

Imagining the present, interpreting the Technology and the

Alain Breuleux

When describing the relationship between education and the new information and communication technologies (ICT), we often use figures of speech that tend to reify technology, suggesting that it is an entity on its own, with a determinism outside the realm of human action. Expressions like “technology is a catalyst for educational reform” mask the more complex reality that it is the educator’s decisions and actions with ICT that result in change and that constitute most of the impact: the use is the technology and it is the impact. The gist of what I argue about educational transformations associated with technology is that something is, indeed, going on, but that technology is not a mere ingredient that “boosts” teaching and learning. Rather, it is part of a collective project of educational communities, and the outcomes of that project depend on a multitude of decisions at the local as well as the global levels.

By expressing a careful perspective on issues underlying the emergence of ICT-supported practices in education, I would like to contribute to an understanding of how technology can transform learning in positive ways and how current evidence can be interpreted so that practices improve continuously. I treat cautiously such notions as “change”, “evidence of change”, or “impact” and “evidence of impact” so that we ask questions that lead to productive discussions and positive actions. For example, we have witnessed over the past 10 years a series of transformations from the question “Does ICT work in education?” to “What types of ICT work in education?” to “Under what conditions can ICT be integrated into education?” to “How can ICT be used to improve student learning?” to “Do we really understand how it is changing the dynamics of teaching and learning inside schools and outside?”

To some extent we have moved along a very natural path from does it work, to what works to why does it work. Beyond rhetoric, I think these versions reflect different emphases and different perspectives, because the discourse we use always conveys a richer set of notions than the facts alone. Being sometimes an architect, sometimes a partner, often an observer of ICT-enabled educational practices, I remain fascinated by the complexity of the phenomena and the ease with which we sometimes simplify them unjustly.



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possible, cultivating the future:

renewal of teaching and learning.

Transforming the Learning Experience

Justifying a continued investment of funds for IT in education – or terminating it – continues to preoccupy us. Educators, policy makers, educational researchers, and the public are curious to know what can be gained by using technology in schools, and at what costs. As we seek to answer their questions, the methodologies, the technologies, and therefore the questions, themselves, are changing in significant ways. In that context, we cannot assume that answers provided five years ago are valid, relevant, or useful today, and it is difficult to establish a well-organized knowledge base for making decisions and taking action. For example, previous studies on “computer-assisted instruction” are of limited use now that computers are used in schools primarily to provide access to Internet communication and information resources. Consequently, as I argue in the last section of this article, we need to reconfigure the systems of educational research and teaching so that we can respond more quickly and establish a more dynamic knowledge base on questions of ICT use in education.

Discussing the positive transformations of teaching and learning with technology brings us back to some fundamental questions about the goal of schooling and the deep foundations of learning. Currently, there is a strong convergence of support for *the social construction of knowledge* – the idea that learning emerges from an active, collaborative process of constructing understandings, or knowledge. Therefore, current research on the use of ICT in schools targets questions of knowledge-building and collaboration: can ICT support more powerful, more complete experiences of collaborative knowledge building? The answer is yes, it can, if we integrate well-designed technologies in the context of meaningful, mindful inquiry projects, non-presentational pedagogies, access to resources and tools, and adequate support for technological maintenance and pedagogical renewal.

Results have been encouraging, but they tend to be obscured by their context: positive outcomes using ICT in schools are associated with other factors, like the knowledge and skills of the teacher. Thus, it is possible to find positive

results of the use of advanced knowledge-building technologies like CSILE (now Knowledge Forum™) in one classroom where the teacher, herself, is actively displaying knowledge-building practices, and less positive results in another class where the teacher models a limited set of knowledge-building acts. Therefore, we are more likely to read that technology “offers opportunities for X” rather than “technology causes X”; we lack the specific, generalizable results that could satisfy a simple-minded policy effort. It all “depends” and, therefore, requires policies to be the result of an active engagement in dialogues, in acts of interpretation and sense-making.

The changes associated with the use of technology in schools cover at least the following dimensions: who learns, why, where, and how. Considering “who learns”, we can see clear transitions from neatly defined boundaries between “students in school” and “workers at work” or between students and teachers to a more flexible and encompassing notion of *inter-connected learning communities*. When we look at “where and how” people can learn with technology, we see another set of transitions from the notion of learning as an isolated act, and as an act of isolation, to the notions of collective intelligence, distributed cognition, and communities of learners. The current alignment of reform and technology offers an array of learning experiences where constructive pedagogies meet the Internet: students are not learning alone, in their room, in silence, in their mind; the mind is not so much an individual possession, and knowledge an individual accomplishment. The Internet, or the network phenomenon, is associated with the transition from the notion of “campus” or “school” as an isolation device, above the “business” of regular life with access to pure ideas in a quiet and peaceful remoteness, to a more fluid relationship between the place of learning and different places of work, practice, and play. Thus the increasing number of classroom projects that include virtual visits, experts in electronic residence, and virtual field trips.

What difference does a network make? It brings in more people, different perspectives, different voices; it opens the door not only for the voices inside the class to be heard outside, but also, reciprocally, for minds outside to be present within the class. In such situations, the student can be a

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L'examen des transformations que la technologie a occasionnées au plan de l'enseignement et de l'apprentissage nous oblige à revoir nos suppositions sur les objectifs de l'éducation et les bases de l'apprentissage. La recherche actuelle nous laisse penser que les TIC peuvent permettre un apprentissage coopératif plus complet et profond si nous utilisons des technologies bien conçues dans le contexte de projets de recherche appropriés, de pédagogies non présentationnelles, et d'un soutien adéquat pour l'entretien technologique et le renouveau pédagogique. Si nous mettons l'accent sur les « pratiques émergentes » plutôt que sur « l'impact », il se peut que nous puissions voir dans les TIC un outil qui facilite le renouveau de nos projets éducatifs collectifs.

peripheral participant in the actual community of practice, and learning is the process of developing the competence, the roles and the responsibilities to be a full participant in a socially meaningful community, be it a community of carpenters or a community of scientists.

As a consequence of these changes, we are likely to see more diversity across the educational system as different schools experiment with potent combinations that are locally grounded and relevant. Our conception of the “place” called school, in particular of its regular features across different locations, is likely to change as more varied choices are offered to schools and different decisions are made locally.

Educators are also asked, what are students doing with IT that is truly powerful? They are manipulating knowledge representations in ways that are more direct and visible, leading to sharing of thoughts and experiences as in the CoVis project,¹ and they are accessing a real and responsive audience of varied correspondents with whom it is possible to establish relationships.

We need, also, to consider the changes taking place in the professional practice of educators as they engage in reflective acts supported by technology. Here we see networked learning communities composed of practicing teachers, teacher educators, and student teachers, signaling to one another the dilemmas of their practice and the solutions that they build. A powerful version of such a network is the community of interpretation described in the last section of this article.

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To characterize the changes taking place in education as new technologies meet constructive pedagogies, I find “renewal” an appropriate term. It describes well what happens to educators and to their practice when they gradually develop an understanding of the potential of ICT and start using it in their day-to-day professional activities. Renewal can mean doing things in a “new way”; but it can also mean re-investing in an established performance, but with a new spirit – confirming and reiterating an established practice, but with a deeper conviction. It also can mean that an existing pattern, time-tested and valuable, is renovated.

The Notion of “Impact on Learning”

When examining the results of research on technology use in education, I find the notion of impact misleading; I prefer to outline a different kind of relationship between technology and education. For instance, we can easily replace literacy by technology in the following quote: “What matters is what people do with literacy, not what literacy does to people.”² Instead of the notion of “impact”, it may be more useful to center our discussion around the notions of emerging practices, or “promising practices”, emphasizing “a system of individuals, in a social, cultural, technological activity setting.”³ These practices are emerging from the reciprocal relations between the potential offered by new technologies and the actual uses that people develop for these tools. Such practices need to be seen, recognized, cultivated and interpreted.

Focusing on emerging practice emphasizes a different set of questions and issues than focusing on “impact”. For example, the question of “vision” changes substantially: the challenge is much more than imagining the future, it is about “imagining the present”, seeing glimpses of the future beyond the trivial, within the ordinary, among the current. It is easy to discard the present as banal, to conclude that technology has had little impact, and wait for the ideal scenario; it is much harder to cultivate our perceptions so that we see the (perhaps small) accomplishments of today and measure how they may lead to a fuller realization of the vision. The latter seems to me more relevant and productive, as we need to develop a capacity to read the present and to tell the present (especially in networked communities of interpretation). The “vision” problem is not about defining an end goal; it is about defining, recognizing, shaping stages toward that goal, and not dismissing as unsuccessful everything that falls short. This is not a proposal to embrace the status quo; it is about encouraging a discipline and a capacity to see the present, to see in it where lies the beginning of tomorrow, the potential for change.

Using Technology to the Best Advantage of the Student


It is possible to feel overwhelmed by the importance of the questions that are precipitated by the availability of ICT in schools and by the scarcity of resources to build an adequate understanding of the possible outcomes. The situation presents itself in more chaotic forms than ever: the speed of change in society, emerging practices such as Internet games, mobile wireless palm devices, the fusion of cellular phones and personal digital assistants all lead to “practice before policy” and suggest that we learn from the future, not from the past. However, technologies can sometimes solve the very problems that they create, and I believe we have a case in point with the highly networked computers today.

If we cease to consider technology in a ballistic way, as an entity coming into the educational system from outside and having an impact on it when it “hits”, we can instead think of ICT as an enabler of the renewal of our collective educational projects. Then the question becomes less of finding the impact, but of engineering more powerful ways of achieving the learning and teaching goals. Learning and teaching with technology becomes a collective, collaborative socio-technical architecture, similar in a sense to democratic governance or collective gardening. And it becomes everyone’s responsibility to document and report relevant findings. For the teacher, reflective practice is a crucial starting point for this contribution to understanding how ICT can be used.

Communities of interpretation are essentially connecting the present with the future, the actual with the possible, and they accomplish this by connecting the views of teachers, researchers, developers, and other interested members of an educational community. They constitute technology-enabled re-combinations of the system of relations between teachers and researchers. They revolve around web-sites, online data repositories, and discussion boards. They are a response to the fallacy that knowledge of “best practice” can be (or should be) made available by researchers to teachers. In a community of interpretation, knowledge of promising practices emerges from acts of observation, sense-making, and interpretation by teachers and researchers. It is knowledge constructed rather than knowledge told, because the transformation of teaching and learning is engineered not simply observed.

We can take the current international IEA and OECD case studies conducted in Canada as illustrations of this need to take the context and perspective into consideration when looking at the use of ICT in practice. Such case studies allow us to expose what front line innovators see and say. Whereas many practising educators in the Canadian case studies mention the “integration of ICT into the curriculum” as an arduous accomplishment, we know that the theoretically oriented educational researcher regards this as banal because it has been “theoretically” established more than for more than a decade. Typical researchers tend to underestimate the knowledge required (and actually developed) at the point of implementation. On the other hand, the case studies are quite inspiring to the practicing teacher,

who is struggling with the enduring challenges of integrating ICT into the everyday routine or with the even more challenging struggle of creating new routines to take advantage of the potential of ICT. The communities of interpretation currently established as a follow-up to the case studies will allow a continued process of observation and interpretation of the cases and connect them with systematic reviews of the literature.

In conclusion, positive changes are taking place as educators engage in the renewal of teaching and learning with technology. Concrete steps can be taken by any member of our educational communities: use the Internet, as well as face to face groups, to participate in constructive dialogues about emerging practices. 

- 1 CoVis: see L. Gomez, B. Fishman, and R.F. Pea, “The CoVis Project: Building a large-scale science education testbed.” *Interactive Learning Environments* 6 (1998): 59-92.
- 2 D.R. Olson, N. Torrance, and A. Hildyard, *Literacy, language, and learning* (Cambridge, UK: Cambridge University Press: 1985).
- 3 G. Salomon, ed., *Distributed cognitions; Psychological and educational considerations* (Cambridge, UK: Cambridge University Press, 1993).

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