Overview

Schools and school systems have been using ICT for more than two decades to address goals ranging from the teaching of programming to increasing participation in distance education to supporting language-acquisition in early childhood. Over the course of this period, advances in hardware, software, and networking have amplified the potential that ICT holds for schools. Concurrently, the influence of systemic factors—including curricula, teacher capacity, infrastructure, and assessment—has become clearer, and has shaped both achievements and expectations.

The ideas and practices identified in this section appear at this time to be gaining currency among educators and education systems worldwide. However, successful implementation of these practices is tightly linked to resources, including financial and human resources within education systems and national infrastructure, private sector capacity, and attitudes about knowledge and technology. In some cases, such as the use of networks to centralize maintenance, provision of learning resources, and data management, the virtues of a specific model may only outweigh the costs in infrastructure-rich environments. Several countries in the Caribbean have attempted to centralize computing services in schools in the absence of reliable connectivity, and have learned that connectivity becomes a chokepoint with even moderate levels of network failure.

Several of the technologies and models that are emerging at this time are unproven. Others require specific circumstances, such as highly trained teachers or authentic-assessment practices, to be deployed successfully. However, some or all of the trends identified in this section have the potential to be adopted or adapted by developing-country school systems. This section is intended to help decision-makers stay informed about trends and new developments and to enable them to gauge current practices and plans in relation to contemporary and emerging norms.

No tool, model, or idea presented here is appropriate for all educational contexts. The appearance of a tool or model in this section does not constitute an endorsement of its value or effectiveness. At the end of each entry, resources providing information that is more detailed are listed.

Trends and innovations cited in this section are focused on primary and secondary education: Global use of ICT in tertiary education has proliferated in both developed and developing countries to an extent that places it beyond the scope of this report.

On the following page is a table outlining the trends described in this section.

Trends and developments in policy and planning

The single most notable development identified in this section is emergence of ICT as an accepted and necessary tool in schools and school systems.

Confirmation of the positive impact of computers on learning outcomes remains elusive. Questions about the measurable impact of technology remain, as do questions about its costs in comparison to other kinds of inputs or intervention.

However school systems with critical needs to improve student outcomes—and with shortfalls of high-quality learning resources, trained teachers, and effective management—increasingly choose to

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### Current International Trends in ICT in Education

<table>
<thead>
<tr>
<th>Trend</th>
<th>Description</th>
<th>Current status</th>
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| Policy facilitation           | Provision of technical assistant and other support to MOEs for the development of ICT policies in education | ■ Demonstrated value over the past ten years  
■ Resulting policies may set goals (i.e., integration of ICT) that are unrealistic or require much more time than planned |
| Procurement via leasing        | Acquisition of large numbers of computers or software licenses through vendor-direct leases rather than purchase | ■ Costs paid from operations, not capital acquisitions  
■ Costs may be lower or may be spread over several years |
| Total Cost of Ownership       | Budget forecasting that calculates cost based on all relevant factors (e.g., training, maintenance, depreciation, etc.) | ■ Much more accurate for planning purposes  
■ Accuracy decreases as the timeframe expands  
■ TCO model enables cost comparison, does not calculate or compare benefits |
| Interoperability frameworks   | Standards for data transfer across diverse hardware platforms and networks | ■ Critical for cost-effective EMIS  
■ Older hardware and software versions may not be addressed |
| Active-learning pedagogies    | Emphasis on learning by doing (i.e., projects, activities, etc.) rather than learning by listening | ■ Effective support for development of higher-order thinking skills  
■ Strong linkage to integration of ICT  
■ Requires changes to curriculum, assessment and TPD to be adopted system-wide |
| Collaborative online projects | Student teams share information, knowledge, and research results to accomplish mutual goals | ■ Commonly among the first widely practiced models for ICT integration  
■ Limited technology requirements  
■ Rarely addresses core curriculum or lesson plans |
| Balanced pedagogies           | Combination of holistic or semantic-level approaches to literacy and numeracy with back-to-basics methods such as phonics | ■ Well-supported by research and by teacher accounts  
■ Requires sophisticated approach to curriculum reform  
■ Teachers must be “brought on board” the program |
| Blogs by teachers and students| Use of blogs to share organizational information, to promote writing skills, and to support small-group collaboration | ■ Easy to use, effective means of enabling student publishing  
■ High levels of student interaction  
■ May appeal to students with predispositions to write, while having less value for other students |
| Probes, digicams, and other primary-research tools | Use of portable or peripheral hardware to collect data from the environmental or lab phenomena | ■ Helps students build data-representation skills  
■ Makes abstract concepts more seemingly real and easily grasped |
| Anti-plagiarism tools, services, and activities | Software and services in response to increased potential for copying passages or whole documents without attribution | ■ Many options, ranging from Web-based tools to services that check student work for teachers |
| Wireless networking           | Use of wireless networking technologies to create LANs in schools | ■ Flexible, with lower installation costs  
■ May lack adequate bandwidth for intensive school-wide use  
■ Reductions in acquisition and maintenance costs  
■ Support for open-source software (Linux) and refurbished hardware |
| Thin-client networking        | Hardware configuration in which all computing power and data reside on server (or servers) connected by network to otherwise “dumb” terminals | ■ Open-source software is linguistically customizable  
■ Adopted by several states and many school districts in the U.S.  
■ Core pedagogical model for the One Laptop Per Child project  
■ Not yet proven to enhance learning outcomes |
| One-to-one computing          | System-wide provision of laptops to students, or  
Use of specific technologies (digital whiteboards, digital tablets) to support increased real-time interaction in classrooms | ■ Demonstrated value over the past ten years  
■ Resulting policies may set goals (i.e., integration of ICT) that are unrealistic or require much more time than planned |

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address these problems through ICT-based solutions.¹⁴ This situation holds true for countries in almost all stages of economic development: significant efforts to place ICT in the service of learning, teaching and administration have been launched by Least Developed Countries (LDCs) such as Namibia, Rwanda, and Bhutan, as well as many others.

**Policy facilitation**

Policy direction in relation to ICT is critical. National ICT or telecommunications policy may determine costs to schools, access to networks, and

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other issues. Education-specific ICT policy may influence budget allocations, options for ensuring the sustainability of school-based computing, or faculty roles and staffing.

In response to the importance of policy, development agencies and donor organizations, along with regional alliances of national governments, have launched policy-facilitation initiatives. These initiatives have taken the form of regional workshops, technical assistance and consultancies, and development or aggregation of resources.

Several organizations involved in supporting governments’ efforts to introduce ICT in education have provided assistance with policy development. In 2006, World Links conducted a policy workshop for representatives of seven Central American countries participating in World Links pilot projects. An ICT-in-education toolkit was launched by the ICT in Education group at UNESCO-Bangkok via consultative needs-assessment among Southeast Asian governments in 2003. In response to demand and need, the project has been expanded internationally through a partnership of UNESCO with infoDev. Development of the Toolkit has coincided with drafting of ICT policies in education by more than 10 Southeast Asian governments. This initiative has broader scope and resources, but is similar in objectives to the OERU ICT in education policy template, discussed in the section, “Selected regional ICT initiatives in education.”

**ICT-in-Education Toolkit**
UNESCO / infoDev
www.infodev.org/en/Project.11.html
www.ictinedtoolkit.org


**Procurement via leasing**
Procurement of hardware and software is challenging for education administrators in all countries. Among the challenges to successful implementation of ICT in schools, financing and procurement management and subsequent costs is supreme. This situation reflects the broader trend toward underfunding of education. In the United States, for example, computer purchases in school districts may be funded by the sale of bond issues approved by voters; retirement of the bonds, however, may not be scheduled until long after the computers purchased with bond-based capital have become obsolete. In other instances, education funding is simply too limited to enable ICT purchases.

Leasing supports procurement based on periodic partial payments, enabling education systems to fund acquisitions based on current appropriations or operating budgets, rather “booking” ICT as a capital expense.

Governments—including school systems and ministries of education—increasingly procure hardware and software under lease or lease-to-buy programs. Hardware vendors (e.g., Apple Computer, Dell, Hewlett-Packard Corporation) operate dedicated units providing financial services for large-scale leasers in education and other sectors.

**Dell Financial Services**
http://www.dellfinancialservices.com/solutions/leasing_programs.asp

**Apple Financial Services Education Finance**
http://www.apple.com/education/financing/

**Total cost of ownership**
TCO is a financial model that aggregates direct and indirect costs in relation to purchase of computer hardware, software, or any other capital item. In the purchase of computers for an education system, TCO would include projected costs of installation, maintenance, training, electricity, recycling, and so on. TCO, then, can be contrasted with analysis based on the cost of acquisition alone.

In the education sector, and in the ICT for development field overall, TCO has gained currency in part as a response to the tendency of technology-project stakeholders to focus on acquisition costs in isolation and to fail to grapple with total project costs or requirements for sustainability. Recently, organizations such as Global e-Schools Initiative (GeSCI) and infoDev have begun development of resources for estimating TCO. Countries such as Namibia have stipulated that their financial projections be based on TCO in their ICT policies in education.
Limitations of the TCO model include its inability to estimate benefits, its use of long timeframes that may confound cost estimations, and its omission of elements such as risk or the time-value of money.

**GeSCI TCO resources (prototype tool)**

**Value of Investment**
Private sector and public sector consortium offering TCO calculator and related tools
http://www.edtechvoi.org/index.cfm

**Interoperability frameworks**
A central challenge to effective EMIS is the problem of data transfer among software platforms and applications. Applications that teachers use on a daily basis may not be interoperable with EMIS platforms, requiring redundant data entry, and increasing the likelihood of errors—and the likelihood of EMIS data never being entered at all.

In the United States, national, state, and large-district school systems are entering into partnerships with manufacturers and service providers to ensure that hardware and software in schools and software used to support schools is interoperable and that data are accessible to authorized stakeholders.

The Schools Interoperability Framework (SIF) is maintained in the United States by the Schools Interoperability Framework Association (SIFA), with membership of over 300 government and private-sector organizations. SIFA has entered into cooperation agreements with Becta in the United Kingdom, European SchoolNet, and education.au (www.educationau.edu.au) in Australia to internationalize development and adoption of SIF.

**SIFA**
http://www.sifinfo.org

**SIFA announcement of cooperation with international organizations**
http://www.edustructures.com/com/news/05-03-06.html

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**Trends in curriculum, teaching, and learning: Primary and secondary school**

Accompanying the acceptance of ICT as an educational tool in developing countries, there has been increasing focus on the interactions of ICT and teaching and learning. Although learning to use ICT remains the most prevalent use of ICT in schools, a shift in favor of the use of computers and the Internet to support activities intended to build complex and higher-order skills is taking place. Many factors influence this shift, but these factors may be effectively organized around the linkage of education policy to workforces prepared to contribute to a globalizing world economy. In strategic development plans (e.g., PRSPs) and vision papers (e.g., Rwanda 2020 Vision) efforts to address both globalization and the potential of the knowledge economy in broader society tend to emphasize education as a means to develop communication and higher-order cognitive skills.

Policy facilitation, especially insofar as it draws on experiences in technology-rich education systems, tends to characterize ICT integration and enhanced learning across the curriculum as broadly accepted best practices. However, the concept of “technology integration” as it is reflected in program designs and pedagogical models takes on diverse and in some cases very limited forms in some instances.

**Active-learning pedagogies**
Whether it takes the form of constructivist pedagogy, project-based or collaborative learning, or competency-based assessment, education systems in many developed and developing countries are attempting to supplement or replace pedagogies based on skills acquisition with active-learning methods. Finland, which now bases its curriculum on PBL, Singapore, and other countries have shifted curricula and classroom practices with overall success. Among developing countries, Costa Rica has been a leader in constructivist education for a decade; larger countries such as India and China have recently undertaken reforms intended to spark development of higher-order cognition and creativity.

These kinds of changes are intertwined with the use of ICT in schools, and have ramifications for
ICT-related curriculum design, teacher education and TPD, student assessment, and other components of the education system. Schools in Singapore have discovered the need to adjust time-tableing, teacher roles, lab and classroom configurations, and other factors influencing the ways that ICT is accessed and used by students in order to approach the kinds of gains in higher-order cognition that are targeted. Among the outcomes of this discovery has been the “teach less, learn more” program (intended to replace approaches that could be labeled “one size fits all.”)

National grade-level examinations used for promotion, graduation, and matriculation deflects teachers’ classroom practices toward enhancing test results. In response to this situation, school systems in Sweden and other countries that are introducing active-learning pedagogies frequently choose to de-emphasize “high-stakes testing.”

The Second Information Technology in Education Study: Module 2 report (SITES M2) documents 174 examples of classroom pedagogical innovation supported by the use of ICT. But SITES M2 also finds that systemic barriers—such as national exams and IT curricula—commonly limit both innovation and the diffusion of innovative practices.

(It bears mentioning that resources, capacities, and challenges shape the possibilities open to each education system, and contribute to determining which initiatives and practices are “best.” In countries in which ICT access and use are not ubiquitous, for example, barriers to using ICT in schools are higher than in ICT-rich countries, while the economic and social value of basic ICT skills may be greater. In such circumstances, initiatives such as using ICT to deliver new learning resources or to provide introductory computer courses may be practical and defensible first steps.)

**Collaborative online projects**

Student-to-student online collaboration has been one of the more common methods of ICT integration by early adopters in schools. Since the first email-based projects launched by iEARN in 1988, students in developed countries have taken advantage of the opportunity to communicate and collaborate with others using email and the Internet. Beginning at least as early as 1996, with the World Links pilot project in Uganda, students in developing countries have been collaborating with other students in both the North and the South.

E-mail collaboration serves as a low-barrier point of entry to the use of ICT to support learning in a range of subjects: E-mail tools are relatively simple to use and require lower bandwidth Internet connections; use of email, as opposed to the Web, minimizes need for teacher guidance and site pre-selection, and maximizes students’ time on task; and e-mail-based collaboration complements local small-group collaboration, reducing barriers to active learning.

Collaboration based on use of the Web connects students to knowledge resources. In the case of competitions such as Think.com, teams also collaborate to construct Web sites to frame knowledge that they have gained through research.

**European SchoolNet**
www.eun.org

**iEARN**
www.iearn.org

**Think.com**
www.think.com

**World Links**
www.world-links.org

**School-to-school networking**

Within education systems, teachers—and whole schools—adopt technology at differing rates. While decision-makers at the ministry level must work to ensure gains by *all* schools, innovative and early-adopting teachers and schools can draw significant benefits from participation in regional or national collaborative networks.
SchoolNet organizations represent one of the chief mechanisms for school-to-school networking. SchoolNet Uganda, which has over 100 member schools, with more than 80 percent of schools using broadband Internet connections, has worked closely with a Ugandan VSAT service provider to shift billing and pricing in ways that more closely meet the needs and revenue cycles of its member schools. SchoolNet Africa operates a portal-style Africa Education Knowledge Warehouse, with resources for learners, teachers, principals, and policymakers. European SchoolNet includes a large number of member schools, and is currently carrying out the Calibrate project, which is intended to develop a highly searchable open-source environment for sharing learning resources.

**European SchoolNet Calibrate project**
www.calibrate.eun.org

**SchoolNet Africa**
www.schoolnetafrica.net

**SchoolNet Uganda**
www.schoolnetuganda.sc.ug

“Balanced” pedagogies
In the United States and other countries, debate has raged for over a decade among advocates of “back to basics” approaches, such as phonics, and advocates of context-aware approaches such as whole-language, writer’s workshop, whole math, or experiential science. That debate is moderating as teachers, followed by education researchers, weigh in on the benefits of combining elements from both pedagogical camps. In reading instruction this approach is framed as “balanced literacy.”

Educational software developers, in response, are starting to reflect (at least in their marketing) demand for resources that support teachers’ efforts to combine approaches.

**Riverdeep**
www.riverdeep.net

**IntelliTools Balanced Literacy**
http://intellitools.com

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15 This situation is current as of early 2005. Please refer to *The Uganda rural schools VSAT connectivity project: Lessons in sustainability and educational impact* (Gaible, E. and Nadel, S., in press, Washington, DC: infoDev / World Bank Institute) for detailed information about SchoolNet and private sector involvement in sustainable broadband for rural schools.

**Blogs, wikis and podcasts created by teachers and students**
A variety of tools that emerged from the Web 2.0 phenomenon have been swiftly adopted by the education community. Web 2.0 refers to a “second-generation” of Internet tools that emphasize user-developed content and social networking. Popular Web 2.0 tools used in schools include blogs, wikis, and podcasts.

Both Apple’s iTunes website and Yahoo! list hundreds of podcasts created by students in kindergarten, primary, and secondary schools. Outcomes that have been ascribed to podcasting include improved written and verbal communication skills, improved research skills, and increased motivation.

Blogs (or Web Logs) are websites with content generated by individuals; entries appear in reverse-chronological order and resemble journals in that they reference first-person experience or the thoughts and opinions of the author. Most blogs enable readers to post comments, as well as comments about comments.

Teachers use blogs in ways that support reflection (a critical component of TPD), as well as dialog and feedback with peers. They also may use blogs to publish class Web pages with information about assignments and links to relevant learning resources. With their classes, teachers may also use group blogs, which enable many writers to participate, to stage asynchronous (and writing-based) discussions of classroom topics among students.

Teachers engage students in blogging to promote the development of writing skills and confidence in writing, to enable them to publish the results of Web research and other schoolwork, and to work together on projects via group blogs (and wikis, another form of Web-based collaboration tool).

The application Word Press is among the most popular of blogging tools for educational uses. The open-source Word Press application is downloadable, meaning that school systems can use it to host blogs on their own servers, and free. School systems also use the application Movable Type to support private blogs viewable only by one teacher and one student, or by groups of students.

**Word Press**
www.wordpress.org

**Podcasting in the classroom**
Generic lesson plan for student podcasts
http://userwww.sfsu.edu/~nshelley

**SupportBlogging!**
Wiki promoting understanding of benefits of educational blogging
http://supportblogging.com

**Best Wiki 2006 Finalists**
The Edublog Awards
Five award-nominated education-focused wikis

**Probes, digicams and other primary-research tools**
Over the past 10 years, educators and education researchers paid increasing attention to the use of electronic probes and other data-collection tools. Probes measure various phenomena—light levels, voltage, temperature, motion, and chemical composition, among others—and enable data to be uploaded to calculators, handheld computers and PDAs, or desktop computers.

Probes support hands-on inquiry-based learning by students in primary and secondary schools, strengthening students’ skills at representing scientific phenomena and connecting scientific concepts to real-world events. Because probes have been developed to interface with mobile devices, not only desktop computers, their use may make it possible to integrate forms of ICT into classroom-based learning more affordably.

Challenges, however, to the use of probes in schools include: compatibility issues arising from the proliferation of probe hardware and software products alongside an even greater number of handheld devices; a lack of wireless networking standards for connecting mobile devices; poor linkage between relevant curricula, teacher capacities, and teacher development. (An experimental use of probes in primary schools in Benin, West Africa, found that teacher resistance and lack of education in the use of “innovative technologies” constituted major obstacles.) In all but the most advantaged educational environments, the promise of probes may at this point be outweighed by their attendant challenges. However, the effective use of graphing calculators, which are related tools with relatively low TCO, has been widely established in math and science classrooms and could be effectively emulated.

**Smithsonian Institution: Natural Science Resources Center Guide** to probeware and computer applications for science and technology concepts for middle school
http://www.nsrconline.org/curriculum_resources/Probeware_Guides.html

**The Concord Consortium**
Open-source and free probe and other software
http://www.concord.org/resources/browse/172/

**Anti-plagiarism tools, services, and activities**
At both secondary and tertiary levels, forestalling and detecting plagiarism increasingly occupies teachers’ attentions. Search engines that provide students with access to a rich array of knowledge resources also provide the means to plagiarize these works (aided and abetted by cut and paste commands). In many instances, students copy works without knowing proper practices in academic citation, and without fully understanding prohibitions against copying and copyright violation.

Many teacher-resource sites now address plagiarism directly, providing lesson plans for teaching citation practices and copyright, and tools for teachers (and students themselves) to use to detect plagiarized passages. Fee-based services will also check student work.

**Plagiarism stoppers: A teacher’s guide**
Naperville Central High School
Trends in hardware and configurations

Over the past 10 years—roughly the period in which ICT has been heavily promoted in relation to development—technology innovation has yielded cost and size reductions, increased mobility, increased reliance on server-based access to applications software, and new Internet-based capabilities that range from blogs to VOIP communication to video chat. Specific developments in hardware, networking, and services help schools and school systems address the challenge of student and teacher access to ICT, a basic problem, but one that remains challenging.

Wireless networking

Schools rapidly adopted wireless local networking (using 802.11 protocols). Wireless LANs reduce installation costs—although they may increase support costs—and increase the flexibility of school-based installations. In particular, laptops or workstation computers can be stored in carts and brought into classrooms on a temporary or as-needed basis for use by teachers or students. Carts—or "mobile computer labs"—combine security, mobility, and network hubs.

Internet access in rural, geographically isolated, or under-served areas has also been enhanced by the use of VSAT technology. A single broadband VSAT connection is sufficient to meet the needs of multiple computer labs and classrooms. In areas in which deregulation has led to increased competition among service providers, acquisition and monthly connectivity costs have fallen to levels that make VSAT-based Internet access affordable by schools. In 2003 in Uganda a new entrant in the VSAT market had 44 secondary-school subscribers within its first year of operation.


Thin-client networking

School and school districts in developed countries, and to a lesser extent in developing countries as well, increasingly choose thin-client solutions to provide ICT access to students and teachers. In a thin-client network, all or almost all software and data resides on a server, from which it is accessed via a network by "thin-client" computers that typically have no hard drive and may run minimal operating systems. Potential advantages of thin-client systems to schools include: lower acquisition costs; lower operating costs due to increased ease of maintenance; and, notably, ubiquitous access by students and teachers to resources, documents in progress, student records and other data—in other words,
“any time, anywhere” there is a computer connected to the network.

In addition, some characteristics of thin-client networks may deliver benefits that are specific, or more pertinent, to schools in infrastructure-poor and economically disadvantaged environments. Without hard drives, client computers typically consume less energy and are more resistant to dust, heat and moisture. In addition, client computers have little value if stolen.

The chief potential disadvantage of a thin-client network lies in the vulnerability of all computers if the server (or server array) malfunctions. Wired Ethernet-based LANs are typically required to enable large volumes of data to move across the network; wireless LANs are insufficient. Rich-media content and applications (e.g., video, audio, multimedia) may not perform well in thin-client network environments, as they can require too much bandwidth.

The Goa Schools Computer Project (GSCP), launched in 2000 in the Indian state of Goa, is among the most well known thin-client-based ICT projects in developing-country schools. The project installed recycled computers in nearly 350 schools; schools receiving four or more computers received these as thin-client networks. Both standalone and networked computers ran GNU/Linux software, which functions reliably in both older PCs and in thin-client configurations, and which generated additional savings in acquisition costs.


Ndiyo
http://www.ndiya.org

One-to-one computing
New developments in affordable, mobile, and laptop hardware have given momentum to one-to-one (or 1:1) computing in developed countries. In the United States, many school districts, and several states—notably Maine and Oregon—have developed programs to enable every student to have full-time access to a laptop computer. Educational researchers from Taiwan, Singapore, the United States, Canada, and elsewhere have formed the Global 1:1 network to investigate the possibilities inherent in the one-to-one model.

These events notwithstanding, one-to-one computing remains the exception in developed-country education systems, not the rule. With the advent of the One Laptop Per Child (OLPC) project, however, several developing countries in Latin America, Africa, and Asia are poised to take steps toward system-wide adoption of 1:1. Within the Caribbean, the national telecommunications provider of Suriname, Telesur, is supporting a 200-laptop pilot initiative using the OLPC-developed laptop.

One of the distinguishing features of 1:1 computing is its focus on the use of technology to facilitate real-time classroom interactions between teachers and students, rather than the asynchronous interactions of virtual communities supported by earlier educational computing projects. Small groups communicating via email, in the 1:1 model, give way to whole-class interactions in which the teacher might use a digital white-board while students use tablet PCs or PDAs to submit questions, answers and comments.

Generally, 1:1 computing is championed as a way of stimulating high interactivity among students and teachers. Of course, continual access to computer technologies also serves as an organic pathway to infusing ICT into learning activities across the curriculum and beyond the boundaries of school.

In the OLPC model, the provision of information appliances configured specifically to stimulate and support knowledge construction will build off children's innate propensity to learn. Although the OLPC laptops will be distributed by governments and supported by schools, children using them will go far beyond the confines of the traditional school-based curriculum.

As stated, a number of education systems in the United States have achieved one-to-one computing via large-scale procurements, leasing programs, and
“scholarships” for disadvantaged children. Some researchers, however, argue that the 1:1 ratio is not advantageous for students, teachers, or schools. Research is now being planned and implemented to analyze this situation; as of yet, however, measurable results remain elusive.

Global 1:1
www.g1:1.org

Edutopia: One-to-one computing
www.edutopia.org/one2one

One-to-one information resources
http://www.k12one2one.org