

EDUCATION POLICY

ICT and Transformative Education Policy



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Education is a fundamental human right. It provides children, youth and adults with the power to reflect, make choices and enjoy a better life. It breaks the cycle of poverty and is a key ingredient in economic and social development. UNESCO¹

Drivers of Educational Change: A World Transformed by Technology

Every aspect of 21st century society is being transformed by information and communication technologies: the economy, the workplace, the home, commerce, government, the health sector

... but what about education?

The economies of leading countries are now primarily based on the manufacture of information products (computers, books, televisions, software) and the delivery of information services (financial services, broadcast services, education)². But even the manufacture of automobiles and appliances depends heavily on innovative uses of information and communication technologies (ICT).

In the contemporary workplace, people work in teams across the boundaries of time and space and use a variety of social, digital, and physical resources to solve complex problems and create new ideas, products, and services³. They use ICT to collaborate and share resources, ideas, and products with colleagues, customers, or a larger audience or market.

Everyday life for hundreds of millions of people has been transformed by a range of devices wirelessly connected to the Internet, as well as audio and video file sharing, social networks, and a variety of digital resources and services⁴. People—particularly the youth—use the Internet to connect with friends and colleagues, make online purchases, generate and use multimedia content, work at home, engage in leisure activities, and find information on topics from health, to jobs, news, and government services.

These ICT-powered changes are most pronounced in North America, Europe, and Asian countries along the Pacific Rim. But ICT is also affecting lives and livelihoods in emerging and developing countries, including the least developed. In Jordan, through a network of Knowledge Stations, out-of-school youth, women,

¹ Education for All: An Achievable Vision. Paris: UNESCO.

http://www.unesco.org/education/efa/global_co/policy_group/EFA_brochure.pdf

² Apte, U., Kamakar, U. & Nath, H. Information services in the US economy: Value, jobs, and management implications. *California Management Review*, Vol. 50, No. 3, 2008, 12-30.

³ Black, S. & Lynch, M. What's driving the new economy: The benefits of workplace innovation. *The Economic Journal*, Vol. 114, 2003, p. 97-116.

⁴ Rainie, L. (2010). *Internet, broadband, and cell phone statistics*. Pew Internet and American Life Project, retrieved on August 1, 2010, from <http://www.pewinternet.org/Reports/2010/Internet-broadband-and-cell-phone-statistics.aspx>; Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). *Social media and mobile internet use among teens and young adults*. Pew Internet and American Life Project, retrieved on August 1, 2010, from <http://pewinternet.org/Reports/2010/Social-Media-and-Young-Adults.aspx>

the unemployed, and small-scale entrepreneurs receive training on the use of computer technologies and access information to enhance their livelihoods and lives⁵. Pastoralists in the Sahel use networked computers, GPS, and cell phones to manage grazing and water resources and to search for new pasture and watering points⁶. Rural Filipino farmers, fishermen, and small business owners use cell phones and the internet to access market prices and trade products⁷. Villagers in Uganda and Tanzania use community radio, computers, and cell phones in local telecenters to access information on markets, farm inputs, crop management, and local affairs⁸.

But what about education? While the rest of the world has changed dramatically, most educational systems operate much as they did at the beginning of the 20th century. Contemporary business and social practices engage people in collaborative efforts to solve complex problems, and create and share new ideas. On the other hand, most education systems around the world still engage in traditional practices that require students to work individually, as they recall facts or perform simple procedures in response to pre-formulated problems, without the aid of books, computers, social networks, or other resources. To prepare students for 21st century challenges and opportunities, significant reform is needed in education, world-wide: who goes to school, what is learned, how it is learned, how learning is assessed, and how schools are organized.

Characteristics of Transformative Education Policy

Fortunately, even in education, change is beginning to happen. From Singapore to Jordan, the United States to Chile, Portugal to Rwanda, policies and initiatives are in place or being developed to change education. But not all policies result in transformational change. What are the characteristics of transformative education policy and what role in it does ICT play?

Transformative Policy is Systemic

Transformative policies address the systemic nature of education. An education system is composed of many interconnected, mutually reinforcing components, including the curriculum, assessment, the teacher professional development, ICT, and research and evaluation. Each component influences



⁵ Nusseir, J. Knowledge Stations initiative: A nationwide network. In: Haddad, W. (ed.), Technologies for education for all: Possibilities and prospects in the Arab region (pp. 43-48). Washington, D.C.: Academy for Educational Development, 2005.

⁶ Batchelor, S., Scott, N., & Taylor, N. The contribution of ICTs to pro-poor growth. Paris: OECD, 2005.

⁷ Batchelor, S., Evangelista, S., Hearn, S., Peirce, M., Sugden, S., & Webb, M. ICT for development. Contributing to the Millennium Development Goals: Lessons learned from seventeen infoDv projects. Washington, D.C.: infoDev, 2003.

⁸ Kozma, R. ICT, broadband and rural development in Africa. Connect-World: Africa and the Middle East, Issue 2006, p. 11-13.

and is influenced by the other components. Transformative policy implements change across all of the components. Even when a policy is focused on only one part of the system, such as ICT or curriculum, it addresses all of the other parts. That is, an ICT master plan supports reform in curriculum, professional development, and so on. So, for example, the ICT master plan in Jordan included action plans related to teacher training, curriculum, pedagogy, assessment, and school organization⁹. In Singapore, the ICT master plan coordinates changes in ICT with changes in teacher professional development, pedagogy, curriculum, and assessment¹⁰. In the United States, the Maine Learning Technology Initiative coordinated the large-scale introduction of one-to-one laptops with teacher preparation and professional development, changes in the curriculum to support 21st century skills, and economic development¹¹.

Transformative Policy is Aligned

Transformative policy aligns all of the components of the system so that they are working together toward the same vision and not working against each other. There are two types of alignment: horizontal and vertical. Horizontal alignment connects policies and programs across related administrative units within and between ministries. Policy should be coordinated across relevant divisions within the Ministry of Education, such as curriculum, assessment, teacher professional development, and ICT. In Singapore, the Educational Technology Division works with other Divisions within the Ministry, such as the Curriculum Planning and Development Division and the Training and Development Division, to implement their master plan¹². Horizontal alignment can also extend across relevant ministries. In Chile, a national digital strategy was developed through the cooperation of the Ministries of Economy, Education, Finance, Transportation and Telecommunications, and the General Secretariat Minister of the Presidency¹³.

Vertical coherence connects and aligns policies and programs through the hierarchical levels of the system, such as federal and state or provincial agencies. Often, particularly in systems with strong local control of education, this alignment comes from an overarching vision articulated at the national level and the distribution of targeted resources. Australia's education system is highly decentralized, with most education decision making done at the state level. Yet with the Digital Education Revolution, the Federal Government entered into a partnership with its States and set aside A\$ 2.4 billion to promote and provide ICT and broadband connections for all secondary schools, increase the level of ICT proficiency for teachers,

⁹ Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational plan, monitoring and evaluation plan: For 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.

¹⁰ Wong, P. (in press). ICT in education policies: Singapore. In R. Kozma (ed.), ICT policies and educational transformation. Paris: UNESCO.

¹¹ Silvernail, D. (2009). Research and evaluation of the Maine Learning Technology Initiative (MLTI) laptop program. Gorham, ME: Center for Education Policy, Applied Research and Evaluation.

¹² Wong, P. (in press). ICT in education policies: Singapore. In R. Kozma (ed.), ICT policies and educational transformation. Paris: UNESCO.

¹³ Ministerio de Económico (2008). Plan de acción digital: 2008-2010. Santiago, Chile: Ministerio de Económico.

embed the use of ICT in teaching and learning, provide for online curriculum tools and resources, and enable parents to participate in their child's education through online access¹⁴.

Transformative Policy is Scalable and Sustainable

The ultimate challenge for any policy is to have its effects spread widely throughout the education system. An important characteristic of transformational policy is a path or trajectory by which initial changes will diffuse throughout the system. Oft-used strategies are to start by seeding "innovative" or "lighthouse" schools, or by creating special funding that is given to schools or districts that volunteer for participation in new, policy-supported approaches. Transformative policy lays out mechanisms by which such innovations, once proven, can be shared with and adopted by other schools. The laptop program in Maine had a planned trajectory that started off by providing all of the teachers and students in grades 7 and 8 with their own laptop in 2002¹⁵. In 2007, all high school teachers were given their own laptops and in 2009 all high school students received laptops. A plan to provide all primary school children with networked laptops in Uruguay, started with all students in one target rural school, followed by all students in the province in which that town was located, followed by all students in the country outside of the primary metropolitan area of the capital, followed by all students in the capital. In parallel, schools were set up with wireless hotspots, teachers were trained in the use of the computers in their teaching, and digital contents and activities were developed¹⁶.

The Role of ICT in Transformational Education Policy

ICT Empowers Transformation

The introduction of new technologies is often an opportunity to review current policies and introduce new ones. The deployment of ICT can be a lever used to launch changes in other parts of the system, such as curriculum, assessment, and teacher professional development. Often, this means easy access to broadband-connected computers for all teachers and students. Specific technological considerations should be subordinate—computers, networks, software, multimedia equipment, etc., should be purchased to meet the educational objectives envisioned by the policy and to empower change.

Curriculum and Assessment. Contemporary curriculum policies are concerned with standards and student outcomes: the skills and capabilities students must have, rather than material covered during the school year. Increasingly, these standards focus on students' understanding key concepts of the subject areas and their ability to apply them to solve complex, real world problems. In many countries, the curriculum is

¹⁴ Center for Technology in Learning (in press). International experiences with technology in education: Final report. Washing, DC: Department of Education.

¹⁵ Silvernail, D. & Bluffington, P. (2009). Improving mathematics performance using laptop technology. Gorham, ME: Center for Education Policy, Applied Research and Evaluation.

¹⁶ Hinoistroza, J.E., Jara, I., Brun, M. (in press). ICT in education policies: Uruguay. In R. Kozma (ed.), ICT policies and educational transformation. Paris: UNESCO.

coming to include cross-domain “21st century skills”, such as creativity, critical thinking, problem solving, learning to learn, communicating, collaboration, information, and ICT literacy.

ICT policy can enable curriculum reform by providing digital resources that reinforce these concepts and skills. The US State of Texas has extended the funding of traditional textbooks to include digital content, software, tools, models and online courses¹⁷. The ICT policy in Chile supported the development of *La Plaza*, a socially-oriented educational portal organized as a community center that includes a post office (email), information kiosk (digital content), and a cultural center (virtual collaborative workplace)¹⁸. In Jordan, the ICT policy, the curriculum policy, and the assessment policy all focus on the “knowledge economy skills” of communication, collaboration, problem solving, and critical thinking¹⁹.

Correspondingly, assessments are changing, as well. Formative assessments chart and support student progress and continuous improvement. ICT-formative assessments include performance assessments and digital portfolios of students’ work. In Australia, upper-secondary students use ICT to develop e-portfolios of their work; these portfolios are used by teachers for formative assessment and shared with a student’s perspective employer upon graduation²⁰. ICT can also support summative, end-of-year assessments. All national, grade-level tests in Denmark are administered totally online. In either case, computers can be used for advanced assessments that present students with complex tasks, such as simulations and multi-media case studies that measure key concepts and 21st century skills²¹. Australia and Hong Kong have national online assessments of ICT literacy for which students use ICT to solve complex problems²². Australia, England, Finland, Portugal, Singapore, and the United States are participating in an international project to develop advanced, ICT-based assessments of 21st century skills²³.

Teacher Professional Development. High-quality teachers are key to high-quality education. Consequently, teacher professional development is a key component of transformational education policy. An ICT master plan must include, of course, training in the operation and use of computers, the operating

¹⁷ Intel Education (2010), *Texas transforms education with innovative policy* (white paper). Santa Clara: Intel Corp.

¹⁸ Hinostroza, J.E., Hepp, P., & Cox, C. (2009). National policies and practices on ICT in education: Chile. In T. Plomp, R. Anderson, N. Law, & A. Quale (eds.), *Cross-national information and communication technology: Policies and practices in education*. Charlotte, NC: Information Age Publishing.

¹⁹ Kozma, R., Vota, W., & Bsaiso, R. (2010). *ICT policy and strategy, operational plan, monitoring and evaluation plan: For 2011-2015 and moving towards 2025*. Amman, Jordan: Ministry of Education.

²⁰ Center for Technology in Learning (in press). *International experiences with technology in education: Final report*. Washing, DC: Department of Education.

²¹ Center for Technology in Learning (in press). *International experiences with technology in education: Final report*. Washing, DC: Department of Education.

²² Center for Technology in Learning (in press). *International experiences with technology in education: Final report*. Washing, DC: Department of Education.

²³ <http://atc21s.org>

system, and common software. Jordan has invested significantly in teacher professional development in conjunction with their ICT deployments, with staff trainings and incentives in the form of promotions²⁴. Also essential is training in new teaching skills that are enabled and required by the integration of ICT into the curriculum. In the US State of Florida, a central goal of their ICT policy is the integration of technology into the curriculum through professional development and the use of research-based instructional methods²⁵. As a result, classroom observations conducted as part of the policy's evaluation found significant increases in student engagement in project-based learning, independent student inquiry, and student use of technology as a learning tool or resource. Increasingly, an important element of teacher improvement is the development of professional communities where teachers share new knowledge and skills and the products of their work. Singapore's ICT master plan encourages ICT-based experimentation among teachers and supports online professional learning communities in which teachers share their practices and products²⁶. The UNESCO ICT Competency Standards for Teachers weave together ICT skills with other important teacher competencies in curriculum, pedagogy, and assessment and are an excellent resource for policymakers²⁷. The teacher professional development efforts in the ICT policies of both Jordan²⁸ and Rwanda²⁹ are linked to the UNESCO standards.

Research and Evaluation. Effective policies depend on data, research, and evaluation in two ways: 1) Research on effective teaching and learning informs effective policy and practice. 2) Continuous revision and improvement depend on an effective information management system. Policies and programs should include a monitoring and evaluation component that schedules milestones and data collection points so as to provide policymakers and administrators with ongoing information on the implementation, progress, and outcomes of policies. Singapore schedules periodic reviews to inform its ICT policy³⁰. Part of its ICT master plan are initiatives that encourage teacher field-based research and innovation. Jordan also has a periodic review process embedded in its ICT policy to monitor progress and inform decisions³¹. In addition,

²⁴ Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational plan, monitoring and evaluation plan: For 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.

²⁵ Center for Research in Education Policy (2007). Florida's enhancing education through technology: 2006-2007 evaluation report. Memphis, TN: Center for Research in Education Policy.

²⁶ Wong, P. (in press). ICT in education policies: Singapore. In R. Kozma (ed.), ICT policies and educational transformation. Paris: UNESCO.

²⁷ UNESCO (2008). ICT competency standards for teachers. Paris: UNESCO.

²⁸ Alnoaimi, T. (in press). ICT in education policies: Jordan. In R. Kozma (ed.), ICT policies and educational transformation. Paris: UNESCO.

²⁹ Issacs, S. (in press). ICT in education policies: Rwanda. In R. Kozma (ed.), ICT policies and educational transformation. Paris: UNESCO.

³⁰ Wong, P. (in press). ICT in education policies: Singapore. In R. Kozma (ed.), ICT policies and educational transformation. Paris: UNESCO.

³¹ Kozma, R., Vota, W., & Bsaiso, R. (2010). ICT policy and strategy, operational plan, monitoring and evaluation plan: For 2011-2015 and moving towards 2025. Amman, Jordan: Ministry of Education.

one of the plan's strategies is to use an information management system to supply Ministry officials, principals, and teachers with data needed for continuous improvement decision making.

ICT Supports Economic Development and Innovation

ICT can contribute to economic development in many ways. One is the direct economic impact from the purchase of ICT equipment and services from local vendors, service providers, and manufactures. In Portugal, the Magellan Project generated approximately 1,500 jobs for software developers, service providers, and telecommunications providers. ICT-supported projects can also develop human capital needed for sustainable economic development by supporting students' learning in mathematics, science, and technology and by providing them with the 21st century skills needed for high-value, high-pay jobs. The computers and professional development provided by the Maine laptop project resulted in higher test scores in both math and science. Jordan's new ICT plan targets a new set of "knowledge economy skills" such as communication, collaboration, problem solving and critical thinking skills.

Economic development is particularly important in underdeveloped countries. In the year 2000, the largest gathering of world leaders in history adopted the UN Millennium Declaration, committing their nations to reduce extreme poverty by 2015. Among the goals to accomplish by this date are reducing poverty, achieving universal primary education, reducing infant mortality, and promoting gender equality. Both Rwanda and Namibia have developed educational ICT policies to promote educational inclusion and support economic development.

ICT and Transformative Education Policy

National governments can take the lead in transforming education by crafting policies that are systematic, aligned, scalable, and sustainable. An ICT master plan can serve an important role in supporting transformation by empowering change in every part of the system: the curriculum and assessment, teacher professional development, and research and evaluation. An education system, so transformed, can be a primary source of human and social capital that supports a nation's economic and social development. As such, ICT and educational policy become essential components in the country's overall social and economic development policy.

About the Author



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