facility – increasing to 81% and 89% in lower and upper secondary educational institutions, respectively. The share of primary schools in Egypt with a telephone communication facility (70%) is similar to that of Jordan; however, in Egypt the share decreases at the secondary level of education, with 68% and 66% of lower and upper secondary educational institutions, respectively, having the infrastructure. In Qatar, all primary and secondary educational institutions have a telephone communication facility.

Figure 1. Proportion of educational institutions with basic electrical and telecommunications infrastructure by level of education, 2011



Notes: Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012.

Source: UIS database.

Building computer and Internet infrastructure: Access to advanced forms of ICT-assisted instruction

In order for countries to provide advanced forms of ICT-assisted instruction, including those using computers and the Internet, adequate computer resources and Internet connectivity must be established, keeping pace with demand based on enrolment. The *learner-to-computer ratio* (LCR) refers to the average number of learners per computer available for pedagogical use and measures the national level of computer access in aggregate education systems. While there is

no international target, a high LCR indicates substantially less computer access per learner than a low LCR, since more students are required to share the same computer.

The LCR sheds light on current infrastructure to support the integration of ICT-assisted instruction. It, however, does not provide information on the range of LCRs across regions, schools, or educational sector (see *Box 2*). For instance, while the LCR may be low in some regions (e.g. urban centres) indicating greater access, it may be much higher in others (e.g. rural and remote areas) indicating scarce resources and minimal access. In Jordan, for example, schools falling under the authority of the United Nations Relief and Works Agency (UNRWA) for Palestine refugees have an LCR of 29:1, compared to the national average of 14:1 (Jordan, 2012).

The LCR does not take into account the issue of computer obsolescence. For instance, several computers may be outdated or in disrepair. Moreover, it also does not take into account whether or not computers are even in use. There are cases where new computers purchased for schools remain in boxes and therefore out of pedagogical use.

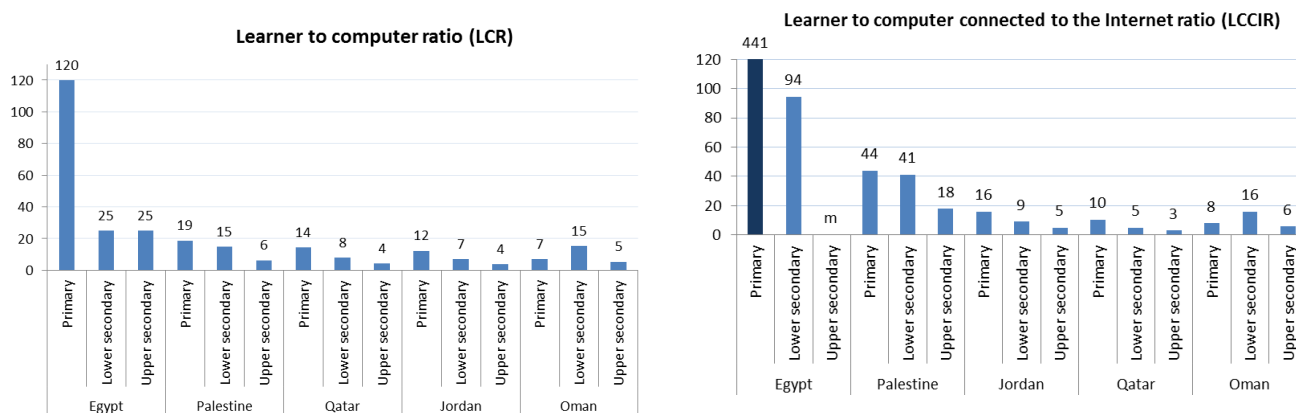
While the LCR indicator does not provide information on computer usage, it may be considered as a proxy measure for enabling computer usage since there is a relationship between LCR and individual learner time using a computer. In most schools, there is typically a less than 1:1 ratio between learner and computer, whereby more than one student must share a computer. Sometimes there are only a small number of learners sharing a computer in school, and group work using computers can have some learning benefit – especially if based on a collaborative or cooperative learning model. In other schools, however, the number of learners sharing a computer is so high that time on task is too limited per learner to allow a meaningful learning experience.

While schools need to acquire computers given the ever-increasing reliance on ICT in several life spheres, the push towards two-way communications between individuals over long distances necessitates computers that are connected to the Internet. The *learner-to-computer connected to the Internet ratio* (LCCIR) is an indicator that measures the capacity of education systems to support ICT-assisted instruction that uses the World Wide Web.

Figure 2 shows the LCRs and LCCIRs for primary, lower secondary and upper secondary education levels. In Egypt, for instance, data show that available computer resources are greatly overstretched since, on average, 120 primary-level pupils nationwide share a single computer². On the other hand, given the lack of recommendations for integrating ICT in education in Palestine, an LCR of 19:1 may not represent a situation where computer resources are overstretched. In Jordan and Oman, where there are recommendations for integrating ICT in all grades and most subjects, there are 12 and 9 primary-level learners, respectively, per computer. In almost all cases, the LCR decreases from primary to secondary levels of education indicating greater access at higher levels. Qatar also has recommendations for using ICT in all grades and subjects, however with a primary LCR of 15:1, access may be somewhat restricted in certain schools and regions.

² However, significant inter-school and inter-regional differences exist

Figure 2. Learner-to-computer ratio (LCR) and learner-to-computer connected to the Internet ratio (LCCIR) by level of education, 2011



Notes: Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012.

The LCCIR is calculated based on all computers, which may include those used for administrative purposes. As such, learner access to the Internet may be somewhat inflated as represented in the LCCIR values shown in Figure 2.

Source: UIS database.

Among the countries with greater access to computers (i.e. Jordan and Oman), the LCCIR is not substantially higher than the LCR. For example, while LCRs are 12:1, 7:1 and 4:1 in Jordan for primary, lower secondary and upper secondary education, LCCIRs are only slightly higher at 16:1, 9:1 and 5:1, respectively. In other words, the data show that countries with high levels of computer access generally also have high levels of Internet access.

In countries where general access to computers is already a challenge, there is a disproportionately profound shortage of Internet connectivity. In Palestine, primary and lower secondary LCCIRs are almost twice as high – 44:1 and 41:1 respectively – than LCRs of 19:1 and 15:1. At the upper secondary level, the ratio is almost tripled: 18:1 for LCCIR and 6:1 for LCR.

In Egypt, there are no specific recommendations for a course in basic computer skills at the primary level and ICT tools are poorly integrated in most areas of the curriculum. Within this poor infrastructure, 441 primary-level students on average share a single computer connected to the Internet. Access improves somewhat at the lower secondary level where 94 students share a computer connected to the Internet, which is almost four times more students than those who have access to a computer in general (i.e. LCR of 25:1).

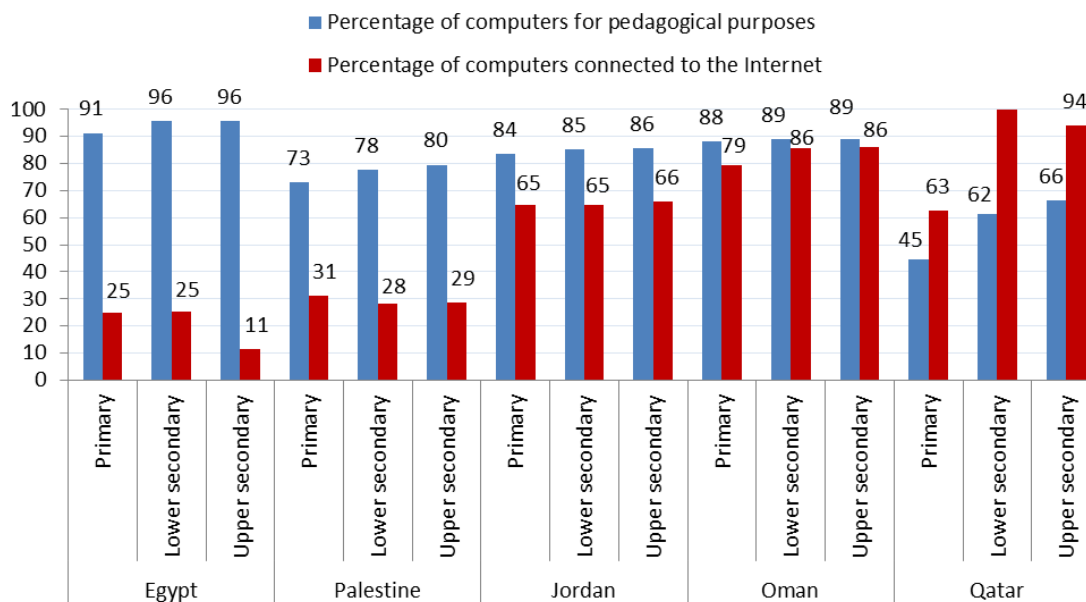
Allocation of computer resources and overall connectivity

Building infrastructure to support newer forms of ICT-assisted instruction using computers and the Internet requires substantial resources. To ensure that students have access, schools need to maintain adequate numbers of computers, keeping pace with student enrolment and technological change, and ensure that policies support the allocation of sufficient numbers of computers for pedagogical purposes, ensuring these are connected to the Internet.

Countries provide data on total computers within the education system, including those allocated to learners, teachers, administrative staff, or some combination of these. It is important to report the number of computers allocated to pedagogical purposes in order to have an accurate picture of the general level of access to support learning and teaching. An understanding of computer allocation strategy is also important, since it provides insight into possible redistribution of computers. For instance, in countries where computers are scarce and a high proportion is used for administrative purposes, a redistribution strategy may lead to more equitable sharing among students and/or teachers.

Figure 3 sheds light on the allocation strategy for computers, as well as their associated connectivity level in primary and secondary schools. Egypt, where computer resources are greatly overstretched and there are 120 primary-level pupils on average sharing a single computer, allocates the largest proportion of its computers to pedagogical purposes in primary (91%), lower secondary (96%) and upper secondary (96%) education. However, while Egypt allocates the largest share of its computers to learning, the largely rural country has a low share of computers (regardless of allocation) connected to the Internet, where respectively 25%, 25% and 11% of computers at the primary, lower secondary and upper secondary level are connected. In sum, while Egypt strives to allocate as many computers to pedagogy as possible, it is nevertheless constrained in its efforts to spread a culture of ICT-assisted instruction by a basic lack of devices and Internet connectivity.

Figure 3. Computers in educational institutions by allocation and connectivity, by level of education, 2011



Notes: Figures representing the percentage of computers connected to the Internet include all computers including those used pedagogically and administratively. Therefore, the actual proportion of computers connected to the Internet available for pedagogical purposes may be lower than the figures presented above.

Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012.

Source: UIS database.

Jordan and Oman also allocate a sizeable majority of computers (i.e. approximately three-quarters or more) to pedagogical purposes for all levels of education. Given the low LCRs and LCCIRs for these two countries, this more “balanced” allocation strategy takes into consideration the need for ICT for administrative purposes as well as for pedagogy. In fact, Jordan addresses allocation of ICT for both pedagogical and administrative purposes in its policy framework by focusing on cost-efficient measures to acquire resources, rather than solely relying on increases to the education budget (UNESCO, 2011a). Oman possesses relatively high capacity levels to support ICT-assisted instruction using both computers and the Internet, given that about 80% or more of computers are also connected to the World Wide Web.

The availability of computers and especially computers connected to the Internet is also overstretched in Palestine given the relatively high national level LCR and LCCIR. However, Palestine, unlike Egypt, practices a more balanced approach in the allocation of computers and connectivity to both administration and pedagogy. Nevertheless, given that approximately one-quarter of computers are used for non-pedagogical purposes, new sharing systems or reallocation of some computers to instruction could be re-examined.

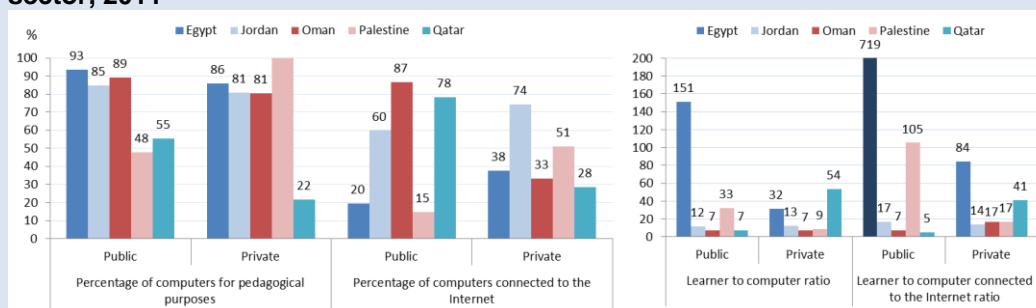
Also in Figure 3, Qatar provides data suggesting that a low share of computers is actually allocated to pedagogy – about 45%, 62% and 66% for primary, lower secondary and upper secondary, respectively. However, this may not represent an obstacle to access in terms of computers in this country, given the relatively lower national-level LCR (see **Box 2**). Access to the Internet is also not an obstacle in Qatar, with about two-thirds of schools connected in primary education to almost all in secondary education.

Box 2. Differences regarding computer/Internet availability in the public and private sectors

The availability of ICT resources is often impacted by the source of funding for educational institutions. For instance, while some private institutions exist to provide alternative educational opportunities to the public sector – frequently of higher quality or meeting religious criteria – others are established to fill gaps left by national education authorities (e.g. in remote regions and funded by communities and parents). As a result, the infrastructure available—not to mention quality—may vary significantly between public and private institutions.

Figure 4 presents the percentage of computers used for pedagogical purposes, the percentage of computers connected to the Internet, as well as the LCRs and LCCIRs in primary education disaggregated by sector. Data show that in Egypt, Jordan, Oman and Qatar, a higher share of computers in the public sector are allocated to pedagogical purposes than in the private sector – albeit the differences are not substantial. Palestine, however, shows the opposite trend, where 100% of computers in private institutions are allocated for pedagogical purposes, compared to just one-half (48%) in public institutions.

Figure 4. Proportions of computers by allocation and connectivity and LCR and LCCIR, in primary-level schools, by sector, 2011



Notes: The share of public enrolment as a percentage of total enrolment is as follows: Egypt (92%), Jordan (74%), Oman (94%), Palestine (80%) and Qatar (43%). The LCCIR for Egypt is coloured more darkly to show that the value of 719:1 exceeds the scale of the graph.

Data are aggregated for total public versus private sectors and therefore may mask substantial differences within the actual range of values representing individual public and/ or private educational institutions.

Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012.

Source: UIS database.

According to Figure 4, the type of institution – whether it is public or private – exerts a substantial influence on the availability of the Internet in Oman and in Palestine – albeit in different directions. For example, in the small private sector of Oman, which is mostly located in rural areas, one-third of computers (33%) are connected to the Internet compared to 87% in public education institutions; while in Palestine, about one-half of primary-level private sector computers (51%) are connected to the Internet compared to just 15% in the public sector (which comprises about 80% of enrolment in the country; in this case the West Bank).

In terms of impact on learners' level of access to computers, Figure 3 shows that the type of institution (i.e. public or private) can impact the LCR, particularly in Egypt and Palestine. For example, 151 primary-level pupils share a single computer in public schools in Egypt, compared to 32 primary pupils in private educational institutions. While not as profound, public access is also relatively low in Palestine, since 33 public students share a computer compared to 9 private sector pupils.

Given the lack of Internet connectivity in these two countries, the type of institution a pupil attends plays an even more profound role on access to computers that are also connected to the Internet. For example in Egypt, where ICT tools are not integrated into primary-level curricula, pupils in primary private institutions are about nine times (84:1) more likely to have access to a computer connected to the Internet than a pupil in the public system (719:1). In Palestine, 105 pupils in public institutions share a single computer at the primary level, compared to 17 in the private sector.

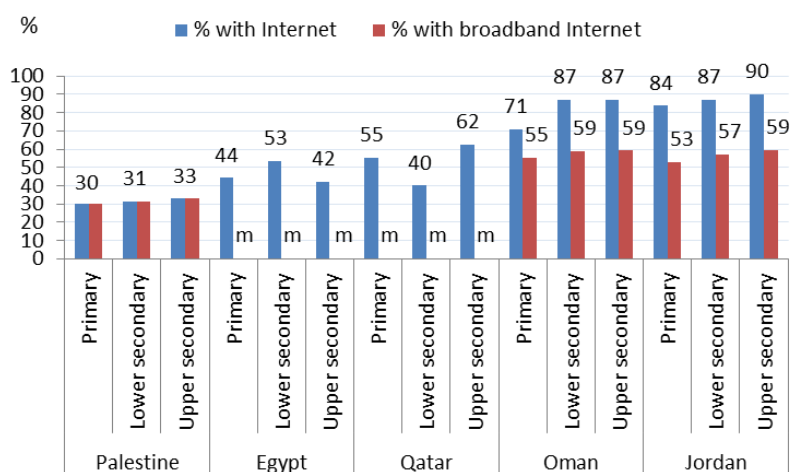
In the small Gulf country of Qatar, where there are recommendations for using ICT in all grades and subjects, the type of school is also a significant predictor of access to computers and the Internet. While there are 41 primary students sharing a computer connected to the Internet in private schools, there are only 5 children sharing a computer with Internet access in public schools. Based on the analysis, policies that better incorporate sectoral differences in access to computers and the Internet, taking into consideration regional differences related to infrastructure, are needed to ensure more children can access ICT in education.

Types of Internet connectivity in schools

Given that connectivity is a prerequisite for the integration of ICT-assisted instruction using the Internet, an analysis of basic Internet connectivity is primordial in determining a country's level of preparedness. Increasingly, the need for broadband connectivity and high bandwidth are necessary to effectively support instruction over the Internet, particularly for two-way synchronous communication (e.g. video conferencing), streaming videos, and using online applications and databases that have high capacity requirements (Broadband Commission, 2013). Nevertheless, furnishing narrowband Internet in certain situations might be considered as a temporary solution to fill in gaps experienced by institutions that would otherwise be unconnected.

Figure 5 shows the proportion of primary and secondary educational institutions with any type of Internet connection, as well as those with a broadband connection. Data on types of Internet connection also shed light on the share of schools that may be using narrowband Internet connections, which to a certain degree limits pupil's capacity for online learning. Fewer than one-half of educational institutions in Palestine and Egypt have an Internet connection, while more than two-thirds of all educational institutions in Oman and Jordan are connected. In general, secondary educational institutions are given priority, and this is most evident in the case of Oman, where 71%, 87% and 87% of primary, lower secondary and upper secondary schools, respectively, are connected³.

Figure 5. Proportion of educational institutions with Internet connectivity and with broadband connectivity by level of education, 2011



Notes: m = missing data.

Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012.

Source: UIS database.

³ From a logistical perspective, most countries have fewer secondary level institutions, which may facilitate connecting all secondary schools before primary level institutions can also be connected.

In Qatar, where resources are unevenly distributed between the public and private sectors, 55%, 40% and 62% of total primary, lower and upper secondary schools, respectively, are connected to the Internet⁴.

Broadband connectivity presents a challenge for many countries in the region. However, in Palestine, where about one third of schools have Internet connections, all are via fixed broadband. In Oman and Jordan, where different types of connections coexist, more than one-half of Internet connections are via fixed broadband. Data on broadband Internet are not available for Egypt and Qatar. Similar to the Internet in general, the implementation of broadband connectivity is prioritised for secondary institutions in both Jordan and Oman, rising incrementally by level of education.

Computer laboratories, networks and support services

The installation of computer laboratories in schools is a significant upgrade to where a class might have one desktop computer in the back of the room. More recently, however, given the reality of a multitude of both personal and school-owned devices (including laptops, tablets and mobile devices), education technologists argue that computer laboratories are becoming obsolete and may, in fact, provide a disservice in some situations, since they imply that computing is a separate subject and that the use of ICT ought not to be fully integrated into the general curriculum. Others point to an inadequate budget in most schools for one-to-one programmes and that more computer skills classes should be developed, in addition to integrating technology into the rest of the curriculum (Pedro, 2012; UNESCO, 2011a).

While the promotion of *One Laptop per Child* programmes has as its aim the achievement of learner-to-computer ratios of 1:1, few countries have been able to attain this. Alternative strategies may potentially improve the availability and management of ICT-assisted instruction in schools. For instance, one alternative is the use of *multi-seat computers* or *networked PCs*, where users simultaneously operating from a single CPU and server possess their own individual monitors and keyboards.

As long as ratios of learner-to-devices and the Internet are more than 1:1, computer laboratories may help to fill in this gap by playing an important role in managing and organising how and when children use ICT-assisted instruction. In the past, many have suggested that computer laboratories can facilitate the teachers' role in structuring learning opportunities more efficiently for a large number of children around computers than having fewer computers in individual classrooms. For this reason, computer laboratories – in addition to classroom-based individualised learning – can effectively support ICT-assisted instruction.

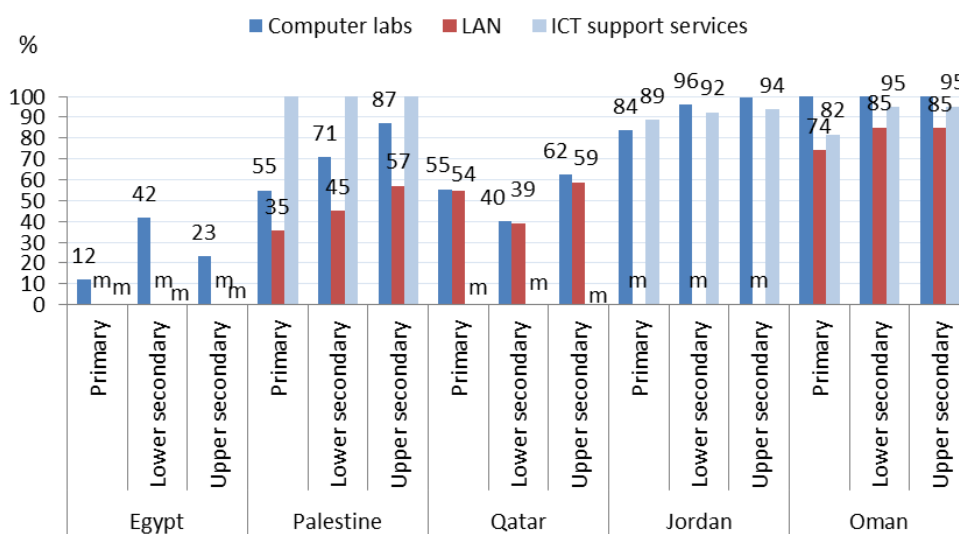
Local Area Networks (LANs), which refer to a network connecting computers within a localised area such as a single building, department or site, also expand potential for ICT-assisted instruction by emphasising interactivity and communication between pupils and/or teachers. They provide the following benefits to learning and teaching: i) increasing resource sharing; ii) flexibility in that information can be accessed from a number of locations in the school setting; iii) network licensing is cheaper than for individual devices allowing for access to a wider segment of children and incurring substantial savings; iv) quick and easy file sharing; v) additional security to computers and information via a central backup and safety system; and vii) devices can be shared by a number of users (including printers, scanners, etc.).

⁴ In Qatar, all (100%) public educational institutions are connected to the Internet.

While computer laboratories and LANs can help expand technological capacity, ICT support services are increasingly important in a highly technical environment. ICT support services must ensure the sustainability of ICT facilities (e.g. computer laboratories and LANs), and they are vital in the coordination, maintenance and overall viability of ICT facilities. More specifically, ICT support services typically coordinate the effective use of ICT across the curriculum for both students and teachers to ensure that teachers and students alike understand how to effectively use ICT in their work. Secondly, they monitor how equipment and software are accommodated, acquired, maintained and replaced. Without ICT support services, several challenges may arise, including the possibility that ICT equipment falls into disrepair, is not properly maintained and replaced, leading to obsolescence.

Figure 6 demonstrates varying degrees of ICT infrastructure within countries to support and enhance the provision of ICT-assisted instruction. In Egypt, for example, where national policy has been to provide computer laboratories in schools at the rate of one laboratory per every 15 classes (Hamdy, 2007), computer laboratories are relatively scarce in primary (12%), lower secondary (42%), and upper secondary (23%) educational institutions, respectively. In Palestine, which does not integrate the use of ICT into all grades of primary education, computer laboratories are available in only 55% of primary institutions, compared to 71% in lower secondary and 87% in upper secondary institutions where ICT is more heavily integrated into the national curriculum.

Figure 6. Computer laboratories, LAN and ICT support services by level of education, 2011



Notes: m = missing data.

Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012.

While total data on ICT support services are missing for Qatar, they are present in 100% of public institutions.

Source: UIS database.

In Jordan, where the Ministry of Education has been making strong efforts to integrate laboratories in all schools, 84%, 96% and 100% of primary, lower secondary and upper secondary educational institutions, respectively, now have functional computer laboratories (Jordan, 2012). In Oman, laboratories are even more common and, in fact, are universally available at all levels of education.

Data on LANs are only available for Palestine and Oman, where the share of schools with LANs increases according to education level. While the share of schools with both LANs and computer laboratories increases by education level in these two countries, more schools overall have laboratories than LANs. This difference is more marked in Palestine where 55%, 71% and 87% of primary, lower secondary, and upper secondary educational institutions are equipped with a lab, respectively.

For countries with available data on ICT support services, two scenarios are presented. In Palestine, where computer laboratories and LANs are less common, ICT support services are almost universal. This suggests that Palestine is prioritising the effective use of ICT in education, despite challenges in terms of developing and maintaining the infrastructure components related to ICT equipment.

In contrast, secondary schools in Jordan and all schools in Oman are more likely to have computer laboratories than ICT support services, suggesting a lack of technical or pedagogical support to students and/or teachers in some schools, as well as a lack of support to properly maintain and/or repair ICT tools. In Jordan, for example, an estimated 8,800 computers require maintenance, are damaged, missing parts, or simply need to be installed. Thus, challenges remain which could be addressed through the availability of adequate ICT support services (Jordan, 2012).

In Qatar, data demonstrate a substantial digital divide in relation to infrastructure availability between the public and private sectors (see *Box 2*). For instance, while 55%, 40% and 62% of all primary, lower and upper secondary schools, respectively, have a computer laboratory, a laboratory exists in the majority of public institutions. Similarly, most public sector schools also have access to a LAN while all public sector schools have access to ICT support services.

Institutional-level ICT-assisted instruction

At the institutional level, ICT-assisted instruction is dependent upon the availability of proper infrastructure, i.e. installation and maintenance of electricity and telephone communication facilities, acquisition and maintenance of computers, and Internet connectivity. However, the instructional strategies and technologies employed by countries are just as influenced by national priorities and policies on the use of ICT in education, in addition to financial resources. Human resources also play an important role since teachers and other educational personnel need to use ICT effectively and impart knowledge and skills to pupils. Implementation plans need to evaluate current needs and future goals and ensure that adequate training and support are provided. The ICT-in-Education Toolkit (<http://www.ictinedtoolkit.org/usere/login.php>) is an online tool that can help policymakers to plan during various phases of ICT in education initiatives (Haddad et al., 2007).

Of the older forms of ICT-assisted instruction, radio-assisted instruction (RAI) has been used as an educational tool since the 1920s, and television-assisted instruction (TAI) since the 1950s, in order to enrich and expand the reach of education. Experience has shown that both types have been successful in expanding educational opportunities on a large scale and at a low cost by: i) targeting young adults who have left primary or secondary schools before graduation, allowing

them to follow curricula from a distance; and ii) providing otherwise unavailable instruction in sparsely settled rural and remote areas (Haddad et al., 2007; Trucano, 2010). Radio has an added advantage in rural areas with little or no electrical infrastructure, since these devices can be operated easily using batteries.

These older forms of ICT-assisted instruction are being challenged, as well as enriched, by computers and the Internet due to their greater capacity. Computer-assisted instruction (CAI) and Internet-assisted instruction (IAI) have evolved and diversified at an exponential rate, increasingly merging with older ICT tools to create new platforms for learning and teaching. In the 1980s, the approach of CAI was based on programmed learning or “drill and practice” software, whereas both the software and hardware have since evolved. Currently, there are many new devices that have been specifically designed or are being adopted into classrooms, such as laptops (regular and low-cost), interactive whiteboards, tablets, e-readers, smart phones, etc.

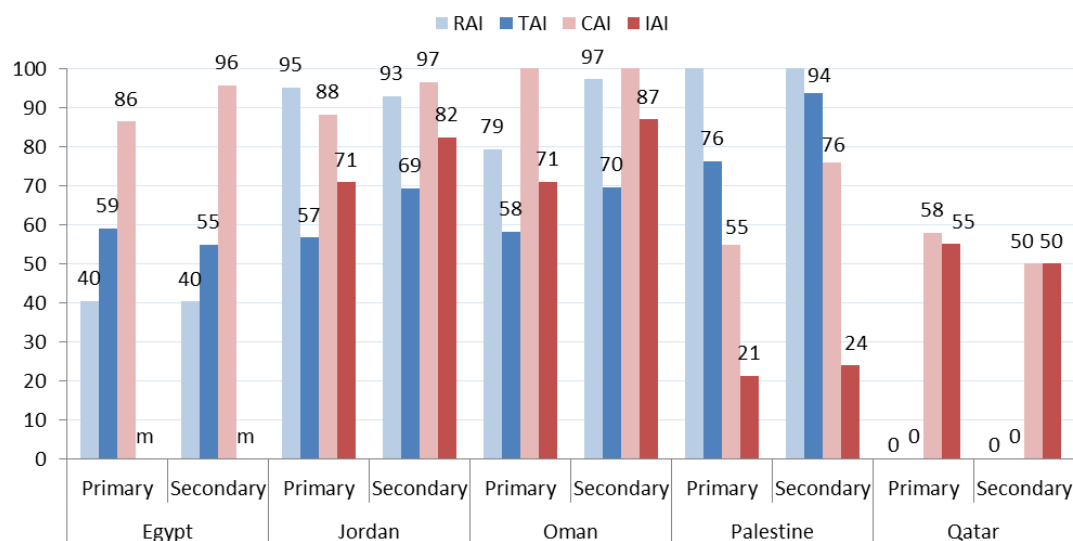
One of the hallmarks of both CAI and IAI is the increased opportunity for interactivity with teachers and other pupils that was not possible through one-way radio and television broadcasts. This interaction may enhance educational quality if used appropriately. On the other hand, because of the increased level of technical sophistication associated with CAI and IAI, start-up and maintenance costs are substantially higher than for older technologies. Despite this, it is necessary to consider the gains that CAI and IAI might have in schools, given their potential impact on learning, performance and motivation of both students and teachers, as well as on school management and system-wide organization.

Figure 7 demonstrates the degree to which educational institutions provide different forms of ICT-assisted instruction, ranging from traditional tools, such as RAI and TAI, to more technologically advanced platforms, such as CAI and IAI. The data present the level of access to different ICT-assisted instruction types but do not provide information on usage or the quality of instruction (see **Box 3**).

According to Figure 7, the five countries in this analysis demonstrate different strategies for integrating ICT-assisted instruction in schools. For example, although the number of computers available in Egypt is not keeping pace with enrolment, and Internet connectivity is lagging behind, the country nonetheless continues to emphasise the integration of CAI. As such, 86% and 96% of primary and secondary educational institutions, respectively, have access to this type of ICT-assisted instruction. However, while CAI is regarded as relatively widespread, actual time on task is limited considering the high LCR and LCCIR in the country.

Older types of ICT-assisted instruction are not a priority in Egypt, even though large populations live in rural or remote areas where they are frequently found to serve a useful function. RAI is available in 40% of primary and secondary schools, while TAI is available in 59% and 55% of primary and secondary schools, respectively, often through the use of mobile technology equipped with transmission receivers to the Egyptian Satellite (Nile Sat) television broadcasts, which air educational programmes for children and general literacy programmes. There is no available data on the provision of IAI at the institutional level in Egypt; however, approximately one-half or fewer of all schools in Egypt have access to the Internet, suggesting that IAI is available in no more than a half of total schools.

Figure 7. ICT-assisted instruction by type and level of education, 2011



Notes: m = missing data.

Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012. In Qatar, the categories RAI and TAI are not offered and therefore are not applicable.

Source: UIS database.

Box 3. Four types of ICT-assisted instruction

ICT-assisted instruction refers to teaching methods or models of instruction delivery that employ ICT in supporting, enhancing and enabling course content delivery. It includes any, all or combinations of the following: radio-, television-, computer- and Internet-assisted instruction.

- **Radio-assisted instruction (RAI)** includes both radio broadcast education and interactive radio instruction. Radio broadcast education entails an audio lecture or lesson, with printed material for pupils to follow the lecture. Interactive radio instruction (IRI) turns a typically one-way technology into a tool for active learning inside and outside the classroom. It requires that pupils react to questions and exercises through verbal responses to radio programme contributors, group work, and physical and intellectual activities while the programme is on air.
- **Television-assisted instruction (TAI)** is similar to radio broadcast education, with the additional benefit of video. It helps to bring abstract concepts to life through clips, animations, simulations, visual effects and dramatisation. It can also connect a classroom to the world but shares the same rigid scheduling and lack of interactivity as radio broadcast education.
- **Computer-assisted instruction (CAI)** is an interactive learning method in which a computer is used by teachers and/or pupils to present instructional material, to perform tasks for learning and to help in selecting and accessing additional pedagogical material.
- **Internet-assisted instruction (IAI)** refers to an interactive learning method using content from the World Wide Web for pedagogical purposes.

Palestine also faces challenges in establishing infrastructure to support CAI and IAI across the entire educational system. Previous evidence shows that many computers were outdated and some laboratories are only used during the technology class, which is 45 minutes per week (Pacetti, 2008). According to Figure 7, slightly more than one-half (55%) of primary schools and approximately three-quarters of secondary schools (76%) have CAI, which is the lowest rate of the countries analysed.

Given that less than one-third of all schools have any kind of Internet connection, instruction based on the Internet (i.e. IAI) is even less common, available in just one-fifth of schools (21%) of primary and one-quarter (24%) of secondary educational institutions. The Palestinian Ministry of Education and Higher Education (MoEHE) rarely permits school funds to be used for connecting to the Internet, resulting in a reliance on community donations (Pacetti, 2008).

In contrast to Egypt, Palestine commonly uses older forms of ICT-assisted instruction to help fill gaps left by a lack of infrastructure needed to support CAI and IAI. For example, RAI is universally integrated in primary and secondary educational institutions, while TAI is present in 76% and 94% of primary and secondary schools.

Jordan and Oman both have strong policy orientations towards providing a wide array of ICT-assisted instruction types. CAI is emphasised in Jordan and Oman in both primary and secondary schools. For example, 88% of primary institutions in Jordan provide CAI and it is almost universally available in secondary education (97%), while in Oman CAI is universally available at all levels. Similarly, IAI is relatively common in both Jordan (71%) and Oman (71%) at the primary level but is more frequently available in secondary schools – 82% and 87%, respectively.

RAI continues to be common in Jordan and Oman, readily available in 95% and 79% of primary schools and 93% and 97% of secondary schools, respectively. While emphasised less, TAI is available in just over one-half of primary schools in Jordan (57%) and Oman (58%). It is more common at the secondary level, where approximately two-thirds of schools use televisions for educational purposes in Jordan (69%) and Oman (70%).

Finally, although Qatar has relatively high rates of access to computers and the Internet as measured by the LCR and the LCCIR, Figure 7 shows that only 58% and 50% of primary and secondary schools offer CAI and 55% and 50% offer IAI. This is due to an uneven distribution of resources between the public sector (where CAI and IAI are universally available in all schools) and the private sector (where computers are relatively scarce precluding access to advanced forms of ICT-assisted instruction). Data from Qatar also show that older forms of ICT-assisted instruction, including RAI and TAI, are not used.

8. Enrolment in programmes offering ICT by gender

There are three aspects to the digital divide in the Arab states: i) the divide between the Arab world as a whole versus other regions; ii) the divide across Arab states (e.g. large, predominantly rural countries versus small, resource-rich countries); and iii) the divide within Arab states according to demographics, including socio-economic status, location (e.g. urban versus rural), culture and ethnicity.

While the integration of ICT in education may help to bridge the digital divide, it may also exacerbate it in some contexts. This can occur, for example, if particular groups tend to be systematically excluded from educational opportunity and if schools are the only place where certain children can readily access and take advantage of the learning provided by ICT.

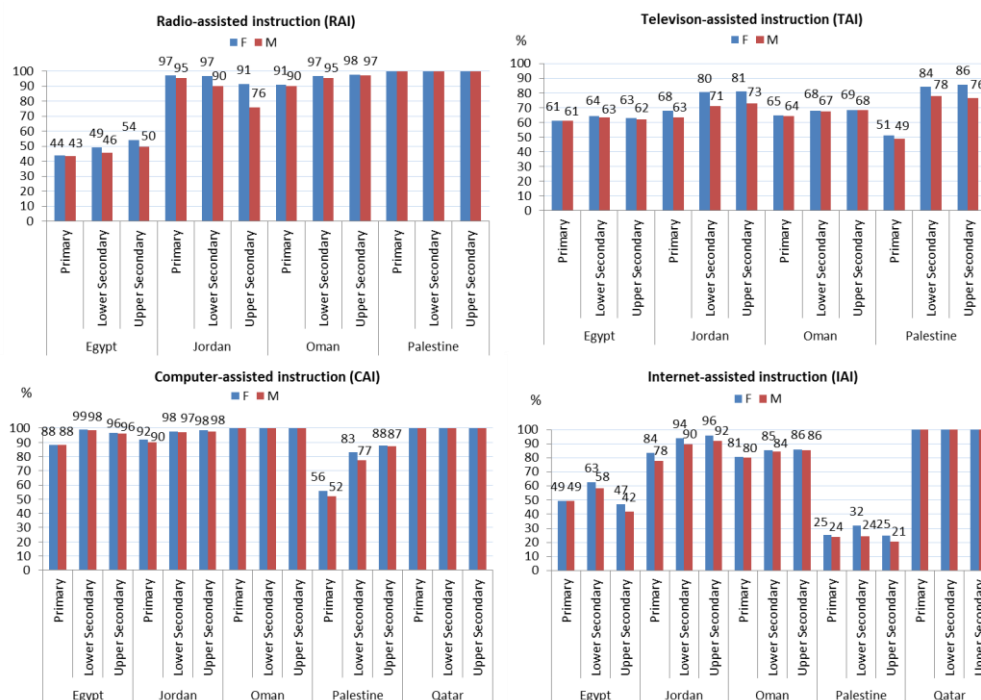
Gender can also have an impact on access to, participation in, retention and completion of education (UIS, 2010). Yet, if girls are to leave school ready to participate equally in the knowledge economy, then they too will require the benefits of ICT-assisted instruction, including the knowledge, skills and attitudes imparted by using these tools. However, much of the research in at least OECD countries shows a gap indicating that boys have more experience with technology than girls and are less apprehensive about its use (Blackmore et al., 2003). Fortunately, research also shows that greater experience with computers results in improvements among girls, including those in developing countries (Kozma et al., 2004; Linden et al., 2003; Wagner and Daswani, 2005).

There has been substantial analysis of the digital divide based on gender (Gorski, 2005; Hilbert, 2012). Many researchers have focused on differences in the manner in which girls and boys access and use ICT to learn and experience the world around them (Sutton, 1991; Volman and van Eck, 2001; Volman et al., 2005). Based on the aforementioned perspectives, it is important to assess access to ICT in education not only at an institutional level, but also at the enrolment level, through the lens of gender (Hafkin and Huyer, 2008).

Figure 8 shows sex-disaggregated data on total enrolment in four types of ICT-assisted instruction: RAI, TAI, CAI and IAI. While these data shed light on the extent that girls and boys who are enrolled in school use ICT in education, the data do not address pre-existing gender differences in enrolment data in general. In other words, the data reveal exclusion from ICT instruction among children already enrolled in educational programmes and not exclusion from education in general. Sex-disaggregated enrolment data are unavailable for Qatar.

While gender differences are not striking overall in terms of participation in programmes offering ICT-assisted instruction, where they do occur, they tend to favour female pupils. It should be noted, however, that data do not address intensity or methods of use by girls and boys. Moreover, data may be contextualised alongside net enrolment rates (NERs), which measure overall participation in education, to better identify gender-based advantages and disadvantages within the general school-age population for accessing ICT in education. Finally, household data generally suggest that boys are more likely than girls to use the Internet at home, work and informal settings in both developed and developing countries; therefore data in Figure 8 need to be understood within the broader education and societal contexts – including patterns of ICT usage in informal settings (ITU, 2013).

Figure 8. Participation of pupils in programmes offering ICT-assisted instruction, by gender, 2011



Notes: Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012. In Qatar, the categories RAI and TAI are not offered and therefore are not applicable. Also for Qatar, data on CAI and IAI reflect public institutions only.

Source: UIS database.

Radio-assisted instruction (RAI)

Participation in programmes offering RAI in Palestine is universal (100%) for male and female pupils while Oman also reports high participation rates (90% or more) and no gender-based differences. In Jordan, where enrolment rates are also relatively high, no gender-based differences are reported in primary education, but at the lower and upper secondary levels, 97% and 91% of female students respectively are enrolled in programmes offering RAI, compared to 90% and 76% of male students.

In contrast, enrolment in programmes offering RAI in Egypt is approximately one-half of total enrolment. Again, while little difference is found between the sexes at the primary level, female enrolment is higher in secondary education, with 49% and 54% of female pupils participating in lower and upper secondary programmes offering RAI compared to 46% and 50% of male pupils, respectively.

As countries increasingly adopt more advanced forms of ICT-assisted instruction, sex-disaggregated enrolment data in regard to older forms of ICT-assisted instruction, which are possibly being phased out (e.g. RAI), become more difficult to interpret. While not necessarily the situation in Egypt, what may appear to be an ICT advantage for girls may simply reflect the

tendency to provide girls with older forms of ICT-assisted instruction, reserving the use of computers and the Internet for boys.

Television-assisted instruction (TAI)

Jordan and Palestine have the highest enrolment rates in programmes offering TAI among the sample countries. At the same time, gender differences are most pronounced in these two countries, especially at the secondary level. In Palestine, approximately half of primary-level female and male pupils are enrolled in TAI programmes; however at the lower and upper secondary level, 84% and 86% of female pupils are enrolled compared to 78% and 76% of male pupils, respectively.

Similarly, higher shares of females in Jordan are enrolled in programmes offering TAI than males: 68%, 80% and 81% of girls are enrolled in primary, lower secondary and upper secondary programmes offering TAI, compared to 63%, 71% and 73% of boys, respectively. Again, these results are difficult to interpret since the data measure enrolment and not usage.

Computer-assisted instruction (CAI)

The majority of female and male pupils are enrolled in programmes that offer CAI in Egypt, Jordan, and Oman, where participation rates are above 90%. Nonetheless, as previously mentioned, participation rates do not provide information on usage or gender differences in terms of time on task. For example, while 88% of both male and female students are enrolled in programmes offering CAI in Egypt, overall usage is presumed to be very low given that the learner-to-computer ratio is 120:1. In Qatar, all public sector children participate in programmes offering CAI.

In contrast, data from Palestine data reveal that girls are somewhat favoured in terms of participation in programmes offering CAI at the primary and lower secondary levels (56% and 83% of female pupils compared to 52% and 77% of male pupils, respectively). In contrast, males and females participate equally in upper secondary programmes with CAI. Similar to Egypt but less profound, a primary-level LCR in Palestine of 44:1 indicates that, while participation in programmes offering CAI is relatively common, time on task is limited in many schools given that several children must share scarce resources.

Internet-assisted instruction (IAI)

Gender differences in participation most frequently occur for programmes offering IAI. In Jordan, which has the highest rate of participation amongst countries surveyed, 84%, 94% and 96% of female pupils are enrolled in primary, lower secondary and upper secondary programmes offering IAI, compared to 78%, 90% and 92% of males, respectively.

In Egypt and Palestine, where rates are substantially lower, gender differences only emerge at the secondary level. For instance, 25% and 47% of female pupils at the lower and upper secondary levels are enrolled in programmes offering IAI, compared to 21% and 42% of males, respectively.

While female pupils may participate more frequently in programmes offering IAI in some countries in the Arab States, household data collected by the International Telecommunication Union (ITU) (2013) offers a different perspective in that females were found to use the Internet less compared to boys. Data from Egypt and Qatar show gender-based differences for Internet usage whereby 24% and 84% of boys use the Internet compared to 19% and 78% of girls,

respectively. Other sources of household data in Egypt, however, show that gender-based difference only begins to emerge at the beginning of upper secondary education (Mandour, 2009). According to the author, stronger integration of ICT in the primary educational curriculum, which is currently lacking in various subjects in Egypt, may help to address gaps in usage.

In Oman, where 80% or more of female and male pupils are enrolled in programmes offering IAI, gender differences regarding participation do not exist. In Qatar, all public sector children participate in programmes offering IAI, compared to roughly three-quarters in private institutions (see Annex 1).

9. Teaching and learning and ICT in education

Teachers are frequently considered to be the most important influence on classroom learning and, as such, play an invaluable role in ensuring that pupils use ICT effectively inside and outside of school. While a significant level of teaching and learning occurs peer-to-peer on how to use ICT, teachers need not only know how to instruct pupils to use ICT effectively, but they also require training to use ICT for teaching different subjects in an effort to integrate the use of ICT across the curriculum to enhance the overall learning experience and improve student outcomes including academic achievement (see **Box 4**). This is especially important since poor or improper usage and management of ICT may, in fact, result in diminished educational outcomes compared to if no ICT had been employed – particularly so if ICT-assisted instruction is inefficiently consuming time that could be used to learn the actual content.

The UNESCO ICT Competency Framework for Teachers is a useful tool to inform education policymakers, educators and providers of professional learning of the role of ICT in educational reform, as well as to assist Member States in developing national ICT competency standards for teachers (<http://www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers/>). It emphasises that it is not enough for teachers to just have ICT competencies and be able to teach them to students. Rather, teachers need to be able to help students become collaborative, problem-solving, creative learners through using ICT in order to be effective citizens and members of the workforce (UNESCO, 2011b).

Ultimately, how teachers are prepared varies from one country to another. Nevertheless, in order to adapt educational curricula to meet the challenges of the information society, the UIS measures teacher training related to ICT preparedness using the following two indicators: i) the proportion of ICT-qualified teachers in schools; and ii) the proportion of teachers trained to teach subjects using ICT.

The proportion of ICT-qualified teachers in schools measures the availability of teachers trained, according to nationally-defined qualification standards, to teach basic computer skills in primary and secondary schools or computing in upper secondary schools. This indicator measures the capacity within the overall teaching workforce but does not provide information on the intensity, quality and effectiveness of the training involved. Since training standards for ICT in education differ between countries, varying in duration from a few weeks to being spread over an entire teacher training programme, this indicator lacks a certain amount of international comparability and, therefore, is perhaps more effective in terms of identifying gaps in the system related to how many teachers require some type of training based on current shares of teachers with relevant instructional responsibilities regarding basic computer skills.

Not only may duration differ, but some countries may adopt policies to train most teachers to be relatively proficient in teaching basic computer skills and/or computing, while others may adopt a policy to provide a more focused training to develop only specialised teachers. While there is

no international target, pupils in countries that have greater access to computers (e.g. low learner-to-computer ratios and/or high enrolment in programmes offering CAI), such as Jordan, Oman and Qatar, would benefit from a teaching workforce that is comprised of relatively higher numbers of ICT-qualified teachers to keep pace with demand.

Data from the five countries in this analysis show that the minority of teachers are prepared to teach basic computer skills or computing. **Table 2** shows that in Oman, 6% of teachers are trained to teach basic computer skills or computing (i.e. ICT-qualified), while in Egypt the share is even smaller at 2% to 3%. It has been argued that a lack of specialised personnel who are educated and trained on the use of ICT in education has resulted in a situation where ICT is not effectively employed in schools. However, given the current lack of ICT infrastructure in Egypt, a more comprehensive and systemic strategy – which also aims to broaden the availability of ICT infrastructure—is much needed (Egypt and UNDP, 2010). Consistent with the finding that teaching basic computer skills is not part of the primary-level curriculum in Palestine, no teachers are ICT-qualified to teach basic computer skills at the primary level.

The proportion of teachers trained to teach subjects using ICT measures the number of teachers trained, according to nationally-defined qualification standards, to teach one or more subjects using ICT to support instruction in the classroom. While countries do not necessarily train large numbers of teachers to teach basic computer skills or computing, they are more likely to emphasise training teachers how to use ICT in their classroom instruction. **Table 2** shows that in Oman and Palestine the shares of teachers trained to teach children using ICT facilities are higher than those trained to teach basic computer skills or computing. In Oman, for instance, 40%, 35% and 30% of primary, lower secondary and upper secondary education teachers, respectively, are trained to teach subjects using ICT tools.

Policymakers may adopt different training strategies for preparing teachers to instruct using ICT at different levels of education. In Oman, training for primary-level teachers includes courses and workshops organised by the Ministry of Education and delivered either centrally or regionally, while secondary teachers of ICT, who have already had courses in computer science and the use of Microsoft Office, are offered a cascading model of professional development whereby regional core teams attend courses and workshops in the capital and then return to the regions to pass on the knowledge and skills (Oman, 2008).

Amongst those surveyed, Palestine has the largest share of teachers trained to teach subjects using ICT (i.e. 50% of teachers at all levels). However, 90% and 80% of primary and lower secondary teachers are teaching using ICT facilities, suggesting that formal training on how to use ICT in teaching may be inadequately available to a large share of teachers. According to Pacetti (2008), despite existing teacher training, many simply do not use computers during instruction due to a lack of experience, as well as the fact that many computers have become obsolete.

Jordan, which has a strong set of policies aimed at expanding ICT throughout the education system, has introduced several measures to enhance the integration and effectiveness of ICT in education. Recognising the professional nature of teaching, Jordan has provided a substantial level of professional development and training through the promulgation of National Teacher Professional Standards (2006) emphasising: i) the importance of ICT in teaching careers: ii) the teaching-learning processes: and iii) the integration of ICT in curriculum content. For instance, the Ministry of Education required all personnel, particularly principals and teachers, to be ICT-literate. As such, between 2003 and 2009, over 90,000 teachers, principals and other Ministry employees completed the Microsoft ICDL programme as part of the Ministry's effort to ensure

basic ICT skills were available to respond to the integration of e-content in curriculum and the use of ICT in management (UNESCO, 2011a).

Table 2. Teachers and ICT in education by level of education, 2011

Teachers		Egypt			Jordan			Oman			Palestine			Qatar		
		Primary	Lower Secondary	Upper Secondary	Primary	Lower Secondary	Upper Secondary	Primary	Lower Secondary	Upper Secondary	Primary	Lower Secondary	Upper Secondary	Primary	Lower Secondary	Upper Secondary
		%			%			%			%			%		
ICT-qualified teachers (to teach basic computer skills or computing)	M	2	3	2	...	...	...	.	3	6	.	10	9	4	7	5
	F	2	3	3	...	...	...	6	5	7	.	11	8	4	5	4
Teachers currently teaching basic computer skills or computing	M	2	3	2	33	33	18	.	3	6	-	10	9	4	7	5
	F	2	3	3	19	19	17	6	5	7	-	11	8	4	5	4
Teachers trained to teach subject(s) using ICT facilities	M	...	...	...	...	...	...	.	35	30	50	50	50	43	68	100
	F	...	...	...	...	...	...	40	35	30	50	50	50	x	x	x
Teachers currently teaching subject(s) using ICT facilities	M	...	...	...	...	...	...	.	35	30	90	80	40	43	68	100
	F	...	...	...	...	...	...	40	35	30	90	80	40	x	x	x
Teachers trained via ICT-enabled distance education programmes	M	...	...	...	...	...	...	.	1	1	-	-	-	.	.	.
	F	...	...	...	...	...	...	1	1	1	-	-	-	.	.	.

Notes: Data for Egypt reflect the academic year ending in 2009. Data for Palestine reflect the academic year ending in 2012. Data from Oman, which represent only the first four grades of primary education, are comprised of female teachers only.

In Palestine, basic computer skills are not included in the primary-level curriculum.

For Qatar, there is no sex-disaggregated data for teachers trained to teach subjects using ICT facilities.

. Denotes that the category is not applicable.

- Denotes a value equal to nil.

x Denotes data in another column or row

Source: UIS database.

Special programmes and donor agencies were also active in Jordan to train teachers. This included the work of the Jordan Education Initiative (JEI), World Links, United States Agency for International Development (USAID), and the Canadian International Development Agency (CIDA), as well as private sector companies contracted by the MoE. These programmes were designed to empower teachers, principals and supervisors with skills to integrate ICT in instruction (UNESCO, 2011a). For example, the JEI and World Links for Development initiatives have trained tens of thousands of teachers in innovative ICT-based pedagogical skills, developed e-content and experimented with new technology arrangements, such as electronic whiteboards and one-to-one laptops for students (Jordan, 2010; 2011). Finally, specialised courses were also offered by the Ministry's ICT Directorate in networking, server maintenance and other hardware-oriented training (UNESCO, 2011a).

Recognizing the professional nature of a teaching career as opposed to a civil service view of human resource development, Jordan's Ministry of Education has officially recognised all ICT in education training programmes as part of the Teacher Ranking System, whereby successful completion of these programmes allow teachers to increase in rank and subsequently receive financial allowances in addition to their monthly salaries. This policy has helped the Ministry in attracting almost all teachers to enrol in these programmes (UNESCO, 2011a).

Box 4. ICT usage and learning achievement in mathematics and science: Evidence from the Trends in International Mathematics and Science Study (TIMSS) 2011

With the global expansion of ICT in education, there is a growing concern about the effectiveness of ICTs to improve the quality of education and to improve overall student achievement and other outcome measures such as increasing retention and decreasing dropout. Both national and cross-national studies have shown that low levels of learning achievement in schools subjects exist in school systems in both developed and developing countries (Martin et al, 2012; Mullis et al., 2012; OECD, 2012). Low levels of achievement tend to be much more prevalent among students from relatively disadvantaged family backgrounds, regardless of national level of achievement (OECD, 2010; Willms, 2006). Since low-incomes families are less likely to have ICTs at home, ICT in education may be ever more important to bridge the digital divide among children from various socio-economic backgrounds.

While many studies have been conducted to determine whether or not computers and ICT favourably affect academic achievement and other measures of student outcomes compared to traditional instruction, results have been mixed. A recent study, which summarizes 25 previous meta-analyses based on more than 40 years of research, concluded that computer use in the classroom does have an overall positive effect on achievement (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). Still, given the imperfect relationship, it can be concluded that ICT does not necessarily lead in improved outcomes. Other factors are also vital including effective teacher training and appropriately linking ICT usage to sound pedagogy.

Table 3 presents 2011 data from the Trends in International Mathematics and Science Study, which examines data from 63 developed and developing countries on children in the 4th and 8th grades as reported by teachers. While overall TIMSS results demonstrate that computer usage is related to somewhat higher achievement scores for both mathematics and science in all 63 countries studied, data from Jordan, Oman, Palestine and Qatar demonstrate somewhat higher achievement in science amongst 8th graders who use computers, but not in mathematics. Moreover, no difference was found amongst 4th graders in either subject. The explanation for these results is unclear given that usage data are limited. It should also be recognized that in the four countries under examination, schools that are well-equipped with ICT also tend to be from regions of a higher socio-economic status (SES). Therefore, unless the effect of SES can be discounted, correlations between availability of technology and learning outcomes should be approached with caution.

Table 3. Computer usage, activities, and student achievement in mathematics and science among Grade 8 pupils, as reported by teachers, 2011

MATHEMATICS									
	Computers available for mathematics lessons				Percent of students whose teachers have them use computers at least monthly to:				
	Percent of students	Average Achievement			Explore mathematics principles and concepts	Look up ideas and information	Process and analyse data	Practice skills and procedures	
		Yes	no	Difference %					
Jordan	53	407	406	0.2	44	48	41	47	
Oman	21	359	369	-2.7	14	18	12	16	
Palestine	27	409	402	1.7	19	25	18	21	
Qatar	45	405	416	-2.6	37	40	37	40	
SCIENCE									
	Computers available for science lessons				Percent of students whose teachers have them use computers at least monthly to:				
	Percent of students	Average Achievement			Look up ideas and information	Do scientific procedures or experiments	Study natural phenomena through simulations	Process and analyse data	Practice skills and procedures
		Yes	no	Difference %					
Jordan	49	457	441	3.6	48	44	42	39	46
Oman	21	440	414	6.3	21	13	16	15	17
Palestine	40	432	412	4.9	38	34	33	28	34
Qatar	48	426	409	4.2	47	43	44	40	46

Source: Martin et al., 2012; Mullis et al., 2012

10. Conclusions

Through global initiatives, such as the Millennium Development Goals and the World Summit on the Information Society, the importance of ICT in education is increasingly gaining ground. Governments are increasingly including the integration of ICT in education, enhancing infrastructure, and training human resources into national policies in order to develop their educational systems. One of the roles of the UNESCO Institute for Statistics (UIS), which is the United Nation's repository for statistics on areas mandated to UNESCO, is to contribute to benchmarking and monitoring the integration of and access to ICT in education, through the establishment of internationally comparable and policy-relevant indicators. In this particular vein, the UIS collected data in 2011 from five countries in the Arab States: Egypt, Jordan, Oman, Palestine and Qatar, as part of its regional, demand-driven survey rollout strategy. The questionnaire collected data on ICT in education policy and the curriculum, school level infrastructure, enrolments in programmes offering ICT-assisted instruction, as well as data related to teachers' training in and use of ICT in education.

As mentioned in this report, different types of ICT-assisted instruction have their own strengths and weaknesses. Several factors can influence which ICT tools countries choose to emphasise in their national planning. The share of schools that offer different ICT will also depend on economic, infrastructural (e.g. availability of electricity and Internet connectivity) and human factors, such as teacher training and preparedness.

To some degree, countries will increasingly adopt newer forms of ICT, including computer-assisted instruction (CAI) and Internet-assisted instruction (IAI) to keep pace with the evolving information society. Whether or not countries discontinue use of older forms of ICT, such as radio-assisted instruction (RAI) and television-assisted instruction (TAI), is another decision that should be given careful consideration given their potential for filling gaps when newer tools are unavailable (e.g. CAI and IAI). Undoubtedly a myriad of factors will influence national planning for ICT in education, but it is also noteworthy that the ICT landscape is becoming increasingly blurry, given the growing tendency towards the convergence of ICT where computers, especially connected via broadband, can provide an ever-widening array of possibilities for both learning and teaching.

Despite the fact that each of the five countries presented in this report has formally developed policy related to the implementation and use of ICT in their primary and secondary education systems, data show that policy has not necessarily translated to practice. For example, while Jordan, Oman and Qatar have comprehensive recommendations for the integration of ICT in all subject areas across all grades, ICT usage has not fully permeated the curricula in Egypt and Palestine, even though the overwhelming majority of schools are equipped with electricity.

Data presented in this report show the emergence of particular patterns related to ICT in education. In general, Jordan, Oman and Qatar have much higher levels of integration of ICT-assisted instruction and the essential infrastructure, including basic hardware (i.e. computers) and Internet connectivity, than Egypt and Palestine. While learner-to-computer ratios (LCRs) are relatively low in Jordan, Oman and Qatar (i.e. 15:1 or less), indicating that fewer children share a computer, they are much higher in Palestine and especially Egypt, where 120 children on average share the same computer⁵. Internet connectivity and access follows a similar pattern. The learner-to-computer connected to the Internet ratio (LCCIR) shows that, while approximately two-thirds of computers in Jordan, Oman and Qatar are connected to the Internet,

⁵ Significant differences in LCR may exist between schools and regions (e.g. urban versus rural).

less than one-third is connected in Egypt and Palestine, which further exacerbates access to more advanced forms of ICT-assisted instruction – particularly Internet-assisted instruction. For example, in Egypt and Palestine where LCRs are already high, the primary-level LCCIRs surge to 441:1 and 44:1, respectively.

As a result, all five countries have developed a unique strategy for implementing ICT-assisted instruction based on their own unique contexts. Except in the case of Palestine, computer-assisted instruction (CAI) is most frequently prioritised and likely reflects current importance in policymaking. While Jordan and Oman are more abundant in terms of infrastructure, including computers, computer laboratories, local area networks and ICT support services, to provide broad levels of CAI access to pupils, infrastructure is relatively poor in Palestine and especially in Egypt, suggesting that actual usage is substantially less.

Internet-assisted instruction (IAI) is also becoming increasingly common in Jordan, Oman and Qatar and is now available in more than one-half of educational institutions. However, due to low levels of Internet connectivity, it is less commonly available in Palestine, serving about one-quarter or less of schools. Palestine partly compensates for this gap with near universal penetration of older forms of ICT-assisted instruction. For example, whereas radio-assisted instruction (RAI) and television-assisted instruction (TAI) are less frequently used in other countries, RAI is available in all schools and TAI is offered by 76% and 94% of primary and secondary schools in Palestine, respectively.

As has been demonstrated in other research, there are many factors – such as gender – at the root of educational exclusion. This report provides sex-disaggregated data on participation rates in programmes offering ICT-assisted instruction based on total enrolment in the countries under analysis. While the data demonstrate that gender is not a strong predictor for exclusion, some gender differences exist, particularly in Jordan and Palestine, but not in all forms of ICT-assisted instruction. Moreover, wherever gender differences do appear, they tend to favour female participation over that of boys. Programmes offering RAI, TAI and IAI show gender differences in participation favouring females, while participation in CAI programmes seems to exhibit few gender differences – with Palestine as the exception. Finally, IAI is the most likely type of ICT-assisted instruction to exhibit gender disparity in enrolment and is the case in Egypt, Jordan and Palestine, but not in Oman. Data are not available for Qatar. Again, these data do not shed light on usage, which also needs to be considered.

11. Next steps: Looking forward

The current report has provided a comparative analysis of ICT integration in five Arab States (Egypt, Jordan, Oman, Palestine and Qatar) by looking at four specific types of data: i) use of ICT in policy and key curricular areas (mathematics, sciences, computing, arts, as well as first and second language learning); ii) ICT infrastructure to support the integration of ICT in educational institutions (access to ICT and connectivity); iii) participation in programmes offering ICT; and iv) teacher's use of and training on how to use and teach ICT in the classroom. These data provide a comprehensive picture of ICT access, as well as basic usage of ICT for education, in the target countries.

As ICT adoption and use in the wider socio-economic context of countries becomes more prevalent, it becomes clear that ICT adoption and policies in education are areas that require further study. In this regard, all aspects of the ICT in education ecosystem, such as contents (use of OER, Free and Open Software (FOSS), and other open solutions for learning), access to and use of hardware (devices, including mobile technologies, one-to-one computing options etc.), connectivity, ICT issues related to pedagogy, and learning (including digital literacy, and issues of assessment), as well as teacher training need to be explored in greater detail to have a fuller picture of the contribution of ICT to quality teaching and learning. Demonstrating meaningful impacts on learning and student outcomes in general are also urgently needed to help policymakers better set national priorities and policies.

In such a dynamic, rapidly changing field, where metrics become a key principle to informed decision-making, ~~UNESCO looks~~ forward to future collaboration with its Member States in the elaboration of new instruments to collect new types of data.

References

- Blackmore, J., L. Hardcastle, B. Esme and J. Owens (2003). *Effective Use of Information and Communication Technology (ICT) to Enhance Learning for Disadvantaged School Students* (Technical Report). Melbourne: Institute of Disability Studies, Deakin University.
- Broadband Commission. (2013). *Technology, broadband and education: Advancing the education for all agenda*. Paris: UNESCO/ITU.
- Clark, R. E. (1983). "Reconsidering research on learning from media". *Review of Educational Research*, 53, 445-449.
- Clark, R. E. (1994). "Media will never influence learning". *Educational Technology Research and Development*, 42(2), 21-29.
- Cohen, D. and H. Hill (2001). *Learning Policy: When State Education Reform Works*. New Haven: Yale University Press.
- Dada, Danish (2006). "E-readiness for developing countries: Moving the focus from the environment to the users". *The Electronic Journal on Information Systems in Developing Countries*. 27, 6, 1-14.
- Dede, C. (1996). "Emerging technologies and distributed learning". *American Journal of Distance Education*, 10(2), 4-36.
- Egypt and UNDP. (2010). *Egypt Human Development Report 2010: Youth in Egypt: Building our Future*. Cairo/New York: Institute of National Planning, Egypt/ United Nations Development Programme (UNDP).
- Gorski, P. (2005). "Education equity and the digital divide". *Association for the Advancement of Computing in Education Journal*, 13(1), 3-45.
- Haddad, G., M. Trucano and C. Wacholz (2007). "ICT-in-Education Toolkit for policymakers, planners, and practitioners". Paris: UNESCO and World Bank-InfoDev. <http://www.ictinedtoolkit.org/user/login.php>
- Hafkin, N. and S. Huyer (2008). "Women and gender in ICT statistics and indicators for development". *Information Technologies and International Development*, 4(2), 25-41.
- Hamdy, Amr. (2007). "ICT education in Egypt". *Survey of ICT and education in Africa: Egypt country report*. www.infodev.org
- Hilbert, M. (2012). "Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics". *Women's Studies International Forum*, 34(6), 479-489.
- ITU (2013). International Telecommunications Union database: Geneva: ITU. <http://www.itu.int/ITU-D/ict/statistics/Gender/index.html>
- Jones, R. (2003). "Local and national ICT policies". In: R. Kozma (ed.), *Technology, Innovation, and Educational Change: A Global Perspective*. pp. 163-194.
- Jordan. (2010). *Jordan Education Initiative (JEI) 2010: Annual Report*. Amman: Jordan Education Initiative.
- Jordan. (2011). *Ministry of Education Information and Communications Technology Strategy (2011-2015)*. Amman: Ministry of Education.

- Jordan. (2012). *ICT use and diffusion in schools in Jordan*. Amman: Ministry of Information and Communications Technology.
- Kozma, R. (1991). "Learning with media". *Review of Educational Research*, 61, 179-221.
- Kozma, R. (1994). "Will media influence learning: Reframing the debate". *Educational Technology Research and Development*, 42(2), 7-19.
- Kozma, R. (2003) (ed.). *Technology, Innovation, and Educational Change: A Global Perspective*. Eugene: International Society for Technology in Education.
- Kozma, R.B. (2008). Comparative analysis of policies for ICT in education, In J. Voogt and G. Knezek (eds.), *International handbook of information technology in primary and secondary education* (Vol. 20, pp. 1083-1096). New York: Springer.
- Kozma, R., R. McGhee, E. Quellmalz and D. Zalles (2004). "Closing the digital divide: Evaluation of the World Links program". *International Journal of Educational Development*, Vol. 24, No. 4, pp. 361–381.
- Linden, L., A. Banerjee and E. Duflo (2003). *Computer-assisted Learning: Evidence from a Randomized Experiment*. Cambridge: Poverty Action Lab.
- Mandour, Dina Atef. (2009). "Impact of ICT on gender gap in Egypt", *Working Paper #004*. Cairo: The American University in Cairo, Social Research Centre.
- McKinsey and Company. (2005). "Building effective public-private partnerships: Lessons learnt from the Jordan Education Initiative". *An initiative of the World Economic Forum and Government of Indonesia*. McKinsey and Company.
- Mullis, Ina V.S., Michael O. Martin, Pierre Foy & Alka Arora (2012a). TIMSS 2011 International results in mathematics. Boston, MA: TIMSS and PIRLS International Study Center/ Lynch School of Education, Boston College.
- Martin, Michael O, Ina V.S. Mullis, Pierre Foy & Gabrielle M. Stanco (2012b). TIMSS 2011 International results in mathematics. Boston, MA: TIMSS and PIRLS International Study Center/ Lynch School of Education, Boston College.
- OLPC (2013). "One laptop per child". <http://laptop.org/en/children/countries/mideast.shtml>. Accessed on 22 January 2013.
- Organisation for Economic Co-operation and Development (OECD) (2012). *Education at a Glance 2012: OECD Indicators*. Paris: OECD.
- Organisation for Economic Co-operation and Development (OECD) (2011). *Against the Odds: Disadvantaged Students who Succeed in School*. Paris: OECD.
- Organisation for Economic Co-operation and Development (OECD) (2011). *PISA 2009 Results: Students On Line. Digital Technologies and Performance*. Paris: OECD Publishing.
- Organisation for Economic Co-operation and Development (OECD) (2010). *Are the New Millennium Learners Making the Grade? Technology Use and Educational Performance in PISA*. Paris: OECD Publishing.
- Organisation for Economic Co-operation and Development (OECD) (2007). *Giving Knowledge for Free: The Emergence of Open Educational Resources*. Paris: Organisation for Economic Co-operation and Development.

- Oman (2008). "ICT and education in the Sultanate of Oman". Muscat: Ministry of Education.
- Oman (2011). "The final report on the Inclusive survey of indicators of information and communications technology in the education sector for grade 1-12". Muscat: Ministry of Education, Sultanate of Oman.
- Pacetti, Elena (2008). Improving the quality of education in Palestine through e-learning and ICT: the bottom-up approach for a sustainable pedagogy. CEUR Workshop Proceedings, 398, pp. 81-87. http://ceur-ws.org/Vol-398/S3_Pacetti.pdf
- Partnership on Measuring ICT for Development (2011). *Measuring the WSIS Targets: A Statistical Framework*. Geneva: International Telecommunication Union (ITU).
- Pedro, Francesc (2012). "Trusting the unknown: The effects of technology use in education". In D. Soumitra and B. Bilbao-Osorio (eds.). *The Global Information Technology Report 2012: Living in a Hyperconnected World*. Geneva: World Economic Forum and INSEAD.
- Scheuermann, F., F. Pedró, & European Commission. Joint Research Centre. (2009). *Assessing the effects of ICT in education: indicators, criteria and benchmarks for international comparisons*. Luxembourg: Publications Office of the European Union ; OECD.
- Sutton, R. (1991). "Equity and computers in the schools: A decade of research". *Review of Educational Research*, 61(4), 475-503.
- Tamim, Rana M., Robert M. Bernard, Eugene Borokhovski, Philip C. Abrami, & Richard F. Schmid (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research*, 81(1), pp. 4-28.
- Trucano, M (2010). "Interactive Radio Instruction: A successful permanent pilot project?" Retrieved from <http://blogs.worldbank.org/edutech/iri>
- Tyack, D. and L. Cuban (1995). *Tinkering toward Utopia*. Cambridge: Harvard University Press.
- Volman, M. and E. van Eck (2001). "Gender equity and information technology in education: The second decade". *Review of Educational Research Winter 2001*, Vol. 71, No. 4, pp. 613–634.
- Volman, M., E. van Eck, I. Heemskerk and E. Kuiper (2005). "New technologies, new differences. Gender and ethnic differences in pupils' use of ICT in primary and secondary education". *Computers and Education*, (2005) 35–55.
- United Nations (2000). *United Nations Millennium Declaration*. United Nations General Assembly, Resolution A/RES/55/2, 18 September 2000.
- United Nations (2012). *Millennium Development Goals*. <http://www.un.org/millenniumgoals/global.shtml>
- UNESCO Institute for Statistics (2010). *Global Education Digest 2010: Comparing Education Statistics Across the World*. Montreal: UIS.
- UNESCO (2000). *The Dakar Framework for Action*. UNESCO: Paris.
- UNESCO (2002). *Forum on the Impact of Open Courseware for Higher Education in Developing Countries*, Final report. Paris, 1-3 July 2002.
- UNESCO (2011a). *Transforming Education: The Power of ICT Policies*. Paris: UNESCO.
- UNESCO (2011b). *UNESCO ICT Competency Framework for Teachers*. Paris: UNESCO.

UNESCO (2012a). *Turning on mobile learning in Africa and the Middle East: Illustrative initiatives and policy implications*. Paris: UNESCO.

UNESCO (2012b). 2012 Paris OER Declaration.

http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/Events/Paris%20OER%20Declaration_01.pdf

Wagner, D.A. and C.J. Daswani (2005). *Impact of ICT on Learning in Out-of-school Youth in Andhra Pradesh (India): Preliminary Results*. Technical Report. Philadelphia: International Literacy Institute, University of Pennsylvania.

Willms, John Douglas (2006). *Learning Divides: Ten Policy Questions About the Performance and Equity of Schools and Schooling Systems*. *UIS Working Paper No. 5*. Montreal: UIS.

Annex I. Country profiles

EGYPT | 2009

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

Egypt 2009

ICT in Education Statistics



Selected Data & Country Indicators DATA

School age group:	Population (2007)	
	Primary	Secondary
MF	9,671,852	9,597,270
M	4,939,600	4,890,535
F	4,732,252	4,706,735

INDICATORS

Education:

Pupil/teacher ratio (headcount)	Primary 27**	Secondary (2007) ...
Net enrolment rate (NER)	Primary 96**	Secondary (2007) ...
	MF	...
	M	...
	F	...
GPI (Gender Parity Index), NER	...	...

ICT & infrastructure: Proportion of households with (ITU, 2011)

Computer:	36
Internet access at home:	31

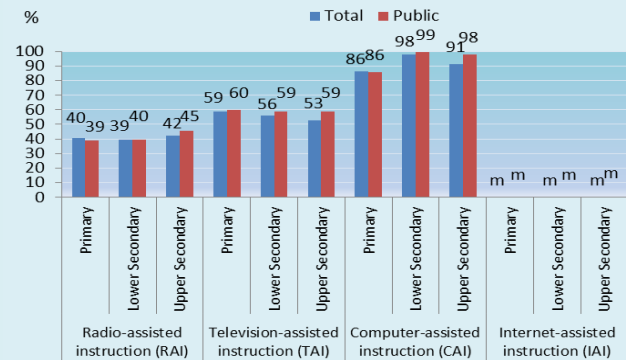
ICT IN EDUCATION POLICY

	National policy	National plan	Regulatory provisions	Regulatory institution or body
Primary	✓	✓	✓	✓
Lower secondary	✓	✓	✓	✓
Upper secondary	✓	✓	✓	✓

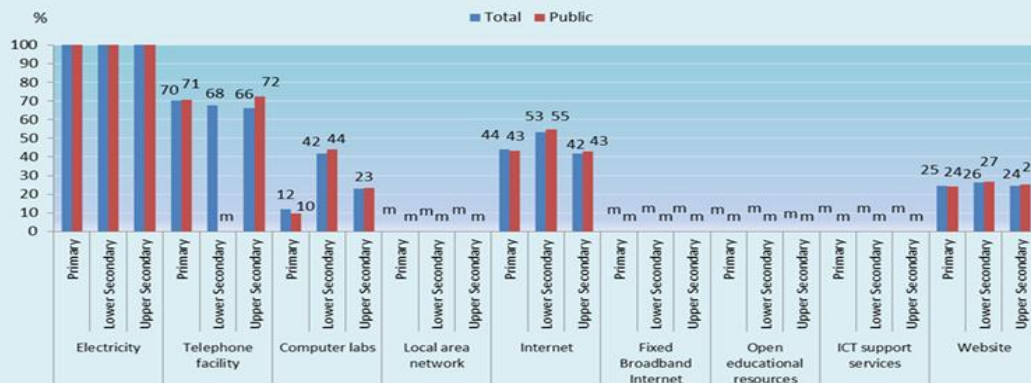
ICT IN EDUCATION CURRICULUM

Subjects	Primary (ISCED 1)		Lower Secondary (ISCED 2)		Upper Secondary (ISCED 3)	
	Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade
Mathematics						
Sciences		✓		✓		✓
Basic Computer Skills (Computing)			✓			✓
Written communications (languages)						
Second languages				✓		✓
Arts						

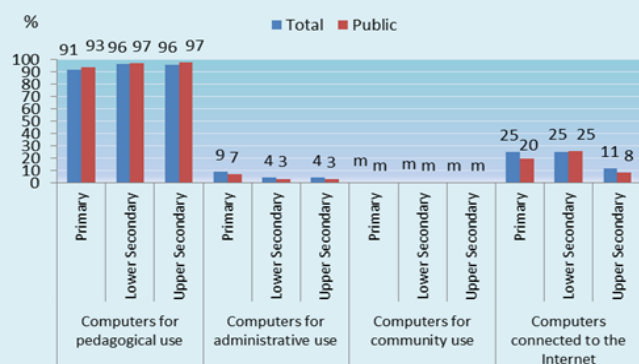
EDUCATIONAL INSTITUTIONS WITH ICT-ASSISTED INSTRUCTION



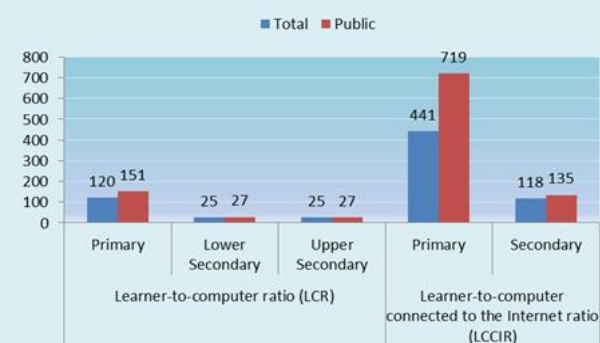
ICT INFRASTRUCTURE IN EDUCATIONAL INSTITUTIONS



COMPUTERS AND INTERNET CONNECTIVITY



LEARNERS TO COMPUTER RATIO



PARTICIPATION IN EDUCATIONAL PROGRAMMES OFFERING ICT-ASSISTED INSTRUCTION (PERCENTAGE OF ENROLMENT)

Enrolment		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Enrolment in programmes having access to electricity	MF	100	100	100	100	100	100
	F	100	100	100	100	100	...
Enrolment in programmes having access to telephone communication facility	MF	74	74	76	77	79	82
	F	74	74	77	78	80	...
Enrolment in programmes offering radio-assisted instruction	MF	44	42	48	48	52	54
	F	44	42	49	50	54	...
Enrolment in programmes offering television-assisted instruction	MF	61	62	64	65	62	65
	F	61	62	64	66	63	...
Enrolment in programmes offering computer-assisted instruction	MF	88	88	99	100	96	99
	F	88	88	99	100	96	...
Enrolment in programmes offering Internet-assisted instruction	MF	49	48	60	61	44	45
	F	49	48	63	63	47	...
Enrolment in programmes having access to open educational resources	MF	...	...	...	...	...	...
	F	...	...	...	...	...	...
Enrolment in courses offering basic computer skills (or computing)	MF	-	-	100	100	100	100
	F	-	-	100	100	100	...

TEACHERS AND ICTs IN EDUCATION (PERCENTAGE OF TEACHERS)

Teachers		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Teachers who teach basic computer skills (or computing)	MF	2	1	3	3	2	2
	F	2	1	3	3	3	3
Teachers currently teaching subject(s) using ICT facilities	MF	...	...	...	...	...	...
	F	...	...	...	...	...	...
Teachers trained to teach basic computer skills (or computing)	MF	2	1	3	3	2	2
	F	2	1	3	3	3	3
Teachers trained to teach subject(s) using ICT facilities	MF	...	...	...	...	...	...
	F	...	...	...	...	...	...
Teachers trained via ICT-enabled distance education programmes	MF	...	...	...	...	...	...
	F	...	...	...	...	...	...

Notes:

Learners to computer connected to the Internet ratio (LCCIR) may include computers for administrative, community and pedagogical use, therefore, indicator may overestimate access to computers
 ... missing (also identified as m)
 - quantity nil (or negligible)
 ** UIS estimation

Further information regarding data used in this country profile, including indicator definitions and data sources is available upon demand. Information on indicator definitions is also available at: http://www.uis.unesco.org/Library/Documents/ICT_Guide_EN_v19_reprintwc.pdf

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INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

Jordan 2011
 JORDAN 2011

ICT in Education Statistics



Selected Data & Country Indicators

DATA

Population (2010)		
School age group:	Primary	Secondary
MF	890,937	816,438
M	456,792	419,677
F	434,145	396,761

INDICATORS

Education:

Pupil/teacher ratio (headcount) Primary Secondary (2010)

... ...

Net enrolment rate (NER) Primary Secondary (2010)

MF 91 86

M 91 83

F 91 88

Gender Parity Index(GPI), NER 0.9 1.0

ICT & infrastructure: Proportion of households with (ITU,2011)

Computer: 51

Internet access at home: 35

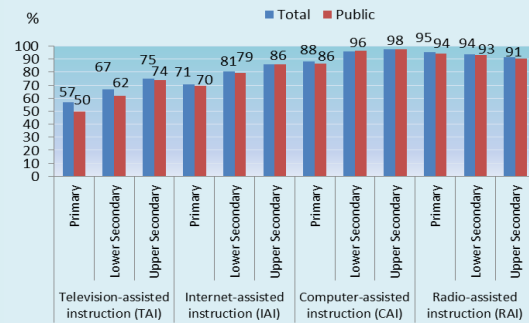
ICT IN EDUCATION POLICY

	National policy	National plan	Regulatory provisions	Regulatory institution or body
Primary	√	√	√	√
Lower secondary	√	√	√	√
Upper secondary	√	√	√	√

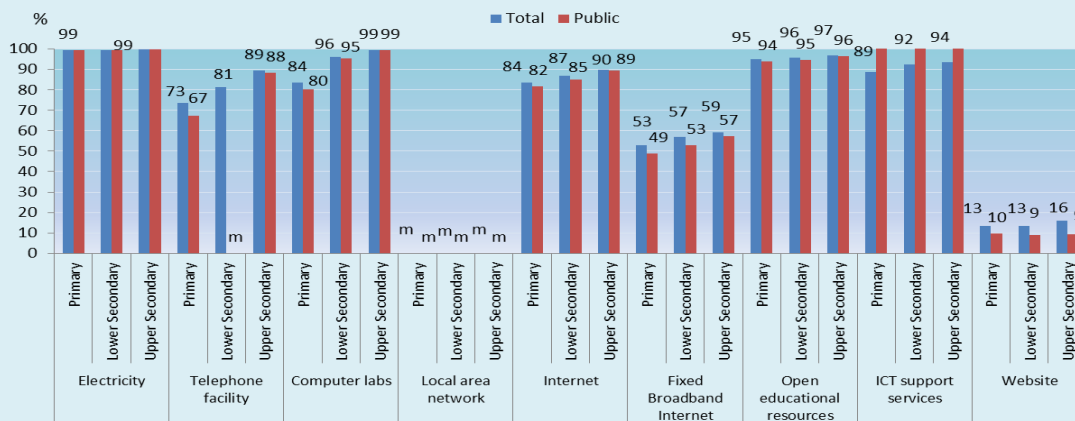
ICT IN EDUCATION CURRICULUM

Subjects	Primary (ISCED 1)		Lower Secondary (ISCED 2)		Upper Secondary (ISCED 3)	
	Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade
Mathematics	√		√		√	
Sciences	√		√		√	
Basic Computer Skills (Computing)	√		√		√	
Written communications (languages)	√		√		√	
Second languages	√		√		√	
Arts	√		√			

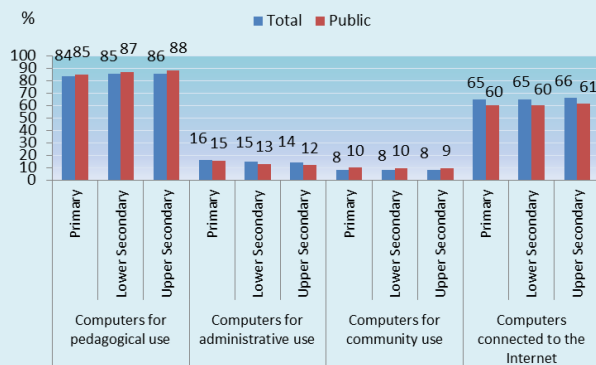
EDUCATIONAL INSTITUTIONS WITH ICT-ASSISTED INSTRUCTION



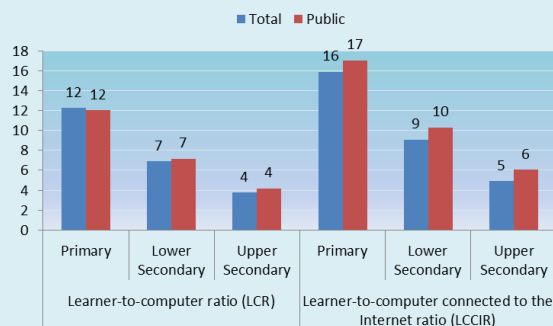
ICT INFRASTRUCTURE IN EDUCATIONAL INSTITUTIONS



COMPUTERS AND INTERNET CONNECTIVITY



LEARNERS TO COMPUTER RATIO



PARTICIPATION IN EDUCATIONAL PROGRAMMES OFFERING ICT-ASSISTED INSTRUCTION (PERCENTAGE OF ENROLMENT)

Enrolment		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Enrolment in programmes having access to electricity	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100
Enrolment in programmes having access to telephone communication facility	MF	90	87	95	93	97	97
	F	91	88	95	94	98	97
Enrolment in programmes offering radio-assisted instruction	MF	96	95	93	92	84	82
	F	97	97	97	96	91	91
Enrolment in programmes offering television-assisted instruction	MF	66	58	76	72	77	76
	F	68	62	80	78	81	80
Enrolment in programmes offering computer-assisted instruction	MF	91	88	97	98	98	98
	F	92	90	98	98	98	99
Enrolment in programmes offering Internet-assisted instruction	MF	81	79	92	91	94	94
	F	84	83	94	93	96	96
Enrolment in programmes having access to open educational resources	MF	98	98	99	98	99	99
	F	98	98	99	98	99	99
Enrolment in courses offering basic computer skills (or computing)	MF	22	...	100	100	100	100
	F	18	...	100	100	100	100

TEACHERS AND ICTs IN EDUCATION (PERCENTAGE OF TEACHERS)

Teachers		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Teachers who teach basic computer skills (or computing)	MF	x	...	31 ^a	...	17	...
	F	x	...	29 ^a	...	17	...
Teachers currently teaching subject(s) using ICT facilities	MF	...	...	...	...	...	...
	F	...	...	...	...	...	...
Teachers trained to teach basic computer skills (or computing)	MF	...	...	...	...	...	9 ^b
	F	...	...	...	...	...	...
Teachers trained to teach subject(s) using ICT facilities	MF	...	...	...	...	...	88 ^b
	F	...	...	...	...	...	...
Teachers trained via ICT-enabled distance education programmes	MF	...	...	...	...	...	15 ^b
	F	...	...	...	...	...	...

Notes:

Learners to computer connected to the Internet ratio (LCCIR) may include computers for administrative, community and pedagogical use, therefore, indicator may overestimate access to computers

a including ISCED 1

b including ISCED 1&2

... category not applicable

... missing (also identified as m)

- quantity nil (or negligible)

Further information regarding data used in this country profile, including indicator definitions and data sources is available upon demand. Information on indicator definitions is also available at: http://www.uis.unesco.org/Library/Documents/ICT_Guide_EN_v19_reprintwc.pdf

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

Oman 2011
 عمان 2011

ICT in Education Statistics
 احصاءات تكنولوجيا المعلومات في التعليم



Selected Data & Country Indicators

DATA

School age group:	Population (2009)	
	Primary	Secondary
MF	286,959	320,737
M	146,137	165,953
F	140,822	154,784

INDICATORS

Education:

Pupil/teacher ratio (headcount) Primary Secondary (2009)

...

Net enrolment rate (NER) Primary Secondary (2009)

MF 97 90

M 98 89

F 96 90

Gender Parity Index(GPI), NER 0.9 1.0

ICT & infrastructure: Proportion of households with (ITU, 2011)

Computer: 58

Internet access at home: 38

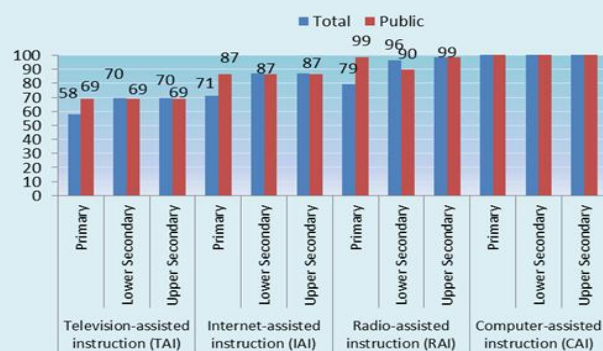
ICT IN EDUCATION POLICY

	National policy	National plan	Regulatory provisions	Regulatory institution or body
Primary	✓	✓	✓	✓
Lower secondary	✓	✓	✓	✓
Upper secondary	✓	✓	✓	✓

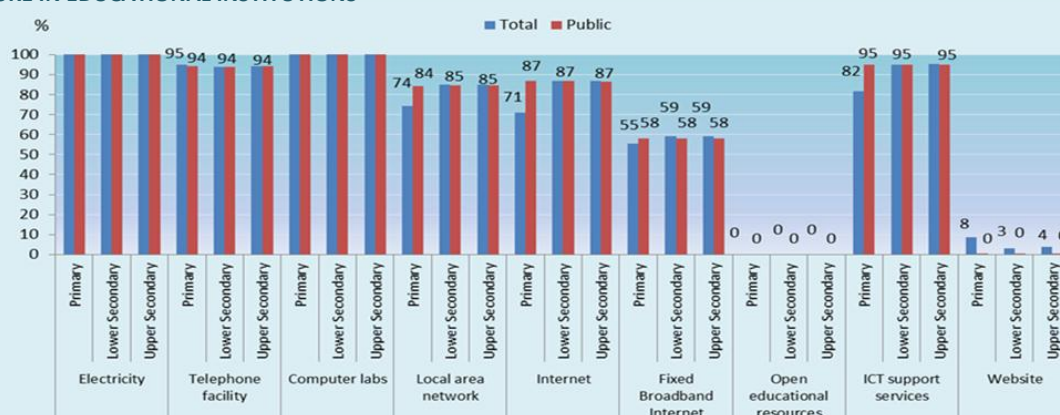
ICT IN EDUCATION CURRICULUM

Subjects	Primary (ISCED 1)		Lower Secondary (ISCED 2)		Upper Secondary (ISCED 3)	
	Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade
Mathematics	✓		✓		✓	
Sciences	✓		✓		✓	
Basic Computer Skills (Computing)	✓		✓		✓	
Written communications (languages)	✓		✓		✓	
Second languages	✓		✓		✓	
Arts		✓		✓		✓

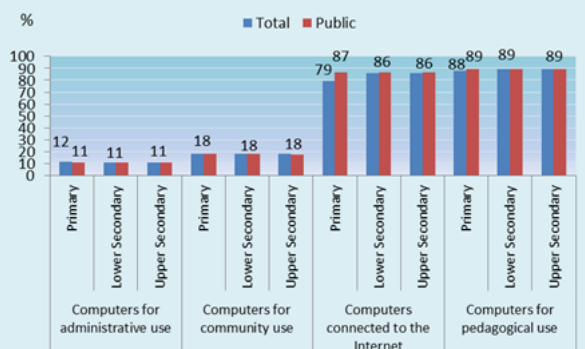
EDUCATIONAL INSTITUTIONS WITH ICT-ASSISTED INSTRUCTION



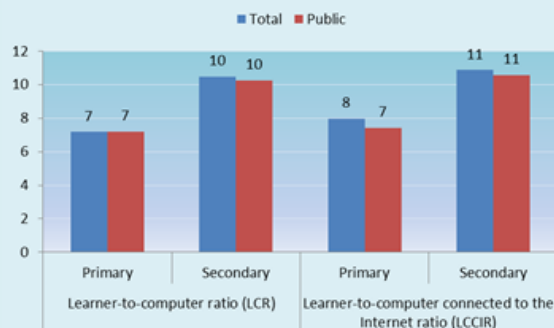
ICT INFRASTRUCTURE IN EDUCATIONAL INSTITUTIONS



COMPUTERS AND INTERNET CONNECTIVITY



LEARNERS TO COMPUTER RATIO



PARTICIPATION IN EDUCATIONAL PROGRAMMES OFFERING ICT-ASSISTED INSTRUCTION (PERCENTAGE OF ENROLMENT)

Enrolment		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Enrolment in programmes having access to electricity	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100
Enrolment in programmes having access to telephone communication facility	MF	95	94	95	94	95	94
	F	95	94	95	94	95	94
Enrolment in programmes offering radio-assisted instruction	MF	91	99	96	99	97	99
	F	91	99	97	99	98	99
Enrolment in programmes offering television-assisted instruction	MF	65	69	68	69	68	69
	F	65	69	68	69	69	69
Enrolment in programmes offering computer-assisted instruction	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100
Enrolment in programmes offering Internet-assisted instruction	MF	80	87	85	87	86	87
	F	81	87	85	87	86	87
Enrolment in programmes having access to open educational resources	MF	.	.	.	.	.	.
	F	.	.	.	.	.	.
Enrolment in courses offering basic computer skills (or computing)	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100

TEACHERS AND ICTs IN EDUCATION (PERCENTAGE OF TEACHERS)

Teachers		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Teachers who teach basic computer skills (or computing)	MF	6	5	4	4	7	6
	F	6	5	5	4	7	6
Teachers currently teaching subject(s) using ICT facilities	MF	40	40	35	35	30	30
	F	40	40	35	35	30	30
Teachers trained to teach basic computer skills (or computing)	MF	6	5	4	4	7	6
	F	6	5	5	4	7	6
Teachers trained to teach subject(s) using ICT facilities	MF	40	40	35	35	30	30
	F	40	40	35	35	30	30
Teachers trained via ICT-enabled distance education programmes	MF	1	1	1	1	1	1
	F	1	1	1	1	1	1

Notes:

- Learners to computer connected to the Internet ratio (LCCIR) may include computers for administrative, community and pedagogical use, therefore, indicator may overestimate access to computers
- category not applicable
- ... missing (also identified as m)
- quantity nil (or negligible)

Further information regarding data used in this country profile, including indicator definitions and data sources is available upon demand. Information on indicator definitions is also available at: http://www.uis.unesco.org/Library/Documents/ICT_Guide_EN_v19_reprintwc.pdf

Information and Communication Statistics

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INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

Palestine 2012

ICT in Education Statistics



Selected Data & Country Indicators

DATA

Population (2011)		
School age group:	Primary	Secondary
MF	447,188	838,301
M	228,512	427,999
F	218,676	410,302

INDICATORS

Education:

Pupil/teacher ratio (headcount) Primary Secondary (2011)
 26 20

Net enrolment rate (NER) Primary Secondary (2011)

MF	87	81
M	87	77
F	86	85

Gender Parity Index(GPI), NER 0.9 1.1

ICT & infrastructure: Proportion of households with (ITU, 2011)

Computer: 51

Internet access at home: 30

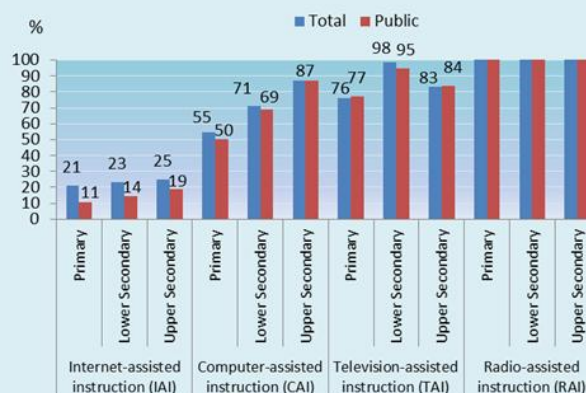
ICT IN EDUCATION POLICY

	National policy	National plan	Regulatory provisions	Regulatory institution or body
Primary	✓	✓	✓	✓
Lower secondary	✓	✓	✓	✓
Upper secondary	✓	✓	✓	✓

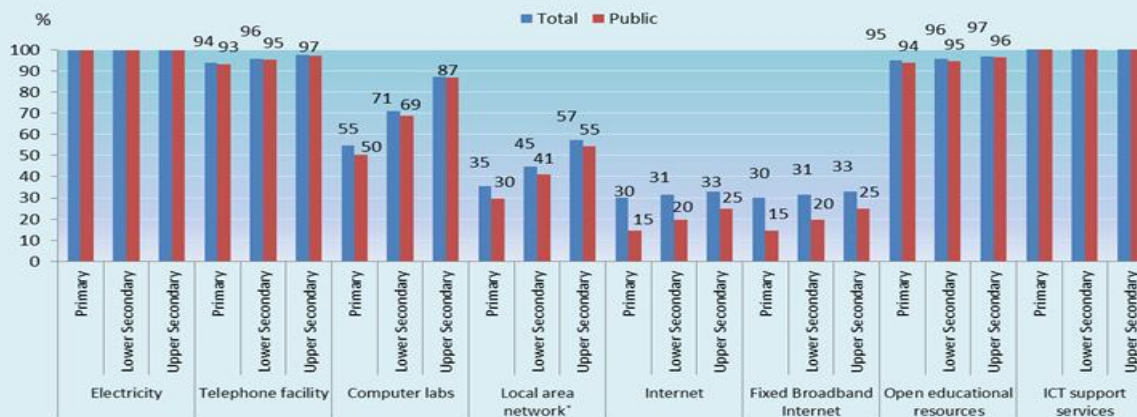
ICT IN EDUCATION CURRICULUM

Subjects	Primary (ISCED 1)		Lower Secondary (ISCED 2)		Upper Secondary (ISCED 3)	
	Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade
Mathematics		✓		✓		✓
Sciences		✓		✓		✓
Basic Computer Skills (Computing)			✓		✓	
Written communications (languages)		✓		✓		✓
Second languages	✓		✓		✓	
Arts		✓		✓		✓

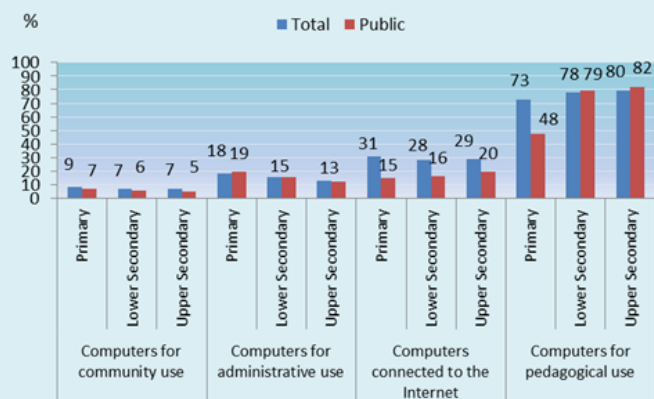
EDUCATIONAL INSTITUTIONS WITH ICT-ASSISTED INSTRUCTION



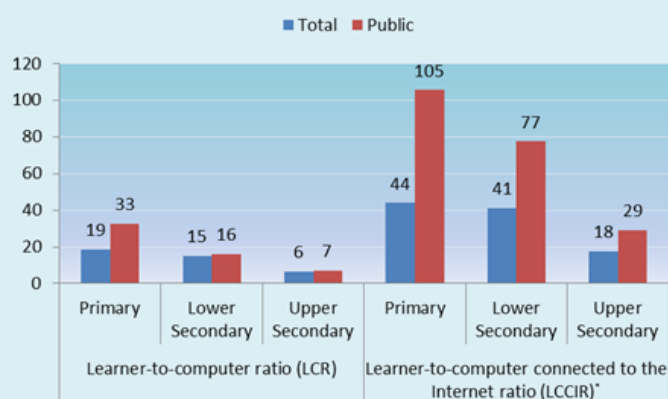
ICT INFRASTRUCTURE IN EDUCATIONAL INSTITUTIONS



COMPUTERS AND INTERNET CONNECTIVITY



LEARNERS TO COMPUTER RATIO



PARTICIPATION IN EDUCATIONAL PROGRAMMES OFFERING ICT-ASSISTED INSTRUCTION (PERCENTAGE OF ENROLMENT)

Enrolment		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Enrolment in programmes having access to electricity	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100
Enrolment in programmes having access to telephone communication facility	MF	96	96	98	98	98	98
	F	96	96	98	98	99	99
Enrolment in programmes offering radio-assisted instruction	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100
Enrolment in programmes offering television-assisted instruction	MF	78	79	81	81	81	82
	F	80	82	84	84	86	75
Enrolment in programmes offering computer-assisted instruction	MF	54	46	80	77	87	87
	F	56	48	83	80	88	87
Enrolment in programmes offering Internet-assisted instruction	MF	25	11	28	17	23	19
	F	25	11	32	20	25	21
Enrolment in programmes having access to open educational resources	MF	-	-	-	-	-	-
	F	-	-	-	-	-	-
Enrolment in courses offering basic computer skills (or computing)	MF	-	-	100	100	100	100
	F	-	-	100	100	100	100

TEACHERS AND ICTs IN EDUCATION (PERCENTAGE OF TEACHERS)

Teachers		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Teachers who teach basic computer skills (or computing)	MF	-	-	11	10	8	5
	F	-	-	11	10	8	8
Teachers currently teaching subject(s) using ICT facilities	MF	96*	90*	80*	80*	80*	40*
	F	90*	90*	80*	80*	80*	40*
Teachers trained to teach basic computer skills (or computing)	MF	-	-	11	10	8	5
	F	-	-	11	10	8	8
Teachers trained to teach subject(s) using ICT facilities	MF	50*	50*	50*	50*	50*	50*
	F	50*	50*	50*	50*	50*	50*
Teachers trained via ICT-enabled distance education programmes	MF	-	-	-	-	-	-
	F	-	-	-	-	-	-

Notes:

- Learners to computer connected to the Internet ratio (LCCIR) may include computers for administrative, community and pedagogical use, therefore, indicator may overestimate access to computers
- category not applicable
- ... missing (also identified as m)
- quantity nil (or negligible)
- * country estimation

Further information regarding data used in this country profile, including indicator definitions and data sources is available upon demand. Information on indicator definitions is also available at: http://www.uis.unesco.org/Library/Documents/ICT_Guide_EN_v19_reprintwc.pdf

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

Qatar 2011
Qatar 2011

ICT in Education Statistics



Selected Data & Country Indicators DATA

Population (2010)		
School age group:	Primary	Secondary
MF	86,188	73,563
M	44,083	40,942
F	42,105	32,621

INDICATORS

Education:

Pupil/teacher ratio (headcount) Primary Secondary (2010)
12 10

Net enrolment rate (NER) Primary Secondary (2010)

MF	93	83
M	92	76
F	93	93

Gender Parity Index(GPI), NER 1.0 1.2

ICT & infrastructure: Proportion of households with (ITU, 2011)

Computer: 88
Internet access at home: 84

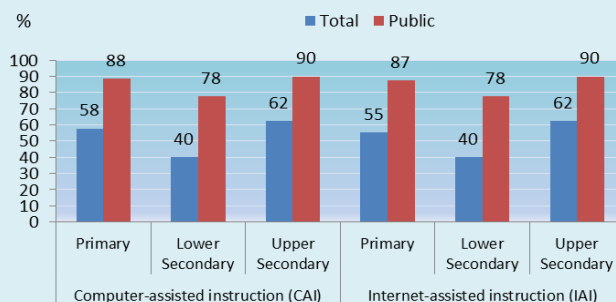
ICT IN EDUCATION POLICY

	National policy	National plan	Regulatory provisions	Regulatory institution or body
Primary	✓	✓	✓	✓
Lower secondary	✓	✓	✓	✓
Upper secondary	✓	✓	✓	✓

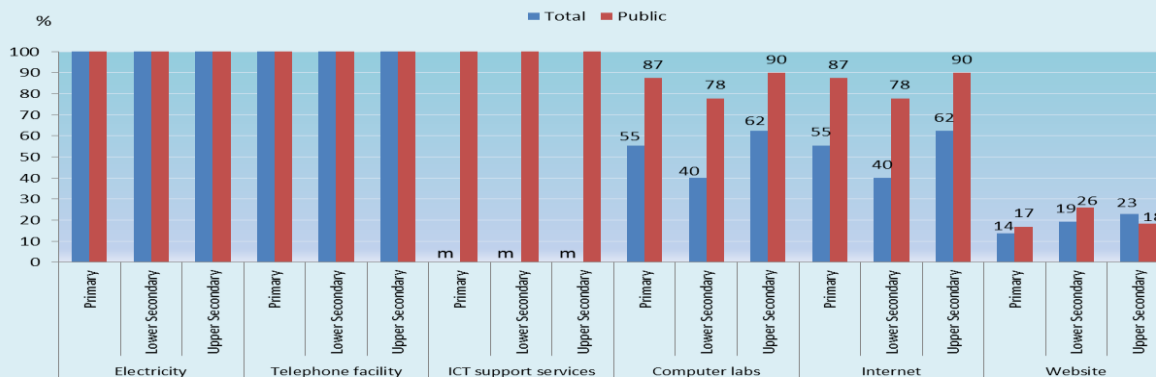
ICT IN EDUCATION CURRICULUM

Subjects	Primary (ISCED 1)		Lower Secondary (ISCED 2)		Upper Secondary (ISCED 3)	
	Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade
Mathematics	✓		✓		✓	
Sciences	✓		✓		✓	
Basic Computer Skills (Computing)	✓		✓		✓	
Written communications (languages)	✓		✓		✓	
Second languages	✓		✓		✓	
Arts	✓		✓		✓	

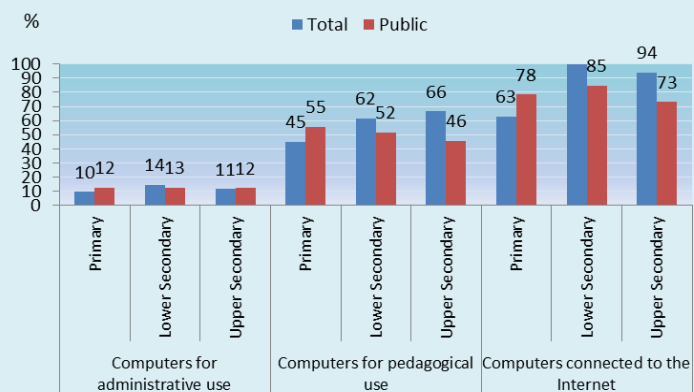
EDUCATIONAL INSTITUTIONS WITH ICT-ASSISTED INSTRUCTION



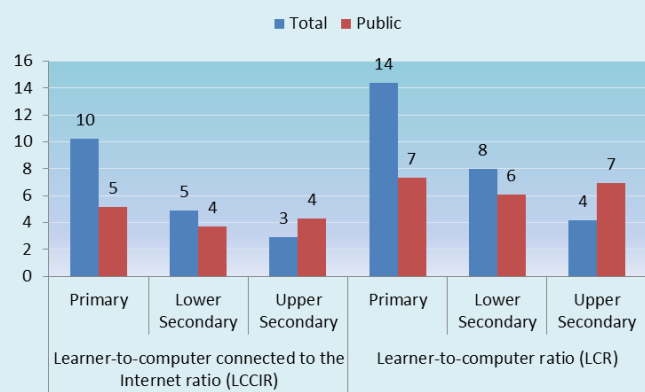
INFRASTRUCTURE IN EDUCATIONAL INSTITUTIONS



COMPUTERS AND INTERNET CONNECTIVITY



LEARNERS TO COMPUTER RATIO



PARTICIPATION IN EDUCATIONAL PROGRAMMES OFFERING ICT-ASSISTED INSTRUCTION (PERCENTAGE OF ENROLMENT)

Enrolment		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Enrolment in programmes having access to electricity	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100
Enrolment in programmes having access to telephone communication facility	MF	100	100	100	100	100	100
	F	100	100	100	100	100	100
Enrolment in programmes offering radio-assisted instruction	MF	.	.	.	.	.	.
	F	.	.	.	.	.	.
Enrolment in programmes offering television-assisted instruction	MF	.	.	.	.	.	.
	F	.	.	.	.	.	.
Enrolment in programmes offering computer-assisted instruction	MF	72	100	76	100	83	100
	F	72	100	77	100	83	100
Enrolment in programmes offering Internet-assisted instruction	MF	...	100	...	100	...	100
	F	...	100	...	100	...	100
Enrolment in programmes having access to open educational resources	MF	.	.	.	.	.	.
	F	.	.	.	.	.	.
Enrolment in courses offering basic computer skills (or computing)	MF	...	...	...	...	...	...
	F	...	...	...	...	...	...

TEACHERS AND ICTs IN EDUCATION (PERCENTAGE OF TEACHERS)

Teachers		Primary		Lower Secondary		Upper Secondary	
		Total	Public	Total	Public	Total	Public
Teachers who teach basic computer skills (or computing)	MF	4	5	6	7	4	4
	F	4	5	5	6	4	3
Teachers currently teaching subject(s) using ICT facilities	MF	43	69	68	100	100	100
	F	...	...	...	...	...	...
Teachers trained to teach basic computer skills (or computing)	MF	4	5	6	7	4	4
	F	4	5	5	6	4	3
Teachers trained to teach subject(s) using ICT facilities	MF	43	69	68	100	100	100
	F	...	...	...	...	...	...
Teachers trained via ICT-enabled distance education programmes	MF	.	.	.	.	.	.
	F	.	.	.	.	.	.

Notes:

Learners to computer connected to the Internet ratio (LCCIR) may include computers for administrative, community and pedagogical use, therefore, indicator may overestimate access to computers
 . category not applicable
 ... missing or not available (also identified as m)

Further information regarding data used in this country profile, including indicator definitions and data sources is available upon demand. Information on indicator definitions is also available at: http://www.uis.unesco.org/Library/Documents/ICT_Guide_EN_v19_reprintwc.pdf

Annex II

Questionnaire on Statistics of Information and Communication Technologies (ICT) in Education



UNESCO
INSTITUTE
for
STATISTICS

UIS/CJ/ED/ICT/2011

Montreal, July 2010

Country: _____

QUESTIONNAIRE ON STATISTICS OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) IN EDUCATION

Academic year ending 2010 or latest year available

This questionnaire is designed to collect recent statistics in order to produce policy relevant indicators on key aspects of ICT integration in education. The data will be published in the UNESCO Institute for Statistics (UIS) Data Centre at <http://stats.uis.unesco.org> and major international reports.

Please return the completed questionnaire before **28th March 2011**. The electronic form can be submitted directly to the UIS by email to b.valdez-melgar@unesco.org. Questionnaires completed using the printed forms should be sent to:

UNESCO Institute for Statistics
P.O. Box 6128, Succursale Centre-Ville
Montreal, Quebec H3C 3J7
Canada

Telephone: **(1 514) 343-7392**
Fax: **(1 514) 343-6872**

Please refer to the *Glossary* before completing the questionnaire.

Data reported in this questionnaire should cover all educational institutions in your country. If this is not the case, please provide a detailed explanation using a comment in the electronic form or footnote in the printed form. To enter comments in the electronic form, please press the RIGHT mouse button and click on "Insert comments".

Please do not leave any cell blank. Please use the following symbols in the tables if you do not have the data requested:

- a = category not applicable
- m = data missing (or not available)
- n = quantity nil
- x = data included in another category (to be indicated with a comment or a footnote)

Estimated or provisional data should be marked with an asterisk (*).

Continued

RESPONDENT INFORMATION

Please provide details below of the person responsible for completing this questionnaire.

Family name:.....	First name:.....	<input type="checkbox"/> Male	<input type="checkbox"/> Female
Job title (or position).....			
Department, division or sector (if any):.....			
Organization:.....			
Mailing address:			
City:		Postal code:	
Country:.....		Fax: ().....	
Telephone: ().....		Email:.....	
Mobile phone: ()		Institutional website:.....	

REFERENCE YEAR FOR THE DATA SUBMITTED IN THE QUESTIONNAIRE

Data reported in this questionnaire should refer to the academic year ending in 2010. If data are not available for the requested year, please report the most recent year available.

The academic year began in (month) 20.....

and ended in (month) 20.....

Continued

SECTION A: POLICY AND CURRICULUM

Please provide the source of the data reported in Section A, if different from the main source on the second page:

Organization:

Department:

Data source (name of publication, database, website, etc.):

A.1 In order to promote/implement the integration of ICT in Education, does your country have?

		ISCED 1	ISCED 2	ISCED 3
A.1.1	a national policy?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
A.1.2	a national plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
A.1.3	a set of regulatory provisions?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
A.1.4	a regulatory institution or body?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

A.2 Does your country have a national policy specifically for the use of open educational resources?

Yes No

A.3 Does your curriculum include specific objectives or a subject on basic computer skills (or computing)?

ISCED 1	ISCED 2	ISCED 3
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

A.4 As part of the policies/plans/provisions to integrate ICT in education, are there recommendations for ICT-assisted instruction to form part of subject delivery at specific grade(s)?

Yes No

If the answer to Question A.4 is yes, please tick all applicable boxes that have ICT-assisted instruction by subject:

		ISCED 1		ISCED 2		ISCED 3	
		Every grade	At least one grade	Every grade	At least one grade	Every grade	At least one grade
A.4.1	All subjects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A.4.2	Mathematics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A.4.3	Sciences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A.4.4	Basic computer skills (or computing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A.4.5	Written communication (language)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A.4.6	Second language	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A.4.7	Arts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Continued

A.5 Please indicate the total statutory annual instructional time (in hours) for the following ISCED levels:

		Recommended statutory annual instructional hours – cumulative hours for all grades by level		
		ISCED 1	ISCED 2	ISCED 3
A.5.1	All subjects (Total)			
A.5.2	ICT-assisted instruction			
A.5.3	Computer-assisted instruction			

SECTION B: EDUCATIONAL PROGRAMMES AND ENROLMENT

Please provide the source of the data reported in Section B, if different from the main source on the second page:

Organization:.....
 Department:.....
 Data source (name of publication, database, website, etc.):.....

Table 1: Educational institutions by programme level

NB. In the table below:

- Columns (1), (2) and (3) must contain the number of educational institutions offering educational programmes at each level. Double counting is permitted since an educational institution may offer two or more programmes that span more than one ISCED level. For example, if an educational institution offers both ISCED 2 and ISCED 3 programmes, it must be counted once under ISCED 2 and once under ISCED 3)
- Column (4) refers only to educational institutions as organisational units regardless of the number of ISCED1-3 programmes they offer. Therefore, (4) is **NOT** the total of columns (1), (2) and (3).
- B.1 is **NOT** the sum of B.1.1 to B.1.9

		Primary and secondary (ISCED 1,2 and 3) – All programmes							
		(1) ISCED 1		(2) ISCED 2		(3) ISCED 3		(4) ISCED 1, 2 and 3	
		Total	Of which: Public	Total	Of which: Public	Total	Of which: Public	Total (Organisational units)	Of which: Public (Organisational units)
B.1	Number of educational institutions								
B.1.1	Number of educational institutions with electricity								
B.1.2	Number of educational institutions with a telephone communication facility								
B.1.3	Number of educational institutions with radio-assisted instruction								
B.1.4	Number of educational institutions with television-assisted instruction								
B.1.5	Number of educational institutions with computer-assisted instruction								
B.1.5.1	Number of educational institutions with computer laboratories								
B.1.5.2	Number of educational institutions with computers connected to a Local Area Network (LAN)								

Continued

		Primary and secondary (ISCED 1,2 and 3) – All programmes							
		(1) ISCED 1		(2) ISCED 2		(3) ISCED 3		(4) ISCED 1, 2 and 3	
		Total	Of which: Public	Total	Of which: Public	Total	Of which: Public	Total (Organisational units)	Of which: Public (Organisational units)
B.1.6	Number of educational institutions with access to the Internet								
B.1.6.1	Number of educational institutions with fixed broadband Internet								
B.1.6.2	Number of educational institutions with Internet-assisted instruction								
B.1.7	Number of educational institutions with open educational resources								
B.1.8	Number of educational institutions with ICT support services								
B.1.9	Number of educational institutions with a website								

Table 2: Enrolment by gender and ISCED level

NB. In the table below,

- *'MF' refers to both sexes and 'F' refers to female.*
- *B.2 is NOT the sum of B.2.1 to B.2.8*

			Primary and secondary pupils – All programmes					
			ISCED 1		ISCED 2		ISCED 3	
			Total pupils	Of which: Public	Total pupils	Of which: Public	Total pupils	Of which: Public
B.2	Enrolment	MF						
		F						
B.2.1	Enrolment in programmes having access to electricity	MF						
		F						
B.2.2	Enrolment in programmes having access to telephone communication facility	MF						
		F						
B.2.3	Enrolment in programmes offering radio-assisted instruction	MF						
		F						
B.2.4	Enrolment in programmes offering television-assisted instruction	MF						
		F						
B.2.5	Enrolment in programmes offering computer-assisted instruction	MF						
		F						
B.2.6	Enrolment in programmes offering Internet-assisted instruction	MF						
		F						
B.2.7	Enrolment in programmes having access to open educational resources	MF						
		F						
B.2.8	Enrolment in courses offering basic computer skills (or computing)	MF						
		F						

Continued

Table 3: Enrolment (*t-1*) in the previous school year by gender and ISCED level

NB. In the table below,

- 'MF' refers to both sexes and 'F' refers to female.

		Primary and secondary pupils – All programmes					
		ISCED 1		ISCED 2		ISCED 3	
		Total pupils	Of which: Public	Total pupils	Of which: Public	Total pupils	Of which: Public
B.3	Enrolment (<i>t-1</i>)	MF					
		F					
B.3.1	Enrolment in programmes offering computer-assisted instruction (<i>t-1</i>)	MF					
		F					
B.4	Pupils who passed at the end of <i>t-1</i>	MF					
		F					
B.4.1	Pupils who passed at the end of <i>t-1</i> from programmes offering computer-assisted instruction	MF					
		F					

SECTION C: COMPUTERS

Please provide the source of the data reported in Section C, if different from the main source on the second page:

Organization:

Department:

Data source (name of publication, database, website, etc.):

Table 4: Computers allocated to educational programmes

NB. In the table below,

- Columns (1), (2) and (3) must contain the number of available computers at each level, whether they are shared or not across levels. Therefore, double counting is permitted.
- Column (4) refers only to the available number of computers (physical units) in all primary and secondary programmes. (4) is **NOT** the total of columns (1), (2) and (3).
- C.3 is **NOT** the sum of C.3.1 to C.3.4

		Primary and secondary (ISCED 1,2 and 3) – All programmes							
		(1) ISCED 1		(2) ISCED 2		(3) ISCED 3		(4) ISCED 1, 2 and 3	
		Total	Of which: Public	Total	Of which: Public	Total	Of which: Public	Total (Physical units)	Of which: Public (Physical units)
C.3	Number of computers available								
C.3.1	Number of computers for pedagogical use								
C.3.2	Number of computers for administrative use								
C.3.3	Number of computers for community use								
C.3.4	Number of computers connected to the Internet								

Continued

SECTION D: PRIMARY AND SECONDARY TEACHERS

Please provide the source of the data reported in Section D, if different from the main source on the second page:

Organization:

Department:

Data source (name of publication, database, website, etc.):

Table 5: Teaching staff by gender and ISCED level

***NB.** In the table below,*

- ***MF** refers to both sexes and **F** refers to female.*
- ***D.1** is NOT the sum of D.1.1 to D.1.5*

			Primary and secondary – All programmes – Part-time and full-time teachers (Headcounts)					
			ISCED 1		ISCED 2		ISCED 3	
			Total	Of which: Public	Total	Of which: Public	Total	Of which: Public
D.1	Number of teachers	MF						
		F						
D.1.1	Number of teachers who teach basic computer skills (or computing)	MF						
		F						
D.1.2	Number of teachers currently teaching subject(s) using ICT facilities	MF						
		F						
D.1.3	Number of teachers trained via ICT-enabled distance education programmes	MF						
		F						
D.1.4	Number of teachers trained to teach basic computer skills (or computing)	MF						
		F						
D.1.5	Number of teachers trained to teach subject(s) using ICT facilities	MF						
		F						

GLOSSARY

ALL PROGRAMMES
All programmes include both general education as well as technical and vocational education programmes. See corresponding definitions.
ANNUAL INSTRUCTIONAL TIME
Annual instructional time (in hours) corresponds to the total number of statutory hours that are allocated for learning activities in a school year according to the national regulations. That is to say, these are the intended number of hours expected to be used for educational activities in a given school year for a given grade.
Please note that instructional periods must correspond to a full hour equivalent of 60 minutes. Where the standard duration of a period is different from 60 minutes, it is transformed into a full hour equivalent by dividing by 60 minutes.
Annual instructional time (in hours) is calculated as: (Standard duration of a period in minutes / 60 minutes * number of instructional periods in a day) * (net number of instructional days per annum)
Where net number of instructional days per annum is equivalent to the number of statutory school days per annum minus the number of days the school is closed (e.g. festivities, national holidays, non-teaching pedagogical days, etc.)
Source: Adapted from the <i>World Education Indicators specific Data Collection Manual</i> .
BASIC COMPUTER SKILLS
Basic computer skills is a curriculum module that covers the most common usages of a computer, including a majority or all of the following: understanding the basic notions of computer manipulation; managing computer files, word processing, using spreadsheets and databases; creating presentations; finding information and communicating using computers; and being aware of social and ethical implications of Internet use.
From a statistical perspective, nationally-defined content of such modules should be considered. In the absence of a national standard, please consider curriculum modules that have a majority or all of the above content units as equivalent to a basic computer skills course.
Basic computer skills may be taught as a separate subject or integrated into other subjects. A common standard applied by a growing number of countries is the International Computer Driving Licence (ICDL) assessment system, which is derived from the European Computer Driving Licence (ECDL).
COMPUTER
Computer refers to a programmable electronic device that can store, retrieve and process data, as well as share information in a highly-structured manner. It performs high-speed mathematical or logical operations according to a set of instructions.
When providing data on the number of computers, personal computers (PCs), laptops, notebooks, terminals connected to mainframes and mini-computers intended for shared use should be included. Computers must also be of functional use to meet pedagogical and/or administrative needs.
Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i> .
COMPUTER-ASSISTED INSTRUCTION
Computer-assisted instruction is an interactive learning method in which a computer is used by teachers and/or pupils to present instructional material, to perform tasks for learning and to help in selecting and accessing additional pedagogical material.
Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i> .
COMPUTER LABORATORY
Computer laboratory is a room or space equipped with computers (networked or not) devoted to pedagogical use in an educational institution.
A computer laboratory must be safe from any disruptive, non-pedagogical content where pupils and teachers may need authorized access credentials. In this context, Internet booth (or community Internet centres) must be excluded unless there is a decisive policy to use such facilities for pedagogical purposes.
COMPUTERS FOR ADMINISTRATIVE USE
Computers for administrative use refer to computers used by non-teaching staff to assist with school management. Such usage may include record-keeping or data processing and analysis of registration and daily attendance in classes, teaching and non-teaching staff, physical school facilities, budget and expenditure data, and assessment results. It also includes planning of programmes and deployment of human, material and financial resources. It may involve secretarial usage through word processing, as well as communications with external bodies or parents through emails.

COMPUTERS FOR PEDAGOGICAL USE
Computers for pedagogical use refers to the use of computers to support course delivery or independent teaching and learning needs. This may include activities using computers or the Internet to meet information needs for research purposes; develop presentations; perform hands-on exercises and experiments; share information; and participate in online discussion forums for educational purposes.
COMPUTING
Computing refers to a course programme usually taught at ISCED 4, 5 or 6 levels. Some schools may also teach computing (mainly computer programming) at ISCED 3. Typical computing course content may include: system design, computer programming, data processing, networks, operating systems and software development. Computing does not include computer hardware design, construction and production.
Source: Adapted from <i>International Standard Classification of Education (ISCED97)</i> .
COURSE
A course is a planned series of learning experiences in a particular subject matter or set of skills, usually offered by an educational or training institution or programme for one or more pupils.
Source: Adapted from <i>International Standard Classification of Education (ISCED97)</i> .
CURRICULUM
Curriculum refers to the design, planning and sequencing of teaching and learning processes. It includes a statement of purpose, contents, activities and learning practices, as well as the modalities for assessing pupils' achievements. For the purpose of this questionnaire, the relevant subjects that are contained in the curriculum are defined below:
Mathematics: mathematics, mathematics with statistics, geometry.
Science: science, physics, physical science, chemistry, biology, human biology, environmental science, agriculture / horticulture / forestry.
Basic computer skills (computing): See corresponding definitions
Written communication (language): This refers to reading and writing in the tongue of instruction normally used in educational programmes.
Second language: This refers to reading and writing in a second 'tongue' (e.g., a foreign language) or reading and writing in the native tongue of the country as a second language (for non natives).
Arts: arts, music, visual arts, practical art, drama, performance music, photography, drawing, creative handicraft, creative needlework.
EDUCATIONAL INSTITUTIONS
Educational institutions have as their sole or main purpose the provision of education. Such institutions are normally accredited or sanctioned by some public authorities. While the majority of educational institutions fall under the jurisdiction of, or are operated by, education authorities, other public agencies dealing with such areas as health, training, labour, justice, defence, social services, etc. may also be involved. Educational institutions may also be operated by private organizations such as religious bodies, special-interest groups or private educational and training institutions, both profit and non-profit making.
Source: Adapted from the <i>UIS Instruction Manual for Completing the Questionnaires on Statistics of Education – 2008</i> .
ELECTRICITY
Electricity refers to regularly and readily available sources of power (e.g. grid/mains connection, wind, water, solar and fuel-powered generator, etc.) that enable the adequate and sustainable use of ICT infrastructure for educational purposes.
In this questionnaire, enrolment in educational programmes offered by institutions having access to electricity must be counted.
Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i> .
ENROLMENT (OR ENROLLED)
Enrolment (or enrolled) refers to a pupil registered in a grade or programme of study at an educational institution who met enrolment prerequisites at the registration date.
Period (0) refers to enrolment for the school year ending in 2010 or most recent year available. Period (t-1) refers to enrolment for the preceding school year ending in 2009.

FIXED BROADBAND INTERNET	INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)
<p>Fixed broadband Internet refers to high-speed connectivity for public use of at least 256 Kbit/s or more in one or both directions (downloading and uploading). It includes cable modem Internet connections, DSL Internet connections of at least 256 Kbit/s or higher, fibre and other fixed broadband technology connections (such as satellite broadband Internet, Ethernet LANs, fixed-wireless access, Wireless Local Area Network, WiMAX, etc.).</p> <p>Private Internet connectivity within educational institutions via mobile phone networks is excluded.</p> <p>Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i>.</p>	<p>For the purpose of statistical reporting, information and communication technologies (ICT) is defined as a diverse set of technological tools and resources used to transmit, store, create, share or exchange information. These technological tools and resources include computers, the Internet (websites, blogs and emails), live broadcasting technologies (radio, television and webcasting), recorded broadcasting technologies (podcasting, audio and video players, and storage devices) and telephony (fixed or mobile, satellite, video-conferencing, etc.).</p>
GENERAL PROGRAMMES	INTERNET
<p>General programmes (or general education) are designed mainly to provide pupils with a deeper understanding of a subject or group of subjects, especially – but not necessarily – with a view to preparing pupils for further education at the same or higher level. Such programmes are typically school-based and may or may not contain vocational elements. Successful completion of such programmes may lead to an academic qualification. However, successful completers typically cannot enter a particular occupation, trade or class of occupations or trades without further training. Programmes with a general orientation and not focused on a particular specialization should be classified in this category.</p>	<p>Internet refers to worldwide interconnected networks that enable users to share information in an interactive format – referred to as hypertext – through multiple wired or wireless receivers (personal computers, laptops, PDAs, Smartphones, etc.). (See also definitions for fixed narrowband Internet and fixed broadband Internet.)</p>
ICT FACILITIES	INTERNET-ASSISTED INSTRUCTION
<p>See definition of <i>Information and Communication Technologies (ICT)</i>.</p>	<p>Internet-assisted instruction refers to an interactive learning method using content from the World Wide Web for pedagogical purposes.</p>
ICT SUPPORT SERVICES	ISCED LEVELS
<p>ICT support services refer to a range of services implemented by educational institutions in order to ensure permanence and performance of facilities for operating ICT-assisted instruction without discontinuity. The implementation of such services may imply operational or administrative measures to support the sustainability of ICT-assisted operations by assigning a designated unit or staff member to the task or renting renewable quarterly, bi-quarterly or yearly contract(s) to private service provider(s). Key objectives behind the use of ICT support services by schools may include:</p> <ul style="list-style-type: none"> ascertaining that every pedagogic and administrative unit, including special needs and library units, identifies its requirements for ICT provision; coordinating the effective use of ICT across the whole curriculum and encouraging aspects of cross-curricular planning; helping pedagogic and administrative units to consider how ICT can support the teaching and learning of subjects other than computing and what those subjects can contribute to the teaching and learning of ICT skills; monitoring on behalf of the senior leadership team how equipment and software are accommodated, acquired, maintained and replaced, and how they are stored, accessed and used by pupils and staff; ensuring that sensible, transparent decisions are made where there are competing demands for resources and that the school improvement plan includes plans for encouraging and supporting the professional development of all staff in the use of ICT in their subjects, in line with school policy and practices; and managing the school's ICT technician and network manager, etc. <p>From a statistical perspective, irrespective of the modalities for acquiring such services either through one or multiple means, the sole existence of such regular or renewable contracted services in an educational institution implies the presence of ICT support services.</p> <p>Source: Adapted from the Department for Children, Schools and Families.</p>	<p>ISCED levels are defined in the 1997 version of the <i>International Standard Classification of Education (ISCED97)</i> maintained by UNESCO. Levels of education are classified as follows:</p> <ul style="list-style-type: none"> ISCED 0 – Pre-primary ISCED 1 – Primary or first stage of basic education ISCED 2 – Lower secondary or second stage of basic education ISCED 3 – Upper secondary education ISCED 4 – Post-secondary non-tertiary education (programmes that lie between the upper secondary and tertiary levels of education) ISCED 5 – First stage of tertiary education (not leading directly to an advanced research qualification) ISCED 6 – Second stage of tertiary education (leading to an advanced research qualification) <p>Source: <i>International Standard Classification of Education (ISCED97)</i>.</p>
ICT-ASSISTED INSTRUCTION	LOCAL AREA NETWORK (LAN)
<p>ICT-assisted instruction refers to teaching methods or models of instruction delivery that employ ICT in supporting, enhancing and enabling course content delivery. It includes any, all or combinations of the following: radio-, television-, computer- and Internet-assisted instruction.</p>	<p>A local area network (LAN) refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless.</p> <p>Source: <i>Partnership on Measuring ICT for Development, Core ICT Indicators, 2010</i></p>
ICT-ENABLED DISTANCE EDUCATION PROGRAMMES	OPEN EDUCATIONAL RESOURCES
<p>ICT-enabled distance education programmes refer to programmes or instructional systems that use ICT (Internet, radio sets, television sets, personal computers, audiovisual material or print material to a minimal degree) to deliver all or a significant portion of teaching to pupils removed in space and time. Distance education can take a variety of forms, which include:</p> <ul style="list-style-type: none"> Internet-based distance learning either synchronously or asynchronously; Telecourses or broadcast-based education, in which content is delivered via radio or television; CD-ROM or DVD-based self-learning in which the pupils interact with computer content stored on a CD-ROM or DVD; Mobile devices-based learning where the learner accesses course content stored on a mobile device or through a wireless server; and Integrated distance learning, combining live versus recorded delivery modes, individualized interaction versus group instruction through various channels, and/or print materials to a minimal degree, etc. <p>...but exclude:</p> <ul style="list-style-type: none"> Correspondence-based distance learning conducted exclusively through postal-mail. 	<p>Open educational resources refers to electronic resources and tools for learning in open document format and released under an intellectual property licence allowing free use, adaptation and distribution.</p> <p>From a statistical perspective, institutions must have a specific policy to devote resources for the coordination and maintenance of an electronic repository for pedagogical use.</p>
ICT-ASSISTED INSTRUCTION	PLAN
<p>ICT-assisted instruction refers to teaching methods or models of instruction delivery that employ ICT in supporting, enhancing and enabling course content delivery. It includes any, all or combinations of the following: radio-, television-, computer- and Internet-assisted instruction.</p>	<p>Plan refers to a government-issued document on how its goals are to be achieved within a specified timeframe. It details each activity to be undertaken, the method employed for implementation, the resources required and the actors responsible for implementing each activity.</p>
ICT-ENABLED DISTANCE EDUCATION PROGRAMMES	POLICY
<p>ICT-enabled distance education programmes refer to programmes or instructional systems that use ICT (Internet, radio sets, television sets, personal computers, audiovisual material or print material to a minimal degree) to deliver all or a significant portion of teaching to pupils removed in space and time. Distance education can take a variety of forms, which include:</p> <ul style="list-style-type: none"> Internet-based distance learning either synchronously or asynchronously; Telecourses or broadcast-based education, in which content is delivered via radio or television; CD-ROM or DVD-based self-learning in which the pupils interact with computer content stored on a CD-ROM or DVD; Mobile devices-based learning where the learner accesses course content stored on a mobile device or through a wireless server; and Integrated distance learning, combining live versus recorded delivery modes, individualized interaction versus group instruction through various channels, and/or print materials to a minimal degree, etc. <p>...but exclude:</p> <ul style="list-style-type: none"> Correspondence-based distance learning conducted exclusively through postal-mail. 	<p>Policy refers to a set of ideas that has been agreed officially by a group of people, a business organization, a government or a political party usually expressed in a government-issued document which outlines the principles, guidelines and strategy in relation to a particular (or determined) public activity.</p>
ICT-ASSISTED INSTRUCTION	PRIVATE EDUCATION
<p>ICT-assisted instruction refers to teaching methods or models of instruction delivery that employ ICT in supporting, enhancing and enabling course content delivery. It includes any, all or combinations of the following: radio-, television-, computer- and Internet-assisted instruction.</p>	<p>Private education is offered by educational institutions that are controlled or managed by a non-governmental organization (including but not limited to a church, trade union or business enterprise), whether or not it receives financial support from public authorities.</p> <p>Source: Adapted from the <i>UIS Instruction Manual for Completing the Questionnaires on Statistics of Education</i></p>

PROGRAMME
<p>Educational programmes are defined as a coherent set or sequence of educational activities that are designed and organized to achieve pre-determined learning objectives or a specific set of educational tasks over a sustained period. Objectives encompass improving knowledge, skills and competencies within any personal, civic, social and/or employment related context. This is typically linked to the purpose of preparing for more advance studies and/or for an occupation or range of occupations. A common characteristic of educational programmes is that, upon fulfilment of learning objectives or educational tasks, completion is recognized or certified by the provider.</p> <p>In ISCED-97, programmes are assigned to levels of education. Broadly speaking, the level is related to the degree of complexity of the content of the programme.</p> <p>The notion of 'levels' of education, therefore, is essentially a construct based on the assumption that educational programmes can be grouped, both nationally and cross-nationally, into an ordered series of categories broadly corresponding to the overall knowledge, skills and capabilities of required participants if they are to have a reasonable expectation of successfully completing the programmes in these categories. These categories represent broad steps of educational progression from very elementary to more complex experiences with the more complex the programme, the higher the level of education.</p>
PUBLIC EDUCATION
<p>Public education is offered by educational institutions that are controlled or managed by a governmental education authority or agency that can be at the national/federal, state/provincial or local level, irrespective of the origin of its financial resources.</p> <p>Source: Adapted from the <i>UIS Instruction Manual for Completing the Questionnaires on Statistics of Education</i></p>
PUPILS WHO PASSED
<p>Pupils who passed refers to pupils who have successfully completed a given grade in a given academic year (I-I) and are, therefore, permitted to register in the following grade in the following academic year (II) or "promoted" to the next grade/level. Nevertheless, the intention here is not to measure the transition or flows across different school years, but the final results of a given academic year. A mandatory passing mark is usually required for promotion to the next grade. Pupils who have passed during a recuperation period following an academic year or session are to be included.</p>
PUPIL
<p>Pupil refers to a child enrolled in an educational programme, whereas children or adults enrolled at more advanced levels are students.</p> <p>Source: Adapted from the <i>UIS Instruction Manual for Completing the Questionnaires on Statistics of Education</i>.</p>
RADIO
<p>Radio is considered to be a stand-alone device (in working condition) capable of receiving broadcast radio signals, using popular frequencies (such as FM, AM, LW and SW).</p> <p>Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i>.</p>
RADIO-ASSISTED INSTRUCTION
<p>Radio-assisted instruction includes both radio broadcast education and interactive radio instruction.</p> <p>Radio broadcast education entails an audio lecture or lesson, with printed material for pupils to follow the lecture. Any teacher, not necessarily qualified in the subject matter, can use the radio programme as a main instructional source. Broadcast programmes follow the traditional model of education and can cover every subject in many different languages, depending on the target audience.</p> <p>Interactive radio instruction (IRI) turns a typically one-way technology into a tool for active learning inside and outside the classroom. It requires that pupils react to questions and exercises through verbal responses to radio programme contributors, group work, and physical and intellectual activities while the programme is on air. For both teacher and pupil, the lesson becomes an immediate hands-on practical guide.</p> <p>Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i></p>
REGULATORY INSTITUTION
<p>Regulatory institution refers to a separate body, organization, committee or bureau that has been given responsibility by the government for promoting, coordinating and ensuring correct implementation of laws and policies.</p>
REGULATORY PROVISION
<p>Regulatory provision refers to a law or legal provision usually made by a government, that is used to order the way in which a society behaves.</p>

TEACHERS
<p>Teachers and teaching staff refers to persons employed in an official capacity for the purpose of guiding and directing the learning experience of pupils, irrespective of qualifications or the delivery mechanism, i.e. whether face-to-face and/or at a distance. This definition excludes educational personnel who have no active teaching duties (e.g. headmasters who do not teach) or work occasionally or in a voluntary capacity in educational institutions (e.g. parents).</p>
TEACHERS TRAINED TO TEACH BASIC COMPUTER SKILLS (OR COMPUTING)
<p>Teachers trained to teach basic computer skills (or computing) refers to teachers considered qualified according to national standards or norms to teach basic computer skills (or computing) courses.</p> <p>At higher ISCED levels, in particular, teachers trained to teach computing should have a nationally required academic credential in an ICT-related field of study, such as computer science.</p>
TEACHERS TRAINED TO TEACH SUBJECTS USING ICT FACILITIES
<p>Teachers trained to teach subjects using ICT facilities are teachers that have received at least a nationally defined minimum of formal training to teach one or various subjects at the relevant level(s) using ICT to support their teaching.</p>
TECHNICAL EDUCATION or VOCATIONAL TRAINING
<p>Technical education or vocational training is designed mainly to provide pupils with the practical skills, know-how and understanding necessary for direct entry into a particular occupation or trade (or class of occupations or trades). Successful completion of such programmes normally leads to a labour market-relevant vocational qualification recognised by the national competent authorities (e.g. Ministry of Education, employers' associations, etc.).</p>
TELEPHONE COMMUNICATION FACILITY
<p>Telephone communication facility refers to fixed telephone lines, cable connections (i.e. cable telephony) or other sustainable communication technology that connects an educational institution's terminal equipment (e.g. telephone set, facsimile machine) to the public switched telephone network (PSTN) and has a dedicated port on a telephone exchange. Access is defined by a subscription to services that allow the physical presence and use of the facilities in a given educational institution. A mobile cellular phone owned by an individual working at a school does not constitute a school telephone communication facility.</p> <p>Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i>.</p>
TELEVISION
<p>Television is considered to be a stand-alone device (in working condition) capable of receiving broadcast television signals using popular access means (such as over-the-air, cable and satellite).</p> <p>Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i>.</p>
TELEVISION-ASSISTED INSTRUCTION
<p>Television-assisted instruction is similar to radio broadcast education, with the additional benefit of video. It helps to bring abstract concepts to life through clips, animations, simulations, visual effects and dramatization. It can also connect a classroom to the world but shares the same rigid scheduling and lack of interactivity as radio broadcast education.</p> <p>Source: Adapted from <i>Revisions and Additions to the Core List of ICT Indicators – Partnership on Measuring ICT for Development</i>.</p>
TRAINED TEACHERS
<p>Trained teachers have received at least the minimum formal teacher training (pre-service or in-service) required for teaching at the relevant level.</p> <p>Source: Adapted from <i>Instruction Manual for Completing the Questionnaires on Statistics of Education</i>.</p>
WEBSITE
<p>Website refers to a collection of interlinked web pages with a related topic, usually under a single domain name. In the context of educational institutions, a website includes a home page with links to pertinent pedagogical information and other related activities.</p>