Is ICT More Than a Learning Tool in Mauritian Educational Reform?

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Abstract

In many countries, ICT is now at the center of education reform efforts that involve its use in coordination with changes in curriculum, teacher training, pedagogy, and assessment. Mauritius also is following the same trend such that ICT is playing a vital role in its education reform efforts and as a result there has been significant ICT investment in the education sector. Such a massive investment needs justification concerning how ICT-based educational reform can contribute to economic growth and social development. The details of these connections are very important to educational policymakers who are charged with trying to prepare citizens to participate in the knowledge economy and information society and create a workforce that is globally competitive. The aim of this study is to thus to explore the contribution of incorporating ICT in education reform to economic and social development and to suggest how policy makers and school administrators can best connect technology and education reform to sustained, equitable economic growth in Mauritius. The survey results reveal that ICT is perceived only as a mere learning tool which helps in delivery and access. There is a long way to go before ICT can be perceived as a tool of supporting knowledge creativity and preparing students at the secondary level to face the challenges of globalisation and ensure sustained economic growth.

Key Words: ICT, Education Reform, Economic Growth.

Introduction

Jhurree (2005) argues that education reform is occurring throughout the world and one of its tenets is the introduction and integration of ICTs in the education system. Countries from Singapore (Ministry of Education, Singapore, 2000) to Chile (Ministerio de Educación, Republica de Chile, 1998) to the United States (U.S. Department of Education, 1996) to Norway (Ministry of Education, Research, and Church Affairs, Norway, 2000) have taken the position that the integration of ICT into classrooms and curricula can improve educational systems and prepare students for the 21st century learning society. Similarly, multinational organizations, such as the Organization for Economic Cooperation and Development (OECD, 1998, 1999) the European Commission (1995, 2000), and the G8 nations (G8 Countries, 2000) have identified the need to prepare students for lifelong learning in the knowledge economy and they assign a central role to ICT in accomplishing this goal. ICT is beginning to be used by students across many school subjects to produce knowledge products, to conduct investi-

gations and inquiries, and to connect with other people and cultures. Within education, ICT is seen as a way to improve educational change, improve the skills of learners, and prepare them for global economy and the information society (Haddad & Draxler, 2002; Kozma & Wagner, in press; McNamara, 2003; UNESCO, 2002; Wagner & Kozma, 2005).

Consequently, this has resulted in significant public sector investments in educational improvement and the application of ICT in schools. Nevertheless the successful integration of ICTs into the classroom warrants careful planning and depends largely on how well policy makers understand and appreciate the dynamics of such integration (Jhurree, 2005). Installing the physical infrastructure is the easiest part of the battle. While many ministries of education around the world have made the commitment to computerize schools, few have developed coherent strategies to fully integrate the use of computers as pedagogical tools in the classroom. Many ministries of education view computers as a stand-alone subject requiring a curriculum focusing on basic computer literacy skills. While computer literacy represents a start, the integration of computers and the Internet into the broader curriculum is where real learning gains will be made.

The main objective of this study is to explore the extent to which the integration of ICT in the Mauritian education reform, at secondary level, has contributed to knowledge creation and hence to sustained economic growth and social development. The rationale for choosing Mauritius as case study is explained by the following reasons. First, education in Mauritius has top-level support, as stated in the budget speech 2001/02. “Our growth prospects will be shaped mainly by our ability to invest massively in our people and develop their full potential” (Budget Speech 2001/2002 Ministry of Finance and Economic Development, 2001). Alongside ICT is playing a vital role in the education sector. For instance, ICT courses were made compulsory in secondary schools in 1995 and students are expected to be proficient after the third year. Some 330 primary school teachers were hired in 2001 and completed a nine-month ICT training course in order to start teaching ICT courses in every primary school in 2003. As from 2006, ICT was used as a pedagogical tool across the curriculum. In addition to encourage students to use and apply ICT, the National Computer Board (NCB) organises annual software competitions with cash prizes. Moreover due to the fact that much research in the area of technology integration in education has been conducted in technologically advanced countries, but little in the developing countries, few statistics are available from developing countries (Jhurree, 2005) and as such this study aims at contributing to this gap.

The paper is structured as follows: the next section overviews the existing literature, followed by an explanation of the methodology applied. Section four highlights and discusses the research findings. The next part is concerned with policy recommendations and the final section concludes.

Literature Review

According to Kozma (2005), there are four types of approaches which explain the effect of ICT on education and these are highlighted below.

ICT in Support of Delivery and Access

Technology can be used to improve the way that instructional methods are delivered by making instruction more efficient, less expensive or more accessible. These can be important contributions, particularly in rural areas and for less developed countries where access to education is often limited. For instance, in China, India, Indonesia, Iran, the Islamic Republic of Pakistan, the Republic of Korea, Sri Lanka, Thailand and Turkey have all used broadcast media to set up national open universities. Most of these institutions serve more than 100,000 students, and china Radio and TV University serves 400,000 (Perraton & Creed, 2002).

Computers, particularly those connected to the Internet are being used to provide students with access to a vast array of multimedia resources, related to current events, science, social studies, and culture. For example, students in a lower secondary school in Norway are using the Internet to collaborate with students in a school in the US to follow two women (one Norwegian and one American) who are going across Antarctica on cross country skis. The students communicate with the women and with weather and research stations in the area to learn about the Antarctic continent. The "Roots Project" connects five rural primary schools in Catalonia, Spain.Students in each school did a parallel research project about their village: the history, monuments, village square, etc. They used word processing, email, and digital photography to communicate with each other and publish their reports on the Web in Catalan (Kozma, 1999).

The internet also provides teachers with access to curricular materials and other resources. These uses are widespread in developed countries have begun to use computers to increase educational access (Wagner & Kozma, 2005). For example, in Chile computers now serve over 90% of the school population and 80% of the teachers have trained in their use (Hepp, Hinostroza, Laval, & Rebein, 2004). One of the most ambitious efforts in Africa is the African Virtual University, which has established 31 learning centers at 17 African universities that are working with partner universities in developed countries to provide over 3,000 hours of instructional programs to more than 23, 000 students.

ICT as the Goal

According to OECD (1999), the development of technological skill improves students' capacity to absorb technology when they move to the workforce. This is illustrated in an international study involving 23 countries and 174 case studies of ICT-supported innovative classrooms. This study identified a number of interesting patterns in the ways that teachers and students were using ICT to change curriculum and pedagogy. In one pattern, called tool use, students used e-mail and productivity tools such as words processors, spreadsheets. And presentation software, to communicate, search for information, and create products. For example, a secondary school in England offered a 2 year on line course leading to formal accreditation in ICT. In these classrooms, students acquire the technical skills that they will be able to use in the workplace.

ICT in Support of Students Understanding

As teams of students engage in solving complex, real world problems that cross disciplinary boundaries, ICT can support their deep understanding of subjects (Kozma & Schank, 1998; Means & Olson, 1995; Means, Penuel, & Padilla, 2001; Roschelle, Pea, Hoadley, Gordin, & Means, 2000; Sandholtz, Ringstaff, & Dwyer, 1997; Schofield & Davidson, 2002). Students and teachers use a variety of multimedia, e-mail, and web design tools, simulations, and course management tools to support deep understanding, collaboration, and project planning. An international case study of classroom innovations, called the Student Collaborative Research Cluster, illustrates this idea.

ICT in Support of Knowledge Creation

Along with pedagogical, curricular, and assessment reforms, ICT can be used, to support the process of knowledge creation in which students and teachers set their own goals, plan their learning activities, build on each other's ideas to create new knowledge, and monitor their current levels of understanding in preparation for lifelong learning and participation in the information society (Brown & Campione, 1994; Scardamalia & Bereiter, 1994).

This is illustrated by several patterns in the case studies of innovative classrooms. For example in the US, the "Future High School" was redesigned as a high-tech start-up business in which stu-

dents developed real world projects consisting of complex tasks with long-range due dates for which they had individual and shared responsibility. Students used computers on a daily basis for everything from research on the Internet to multimedia projects that combined social studies, math, science, economics, government, and literature. And they maintained on-line portfolios that were assessed by staff and community members. In the Teacher collaboration cluster, teachers collaborated with students, their colleagues in the school, and others outside the school. In an upper secondary school in the Slovak Republic, two informatics teachers trained students to create hypermedia materials and work with teachers in other areas such as mathematics, physics, the Slovak language, and history to design educational materials for their courses.

These classrooms practices support the development of skills needed by a society focused on sustained economic development and social transformation: information management skills, communication and collaboration skills, interpersonal and self-directional skills, and the ability to create and innovatively apply new knowledge to solve complex problems (Lall,2000; Partnership for the 21st Century, 2003, 2005; Resnick & Wirt, 1996), skills that are often difficult to measure with traditional assessments. Novel ICT-based assessments are beginning to provide complex performance tasks with which students can use a various ICT tools and collaborative environments to find or create the appropriate knowledge and apply it to solve the problem (Educational Testing Service, 2002; International Society for Technology in Education, 1998; OCED & Statistics Canada, 2000; Quellmalz & Kozma, 2003).

Hence it is the final approach which links ICT-based education reform to sustained economic growth and social development.

Methodology

It should be noted that direct evidence from the literature reviewed shows that the survey is the most dominant technique used to gather data for ICTs and development studies including the area of education (Adeya, 2002). Besides, qualitative methodologies are used more than quantitative ones (Adeya, 2002).Hence for this study also, a survey was used. More precisely, both secondary data primary data were exploited. The methodology used to collect primary data is highlighted below.

Sampling Method

For this study, the purposive sample size consisted of 14 state secondary schools including both state and private schools (out of 143), given that ICT was introduced as part of education reform in secondary schools since 1995, compared to primary schools which started only recently in 2003. As the population is very homogenous, a small sample would give a fairly representative view of the whole population. The sample was representative of the Mauritian population belonging to different ethnic groups and living in both rural and urban areas.

Research Tools

The main tool for primary data collection was the administration of a survey questionnaire. In the survey questionnaire, questions were designed to investigate on the use of computer technology as an aid to learning in schools as well as impact and effects of using ICT on students' pedagogy, learning outcomes and learning environments and also to examine how the integration of ICT in the education system was contributing towards knowledge creation and hence sustained economic growth and social development.

Pilot Testing

A few test questionnaires were distributed to teachers and students on a pilot basis. The students and teachers used for the pre-testing exercise were not used in the sample for the survey. The responses revealed that certain terms, the presentation and order of question were not clear. Then the questionnaire was reviewed with the test takers and confusing points that were discussed and worked together to solve the problems.

Analysis and Discussion of Research Findings

The following paragraphs summarise and discuss the results of the survey.

Use of Computers in Schools

Figure 1 shows the use of computers in schools on a weekly basis. It can be noted that in most cases a maximum of 1-2 hours are spent on computers at school per week, which is indeed very few compared to hours spent on other subjects. Alongside the fact that on average boys do use computer for longer hours than girls, is quite a worrying issue, since among international development practitioners, female education is recognised as one of the critical factors in promoting social and economic development. For instance, an educated woman is more productive at work—studies suggest that an extra year of schooling will increase a woman's future earnings by about 15 percent, compared to 11 percent for a man (UNICEF, 1996). Also, because women are the primary caregivers in developing countries, it is often said that, "when you educate a woman, you educate a whole family."

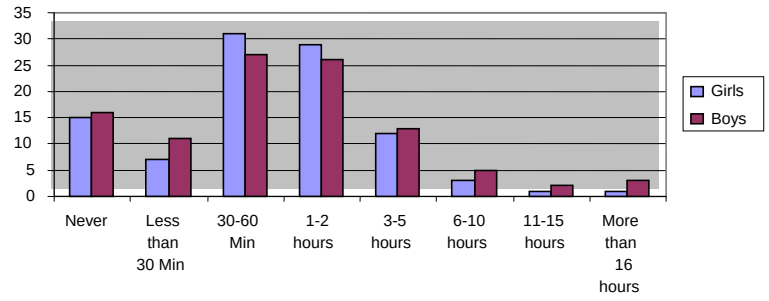


Figure 1. Weekly Use of Computers by Boys and Girls

Preferred Source of Information

Table 1 shows that most students turn to their textbooks and teachers when it concerns notes. Very few try to search for information on their own from sources such as Internet. This can partly be explained by the fact that keeping computers working is a major challenge. A myriad of problems ranging from electrical spikes, to viruses, dust, heat, and normal wear-and-tear can bring activity in a computer lab to a screeching halt. Most schools lack the funds for a employing a full time computer technician, and when one is hired and trained, he is often lured away to a more lucrative job elsewhere, leaving the school to start the search over again. On a regional basis it can be noted that a higher percentage of students from urban region use internet as a source of information compared to the rural region. This may be due to the fact that several multinational ICT companies have initiated pilot projects that put networked computers into schools located mainly in urban areas.

Table 1. Preferred Information Sources for learning purposes by school types (%)

	City school	Rural School
Textbooks	78	72
Teachers	65	76
Encyclopedias, handbooks	50	49
Internet	38	22
Parents	27	25
Friends	20	15
TV, radio	8	6
Newspaper, journals	7	5

Over 60 percent of the students, both in the urban and rural regions, still rely on textbooks and teachers' notes. This gives an indication that an average classroom today has not significantly changed from the classroom of a hundred years ago with, students lined up in rows, paper and pencil in hand; a teacher at the blackboard jotting down important facts; students furiously copying all that is written and said, expecting to memorize the facts and spit them out on an exam. While much has been changed by the advances of science and technology, education and the way that students learn and teachers' teach have remained largely unchanged.

More so, this result confirms the published data by the Central Statistics Office (CSO http://www.gov.mu/portal/sites/ncb/cso/es523/intro.doc), which indicates (refer to Figure 2) that only 24% of the population whose educational attainment is up to secondary level, make use of internet. This in turn implies that they were not enough exposed to the internet and there has been a lack of motivation to inculcate the culture of using the internet in them at the secondary level. At the same time there is also the fact that computers are only regarded as many other learning tools and the common view is that "if it's not going to be tested, then it must not be important."

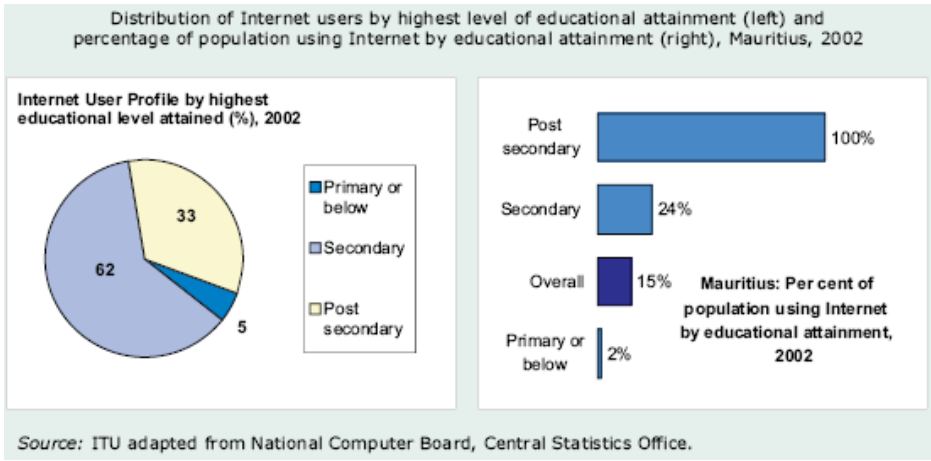


Figure 2. Distribution of Internet users by highest level of educational attainment

Role of ICT in Learning

Table 2 shows how students perceive the use and role of ICT in school and their learning outcome. The use of computers can impact on students to acquire, deepen and create their own knowledge.

Table 2. Percentage of students who did "agree" or "strongly agree" with the following statements about the role of ICT in learning

Statement	Agree or Strongly agree
All students should learn how to use computers in primary schools	91%
I would like to make greater use of computers in learning	86%
I prefer processing my texts on the computer instead of writing on paper	71%
With the computer, complex or annoying exercises become interesting	70%
Students behave better in lessons where computers are used	67%
With the computer, I can learn at my own pace	47%
With the computer, my creativity increases	42%

From Table 2 it can observed that more than 90% of the students believe that computer studies should be started at the primary level itself and some 70% also agree to statement that computers as a learning tool can decrease the class monotony compared to the traditional way of conducting classes. At the same time the results reveal that most students view computers just as a learning tool. Only 42% perceive it as a mean of supporting creativity. Hence the role of ICT in education reform is recognized only in terms of improving the way that instructional methods are delivered by making instruction more efficient, less expensive or more accessible, rather than supporting students' understanding and knowledge creation.

The above findings thus indicate that there is a need to focus on improving student learning by shifting teacher's hands-on instructional practices to project-based learning focused on student understanding, problem solving, and creative thinking in math, sciences, and the creative arts. The application of project-based learning should be stressed at the secondary level with the goal of producing better prepared graduates and thus providing the most immediate payoff for the economy.

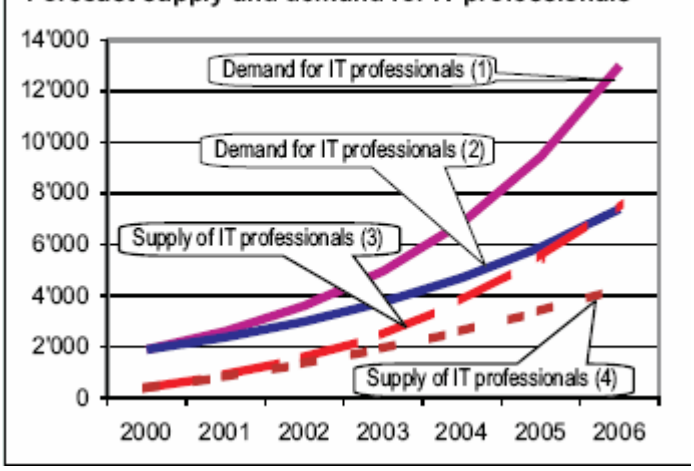
Role of ICT in Society

Table 3 shows how students perceive the use and role of ICT in society and the future of ICT in society. The knowledge and skills thus acquired prepare the students for a better future in society.

Table 3. Percentage of students who did "agree"or "strongly agree" with the following statements about the role of ICT in society

Statements	**"Agree" or Strongly agree"**
With ICT skills one can get a better job	93%
The role of ICT in society is over emphasised	55%
The future of Mauritius depends on ICT	54%
ICT causes more inequality in society	53%
ICT- based education reform better prepares student to face the challenge of globalisation	46%

The responses to the above statements demonstrate that 93% of the students agree or strongly agree to the statement that technological skill improves students' capacity to absorb technology when they move to the workforce and hence help them in securing a better job. This can be partly confirmed by the fact that a survey made by the tertiary Education Commission in collaboration with the Central Statistics Office in 2004 (results illustrated in Figure 3), revealed that the demand for IT professionals was not matched by its supply and hence more students should enroll on IT courses.



Source: ITU adapted from Central Statistics Office, Ministry of Education and Scientific Research and Tertiary Education Commission.

Figure 3. Forecast for IT Professionals

Only around 50% perceive the role ICT in society as being over emphasised as well as agree to the statement that there is the problem of digital divide such that ICT is causing higher inequality in society, especially on a regional basis. Less than 50% of the respondents are of the view that ICT-based education reform better prepares them to face the challenges of globalisation. Hence, according to approximately 54% of the respondents ICT is neither reducing the recall of factual knowledge nor preparing students for participation in manufacturing and other industries that would become increasing innovative.

Policy Recommendations

The following section explores certain policy recommendations in light of the results observed from the survey undertaken.

Professional Development of Teachers

The professional development of teachers sits at the heart of any successful technology and education program. In Mauritius, while all teachers are obliged to follow IT classes "it would seem that this module only makes the teachers computer literate rather than enabling them to use IT for teaching across the curriculum." (Ministry of Education and Human Resources. 2001). Teachers need not only formal training, but also sustained and ongoing support from their colleagues to help them learn how best to integrate technology into their teaching. Training must go well beyond basic cutting-and-pasting. Teachers need to be able to transform their classrooms from places where a static one-way flow of information from teacher to student occurs, into dynamic, student-centered learning environments in which learners interact with peers in teams, both in

their own classroom as well as with virtual classes around the world through the Internet. Most teachers, however, are intimidated by technology and are comfortable with their own teaching styles. Any teacher training program should help teachers see past the technology to the pedagogical and educational gains that use of the technology will bring to the classroom. Furthermore, teachers need to be transformed from information consumers, using the Internet to access resources, into information producers, adapting the information for their particular cultural and educational reality.

Technology Plan

Levine (1998) emphasises the importance of having a plan that is based on real school needs and one that is realistic, achievable, and effective. The plan should be produced, not for the sole purpose of putting technology in the classroom but to reflect the real needs of schools in order to make effective technology deployment and to produce enhanced learning environments (Levine, 1998).The national plan should specify measurable goals, authorize and fund specific programmes and projects to advance this vision and provide the resources needed to implement them. To reinforce broader education reform, the technology plan should also describe how technology will be coordinated with changes in curriculum, pedagogy, assessment, teacher professional development, and school restructuring.

Align Policies

Hepp, Hinostroza, Laval and Rehbein (2004) note that in order to have long lasting effects, an ICT policy should preferably not be designed in isolation. Rather, it should be part of a more comprehensive effort towards improving the equity and quality of an educational system. To realise the full impact of ICT-based education reform, educational policies and programs need to be coordinated with those in other ministries, such as economic development, human resource development, telecommunications, agriculture, and rural and urban development. A national, cross-ministerial ICT coordinating agency or council can facilitate this policy and programmatic harminisation as well as promote the sharing of knowledge and resources. The committee should include participants from outside the government, such as business people, unions, university faculty, members of scientific organisations, and so on.

Monitor and Evaluate Outcomes

Significant public investment demand a significant returns in terms of educational, social, and economic benefits. National development plans should specify a stepped trajectory of exposed outcome should be used to continuously monitor the progress of programs toward goals and provide information to policymakers that can be used to refine policies and programs and adjust trajectories. In this way, initial policies and programs can be shaped to assure on-going coordination and foster fundamental changes in education, society, and the economy. For instance the Gian Nath Computer Scheme, launched in 2000 (whose goal was to increase IT awareness by setting up ICT facilities in public locations across Mauritius, including 112 community centres, 12 women centres, 52 social welfare centres and ten public centres in Rodrigues), failed and had to be discontinued since personnel were not assigned to supervise use of the facilities and follow up problems.

Conclusion

Computers by themselves bring very little to the learning process—they are only tools, like many others. The main objective of this research work was to explore to the contribution of the integration of ICT in education reform to economic growth and social development in Mauritius. The survey results indicate that use of ICT as an educational tool is limited at the secondary level in

the island. Hence there is urgency for ministries to make a commitment to helping teachers effectively integrate computers and Internet technologies into their schools by aligning curriculums, exams, and incentives with the educational outcomes that they hope to gain.

It is time to collectively change our approach to the learning process, and particularly, take advantage of the power of technology to improve learning outcomes, enhance economic opportunities, foster greater creativity, and realize the dreams of disadvantaged youth in developing countries. Finally, it must be emphasised that there is no universal truth when it comes to applying ICTs in education, and that there is no advice that can be directly applied without considering each country's reality, priorities and long-term budgetary prospects and commitment.

References

Adeya, N.C. (2002). *ICT and poverty: A literature review*. Retrieved from www.sourceoced.org and http://web.idrc.ca/uploads/user-S/10541291550ICTPovertyBiblio.doc

Budget Speech 2001/2002 Ministry of Finance and Economic Development. (2001). Speech given on11 June 2001. Available at: http://www.gov.mu/portal/site/MOFSite

Brown, A., & Campione, J. (1994). Guided discovery in a community of learners. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp.229-270). Cambridge, MA: MIT.

Educational Testing Service [ETS]. (2002). *Digital transformation: A framework for ICT literacy.* Princeton, NJ: ETS.

European Commission. (1995). *European Commission white paper on teaching and learning: Towards the learning society*. Brussels: Commission of the European Communities

European Commission. (2000). *eEurope: An information society for all.* Brussels, Belgium.

G8 Countries. (2000). *Okinawa charter on the global information society*. Retrieved from http://www.dotforce.org/reports/it1.html

Haddad, W., & Draxler, A. (Eds.). (2002). *Technologies for education: Potentials, parameters, and prospects*. Paris: UNESCO

Hepp, P., Hinostroza, J., Laval, E. & Rebein, L. (2004). *Technology in schools: Education, ICT, and the knowledge society*. Washington, DC: World Bank.

Jhurree. (2005) Technology integration in education in developing countries: Guidelines to policy makers. *International Education Journal*, *6*(4), 467-483.

Kozma, R. (1999). *ICT and educational reform in developed and developing countries.* Centre for Technology in Learning Menlo Park, CA: SRI International

Kozma, R. (2003a). Technology and classroom practices: An international study. *Journal of Research on Computers in Education, 36*, 1-14.

Kozma, R. (Ed.). (2003b). *Technology, innovation, and educational change: A global perspective*. Eugene, OR: International Society for Technology in Education.

Kozma, R. (2005). *White Paper on ICT, education reform and economic growth*. Available at http://download.intel.com/education/wsis/ICT_Education_Reform_Economic_Growth.pdf

Kozma, R. & McGhee, R. (1999). *World links for development: Accomplishments and challenges.* Monitoring and evaluation annual report, 1998-1999 Menlo Park, CA: SRI International

Kozma, R., & McGhee, R. (2003). ICT and innovative classroom practices. In R. Kozma (Ed.), *Technology, innovative, and educational change: A global perspective* (pp. 43-80). Eugene, OR: International Society for Technology in Education.

Kozma, R., & Shank, P. (1998). Connecting with the 21st century: Technology in support of educational reform. In C. Dede (Ed.), *ASCD yearbook 1998: Learning with technology* (pp. 3-30). Alexandria, VA: American Society for Curriculum and Development.

Kozma, R., & Wagner, D. (in press). Reading the most disadvantaged with ICT: What works? In R. Sweet & D. Wagner (Eds.), *ICT in non-formal and adult education: Supporting out-of-school youth and adults*. Paris: OECD.

International Society for Technology in Education [ISTE]. (1998). *National educational technology standards for students.* Eugene, OR: ISTE.

Lall, S. (2000). *Skills, competitiveness and policy in developing countries* (Working Paper Number 46). Oxford, UK: Queen Elizabeth House

Levine, J. (1998). *Planning strategically for Technology Integration*. Conference Proceedings Association for the Advancement of Computing in Education.

McNamara, K. (2003). *Information and communication technologies, poverty and development: Learning from experience*. Washington, DC: Information for Development Program [infoDev]. ICT Policy and Development 153.

Means, B., & Olson, K. (1995). *Technology's role in education reform: Findings from a national study of innovating schools*. Washington, DC: U.U. Department of Education, Office of Educational Research and Improvement.

Means, B., Penuel, W., & Padilla, C. (2001). *The connected school: Technology and learning in high school.* San Francisco: Jossey-Bass.

Ministerio de Educación, Republica de Chile. (1998). *Reform in progress: Quality education for all.* Santiago, Chile: Ministerio de Educación.

Ministry of Education and Human Resources. (2001). *Interim Report of the Inter-Ministerial Task Force on E-Education and E-Training*. Available at: http://www.gov.mu/portal/site/education

Ministry of Education, Research, and Church Affairs, Norway. (2000). *ICT in Norwegian education: Plan for 2000-2003* [Online].

Ministry of Education Singapore. (2000). *Mission with a passion: Making a difference*. Singapore Ministry of Education.

Organisation for Economic Co-operation and Development [OCED]. (1998) *Education at a Glance*. OCED Indicators 1998. Paris

Organisation for Economic Co-operation and Development [OCED]. (1999). *Human capital investment*. Paris: OCED.

Organisation for Economic Co-operation and Development [OCED] & Statistics Canada. (2000). *Literacy in the information age*. Paris: OCED.

Partnership for the 21st Century. (2003). *Learning for the 21st century.* Washington, DC: Partnership for the 21st Century. Available at http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=29&Itemid=42

Partnership for the 21st Century. (2005). *A report on the landscape of 21st century assessment.* Washington, DC: Partnership for the 21st Century.

Perraton, H., & Creed, C. (2002). *Applying new technologies and cost-effective delivery systems in basic education.* Paris: OCED.

Quellmalz, E., & Kozma, R. (2003). Implications of technology for learning and assessment. *Assessment in Education*, *10*,389-407.

Resnick, L., & Wirt, J. (1996). Changing the workplace: New challenges for education policy and practice. In L. Resnick & J. Wirt (Eds.), *Linking school and work: Roles for standard and assessment* (pp.1-22). San Francisco: Jossey-Bass.

Roschelle, J., Pea, R., Hoadley, C., Gordin, D., & Means, B. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children, 10*(2), 76-101.

Sandholtz, J., Ringstaff, C., & Dwyer, D. (1997). *Teaching with technology: Creating student-centered classrooms*. New York: Teachers College Press.

Scardamalia, M., & Bereiter, C. (1994). Computer support for knowledge-building communities. *Journal of the Learning Sciences, 3*, 265-384.

Schofield, J., & Davidson, A. (2002). *Bringing the Internet to school: Lessons from an urban district.* San Francisco: Jossey-Bass.

UNICEF (1996). *The state of the world's children*. Retrieved from. http://www.unicef.org/sowc96/ngirls.htm

United Nations Education, Scientific, and Cultural Organisational [UNESCO]. (2002). *Open and distance learning: Trends, policy, and strategy considerations.* Paris: UNESCO

U.S. Department of Education. (1996). *Getting America's students ready for the 21st century: Meeting the technology literacy challenge.* Washington, DC: US Government Printing Office.

Wagner, D., & Kozma, R. (2005). *New technologies for literacy and adult education: A global perspective*. Paris: UNESCO.

Biography

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