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SCHOOLING FOR TOMORROW

THE ROLE OF ICT IN THE OECD/CERI SCHOOLING SCENARIOS

by

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The following report has been prepared by a team formed by *Red Enlaces*, Ministry of Education, Santiago, Chile (Pedro Hepp[*], Hugo Martinez & Magdalena Claro); Instituto de Informática Educativa, Universidad de la Frontera, Temuco, Chile (J. Enrique Hinostroza & Ernesto Laval) and Fundación Chile, Santiago, Chile (Celia Alvariño) as a result of "brainstorming" on the OECD schooling scenarios.

The reflections of this team aimed to giving more systematic attention to the role that ICT might play in each of the six scenarios developed through the OECD/CERI project on "Schooling for Tomorrow". For each scenario, these reflections have been organized under four headings:

- ICT Infrastructure and Resources in Schools;
- Learning and Organization;
- Management and Governance;
- Teachers.

The views reflect those of the authors, and are not necessarily those of either the OECD or of any national authorities.

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1. ATTEMPTING TO MAINTAIN THE STATUS QUO

SCENARIO 1.A "BUREAUCRATIC SCHOOL SYSTEMS CONTINUE"

ICT Infrastructure and Resources in Schools

In this scenario, ICTs will be in "resource centres," along with textbooks, teaching materials, etc. They will not form the usual resources for academic work, nor is it likely that they will be used extensively in classrooms. No major investments will be made to update and improve ICT infrastructure, and funds from sources outside schools will be required for adequate maintenance.

The younger, less experienced teachers will be responsible for running the laboratories, with these resources used and managed independently from the general management of the schools' educational resources.

Specific classrooms will be available for students to complete their homework and conduct data searches on the Internet which, at certain points in time, will turn into veritable information centres taken over, in the case of high schools, by the students.

Learning and Organization

The basic purpose of computer rooms will be to achieve digital literacy, and therefore students will mainly be learning how to use ICTs efficiently and effectively. The Internet will primarily serve as the means to disseminate educational programmes, whose contents and associated standardized teaching methods are for classroom use by teachers.

People will become disappointed with the original promise offered by ICTs in that they would be used to improve learning results in traditional schools, implying that to improve education on a mass scale, there would be a "return to the basics", not innovation in state-of-the art- pedagogy. Technology will be viewed as an expensive ornament in the classroom, which has no major impact and so will not enjoy significant funding in the traditional teaching of the curriculum.

In affluent areas, learning of ICT will be much more intensive than in those that are less well off: children will have access to technology at home and it will be updated periodically. This will create a disadvantage for the poorer sections of society, whose children will only have access to older technology at home, and they will be unable to maintain the level of investment that accelerated modernization of technology requires. Schools will be seen as potentially the means to equalise access to technology for the lower income groups but they will not be able nor motivated to invest at a level that would allow the poorer students to maintain their involvement in the culture of technology as do their more affluent contemporaries.

Management and Governance

ICTs will be actively used to manage establishments and teachers. They will underpin standardized reporting systems, control efficiency, maintain centralized grading systems, and collect indicators on learning performance to support accountability mechanisms. Schools will provide information in digital formats to both the authorities and the Ministry, as well as to the students, and will integrate these methods into their data management systems.

Teachers

Most teachers will use ICTs to respond to the control mechanisms, prepare their classes, update information related to their courses, and exchange "best teaching practices" (modelling) with other colleagues. The intensive use of ICTs will be more closely associated with particular individuals, such as the young teachers described in Scenario 1.b, rather than with institutions. There will be a constant turnover of these educators as they search for better job opportunities and working conditions.

SCENARIO 1.B TEACHER EXODUS – THE MELTDOWN SCENARIO

Insofar as this scenario is likely to take place, the "exodus" would more likely occur in more developed countries and sectors, which have better living standards and provide a broader range of job alternatives to the teaching profession. Poorer countries and areas are less likely to see this mass exodus of teachers, so that their educational systems would continue as described for Scenario 1a. Given that the scenario is more likely to occur in societies that already have a high level of economic and technological development, access to technology, a technological culture and its use for everyday human activities will be natural in homes and in environments outside school.

ICT Infrastructure and Resources in Schools

Families will be responsible for technologies while schools will only provide the basic communications infrastructure for wireless access.

Learning and Organization

As in the 1980s, ICTs will be considered as a "life-saver" for education, with a strong market profiting from this crisis by offering products aimed at guiding learning, simulation and virtual reality devices, intelligent tutors with good learning and evaluation models, etc. Integrated learning systems (ILS) will be broadly used to supplement teachers' activities. Efforts will probably be made to compensate for insufficient educational coverage by providing teaching material and high quality distance learning and interactive television. Self-diagnosis and on-line evaluation systems will be available, and will prove effective for providing training in technical activities and for students with the intellectual level sufficiently developed to make good use of them. In more isolated rural areas, considerable resources will be invested in high-speed networks and in the production of specialized educational material to compensate for the lack of teachers.

The gap between areas with different levels of cultural capital will be larger than in the preceding scenario, given that an important part of education will take place at home, and will be dependent on the individual parent's own training and involvement.

Management and Governance

The Internet will be used as a fundamental instrument of support for solving the management problems generated by the lack of teachers: co-ordination, communication, leadership, exchange of information. To these ends, management and virtual communication tools will be developed and made available.

Teachers

Many teachers will take distance courses so as to reach larger groups of students and thereby compensate for the shortage of teachers. Intelligent tutors and communication tools will be crucial to this task.

2. RE-SCHOOLING

In these scenarios, ICTs will be a fundamental support tool to allow educational establishments to comply with their central social function. In both scenarios, we there will exist a highly developed understanding of the potential and uses of ICT and no-one will question its key role in schooling.

SCENARIO 2.A SCHOOLS AS CORE SOCIAL CENTRES

ICT Infrastructure and Resources in Schools

Technologies will form part of the basic infrastructure of schools, which will be transparent "resource centres" open to the community, operating under a management structure geared to organising teaching and learning activities for and with the community.

ICTs will be used in different ways for everyday school activities. There will be reconditioned PCs in theme classrooms to promote creative writing; terminals in some classrooms for consulting and searching for the information required by students for their homework and projects; mobile and wireless devices for developing defined and structured curricular activities; and sophisticated environments for creative musical activities, visual arts and remote communications.

Learning and Organization

Learning the use and application of technology will be part of the activities that are focused on creation, discussion and reflection. Students will develop projects with teachers, not merely guided by them, as part of an educating community; to this end, they will use the technology available in the school to present their arguments, communicate their ideas, search for information and develop products in a co-operative way.

ICTs will play a fundamental role in socialization and the students' contact with the world. Internet discussion groups at different levels (courses) will be a prominent feature of different national and international establishments, creating open spaces in which other society members will be able to participate. ICTs will help broaden the horizon of experiences and actors involved in learning and education of students.

Management and Governance

Schools will be considered as spaces that are subject to physical boundaries but open in virtual terms to the community and the world, strongly supported by ICT, creating networks of schools, projects, people, and families. This will be possible through quasi-instantaneous and very broad transmission bands that are ubiquitous, invisible, specialized, and hyper-medial. ICT will be so integrated that it will not appear as an explicit element of the schools resources and methods of work.

Automated processes based on information systems will support the management of learning establishments. Remote access to these tools will be available not only for the community (access to students' scores, school agendas, communications with teachers, participation in consultations and debates, etc.), but also for the teachers. They will have virtual and customized desks, with the usual working tools and access to personal files and documentation. Teachers will become members of virtual associations, which will organise, develop and evaluate projects with students from different

places. ICTs will facilitate periodic contact between teachers and parents, who will be able to observe part of what is going on in schools from afar, and thereby participate actively in the education of their children.

Teachers

One or more teachers will be responsible in each school for managing these resources and the methodological support for their use by the other teachers. In general, these educators will be required from the moment of hire to have the necessary skills for accessing these tools, and the competencies to use ICT well.

Teachers will use the available network communications and resources during their professional lives and will act as consultants to many institutions and virtual groups. They will be able to carry out a substantial part of their duties from their homes although, in this scenario, their presence in school continues to be essential. Teachers will continuously upgrade their skills by means of on-line courses offered by a broad and diverse e-learning market made up of private and public institutions.

Revaluation of the teachers' role will encourage changes in faculties of education, and strongly promote the use of ICTs by teachers - inside and outside the classrooms - including senior teachers.

SCENARIO 2.B SCHOOLS AS FOCUSED LEARNING ORGANIZATIONS

ICT Infrastructure and Resources in Schools

The infrastructure and resources implications will be very similar to the preceding scenario: diverse and flexible ICT use as part of the everyday activities in schools.

Learning and Organization

Technologies will be present in different teaching and learning environments, both as access stations to networks, and as tools for information or data analysis and processing. They will be used in broadly common ways across disciplines to maximize results (tools for analysis, development, processing, etc.), and they will have more specific roles in the learning process. They may allow the exercise of competencies and the application of knowledge in simulated situations, while at other times they may permit assessments, or self-evaluations, to diagnose competencies. They will also provide efficient tools for drawing up reports, portfolios and the presentations of research results and projects, etc.

Educational institutions will specialise in specific disciplines, and students will have access to a range of local or distance institutions, either in person or through the networks. Technology will be strongly used as in knowledge-building "professional" institutions (universities, scientific communities, etc.) Students and teachers will be able to communicate with their peers, have access to quality databases, and publish in digital educational academic magazines. Competition to excel academically will be fierce, with technology serving to achieve and demonstrate excellence.

Management and Governance

The purpose of schools will be different from traditional systems, as they will be more focused on knowledge-building as joint activities between teachers and students. In this respect, working networks - with other schools and also with higher education institutions - will become very common. Teachers will be members of virtual associations, organising, developing and evaluating projects with students from different countries. In addition, records on students' learning activities will be kept as a basis for re-designing educational programmes and methodologies.

Technology will play an important role in communications support and knowledge management through shared databases, to which participants may contribute with data, hypotheses and questions through which to generate arguments and validate proposals.

In establishments in this scenario, there will be a constant risk of saturation with regard to the use of technologies. Thus, educators will be subject to periodic evaluations and reviews of the ICT models used, and the lessons learned will be incorporated into subsequent practice.

Teachers

Teachers will use communications and resources available in the networks to make themselves specialists in teaching specific subject matter. They will actively explore what, how and when they should use ICT in their respective subjects, and share good practices in virtual learning communities. They will perform some of their work from home, and act as consultants to similar institutions and virtual groups.

3. DE-SCHOOLING

In these scenarios, ICTs will play a crucial role. They will be the platform that will determine the way in which decentralized and personalized education will take place. It will be essential for teachers and students to remain connected, and to have the necessary skills to manage these systems for access to resources, contents, communications, etc.

ICTs will facilitate participation in learning processes guided by institutions offering assistance through networks, with curricula globally available through virtual means. There will be the powerful presence of new ICT learning tools - super simulators, super virtual realities, intelligent tutors, etc. Families will require learning plans of some sort for their children, and they will need to enrol in these types of arrangements. Students will gather in cyberspace communities with no geographical boundaries.

SCENARIO 3.A LEARNING NETWORKS ANDTHE NETWORK SOCIETY

ICT Infrastructure and Resources

ICTs will be powerful and indispensable in this scenario; bandwidth and processors with a high graphic and multimedia capacity will be preferred and will simultaneously be able to execute different tasks. Participants in such virtual arrangements will be asynchronously connected with their teachers, work teams and resources in contexts of global ubiquity. Progress will be made towards more visual solutions to include the Internet, such as the former webtv, strongly strengthening learning outside schools. In this scenario, the 1960s utopia of the “school without walls” will become a reality.

Learning and Organization

The tools to be developed will allow groups of students from different cultures, languages, and even school calendars to work together, undertake complex assignments, evaluate their learning, customize their working pace, share resources, etc.

Learning communities, co-ordinated through networks, will be created. Socialization and affective development will take place in community organizations, where people will achieve co-ordination through ICTs. Society will no longer question “distance” learning as inadequate; instead, these models

will have been greatly refined together with sound certification, evaluation systems, and better learning models.

Technologies will be present in all homes, thereby granting learners access to a variety of courses and resources through the networks. Internet discussion groups from different national and international sources and different school levels (grades) will predominate, generating at the same time the creation of interest groups among young people. These will also be the basis for establishing friendships.

Management and Governance

The state will continue to play a supervisory role through the ICTs. It will have on-line information on each student's progress and on the results of the different suppliers of education products. Grants will be established to finance these services, which will also include technological resources for access to virtual platforms and environments.

The responsibility for education will fall increasingly to parents and students rather than to teachers. Therefore, "family" systems for recording the teaching and learning activities of each student will be kept, while, at the central level, the supply of courses will be certified and students' results will be qualified.

In this scenario, there is also a high risk of increasing the digital gap, because learning will essentially take place within the home and in virtual environments. It thereby assigns a determining role to the family's cultural capital in the child's development.

Teachers

Teachers will use ICTs to carry out from home an important part of their usual teaching activities. They will acquire new skills and competencies, such as "distance educational design", "evaluation assisted by means of remote communication networks", "distance tutorials and follow-up". There will be different pedagogical roles where a group of teachers will design and participate in multi-disciplinary teams for building platforms, while others will act as tutors or participate in "educational calling centres".

SCENARIO 3.B EXTENDING THE MARKET MODEL

ICT Infrastructure and Resources in Schools

We see this as having the same implications as for 3.a (see above).

Learning and Organization

ICTs will offer a range of virtual curricula, some based on traditional educational values, others addressed to specific niches, (such as skills development, learning for religious groups, etc.), supported by highly specialized software and hardware. There will be mechanisms to allow students to move from one system to another at will, as education will represent a very large market with community-inspired grass-roots organizations. The state will offer an alternative curriculum targeted to low-income groups.

Students in this scenario, through these powerful networks, will be active consumers; with state support they will be able to select their education provider based on their interests, the learning conditions offered, quality of additional services, etc.

Management and Governance

In both “de-schooling” scenarios (but especially in 3.b), there will be vast opportunities for those who have the management skills and teaching qualities that allow them successfully to compete in the unregulated and highly competitive environment. They will take advantage of technologies’ most powerful features to perform efficiently. There will be an emphasis on developing the ICT competencies of all students, whether by learning at school or through self-teaching at home and institutional certification; well-trained teachers with clear models on the use of educational technology (i.e. simulations, tutorials, support software for classroom teaching) will make good use of it, but in a mixed and diverse manner - there are no standard models.

However, schools that lack the necessary resources to compete, through poor management capacity or teacher training, will become even more deficient and probably stagnate; they may then disappear, generating quality problems or poor coverage in less competitive areas. Many institutions could find themselves in this impasse - investing in the socially expected infrastructure and technology use but with neither a sound basis nor the necessary support to use it effectively.

Teachers

Teachers will become “members” of an institution and develop a “professional career” there. They will periodically upgrade their skills through further training and certifying their newly acquired knowledge in order to be more competitive in the educational market.