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## **C. A Inovação Organizacional**

### **C.1. “Toward Learning Schools: Building leadership and change momentum through technology innovation”**



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#### **Abstract**

This chapter explores organizational innovation in a systemic way, by using ICT to align the efforts of stakeholders in a school (e.g., school managers, staff, ministry of education, employers, linked institutions, students, their families and communities), thereby to improve what they get from the school and give to the school, including practices that enhance the school’s ability to self-improve, in the manner of a learning organization. That alignment can help a school to become better at deciding what to change, when to change, and how to make needed changes. This chapter gives examples of five types of change:

(1) Changes that help a school’s leaders to become more aware of, and increasingly better-placed to benefit from, proven practices in using ICT that are a good fit to the goals and nature of the school and that are worth the school’s effort to adopt and if necessary adapt.

(2) Changes that build momentum for change, in all parts of the school ecosystem, by gaining the commitment of more and more stakeholders to leadership-supported change. ICT can facilitate the spread of complementary practices and tools that empower individual stakeholders in ways that they value (e.g., that help them to be more efficient, more effective, have greater standing in communities important to them, and be more aware of changes in the external environment and better able to anticipate or react to those changes).

(3) Changes that help in tracking and sharing emerging good practices and other innovations.

(4) Changes that encourage sharing experience of preparing for a changing world and effecting change. ICT can help to document and share what has been learned from each episode of change and to publicly acknowledge the contribution that each person makes.

(5) Spotting and discouraging uses of ICT that have a negative effect (for example, are dishonorable, unethical, prejudiced, anti-social, disregard the rights of others or are counter to the goals of the school).

## 1. Introduction

Organizational change can be slow and difficult, especially if it is undertaken by people who are unfamiliar with any technologies involved and who lack experience as change agents (Caluwé & Vermaak, 2003). Over 40 years ago, when IT was much dearer and much less pervasive and far fewer people appreciated the importance of the Communication aspect of IT, the majority of very large and innovative IT projects tended to fail. Small and unambitious IT projects tended to deliver most of their goals, mostly on time and within budget. Those organizations that could learn from both large and small failures managed to generalize their insights, and thereby reduce the incidence of failures of all kinds, including new types of failure. A similar picture applies today to major failed projects, both in IT and in other areas (Desai, 2010). Organizations unable to learn from their operating experience may continue to fail.

Since the early days of IT-based innovation, one important predictor of failure or success in IT projects has been the goodness of fit between *the IT side* and *the organization side*. The IT side includes the nature, affordances and roadmap of the types of IT available to an organization. The organization side includes the kind of organization; its needs and the needs of its stakeholders; its experience of using the chosen types of IT in similar projects; its experience of effecting change and learning from it; its goals and its roadmap; and its processes, process rhythms and resources. The greater the fit between both sides, the greater the likelihood that organizational change based on IT will be fast, successful and sustainable.

As early as the 1960s and 1970s, it was claimed that IT was not only changing organizations but also changing the nature of the demands upon citizens (e.g., Toffler 1970). Reports from that time concerning “what can be automated” suggested that many of the early generations of information-processing jobs would disappear as soon as IT became sufficiently affordable. With each subsequent decade, those early types of information-processing jobs have indeed disappeared, to be replaced by jobs requiring quite different

capabilities, some jobs being in new organizations in new knowledge-based industries. Those new jobs were envisaged in a general form by futurists (e.g., Toffler 1970; (Gibson, Toffler, & Toffler, 1998), who also envisaged the general capabilities that future workers would need in order to be employable in an IT-transformed world.

The consensus was that faster change was coming whether we wanted it or not, and workers needed to become more capable of updating their knowledge by themselves as in self-directed learning (Carneiro, Lefrere, Steffens, & Underwood, 2011), and more adaptable and agile in applying their new knowledge to new demands. The implications for formal education were clear. Schools needed to be updated and perhaps even re-conceived, if they were to have any chance of mass-delivering the vision of a “new education”:

“The new education must teach the individual how to classify and reclassify information, how to evaluate its veracity, how to change categories when necessary, how to move from the concrete to the abstract and back, how to look at problems from a new direction—how to teach himself. Tomorrow’s illiterate will not be the man who *can’t read*; he will be the man who has *not learned how to learn*.”... (Herbert Gerjuoy, emphasis added, quoted in (Toffler, 1970): 271).

Much has changed since then in the challenges that citizens face, and in the implications for schools. For example, it seems increasingly that the ability of an employee to do whatever it takes to generate profits has become much more attractive to employers than academic attributes once sought after in school-leavers (e.g., ethical behavior, wide general knowledge, competence in science and mathematics, and literacy/study skills that include spelling, grammar and sense-making). To paraphrase Gerjuoy and Toffler, today’s equivalent of Academic illiteracy might be Economic illiteracy, as in “Tomorrow’s illiterate will not be the person who doesn’t know *how to learn*, but the person who has *not learned how to earn*”. This captures one obvious difference between the world of 1970 and the world of today: attitudes to education have become far more instrumental. Education is no longer a goal in itself or a universal right that helps us to understand our world and become better people. In countries with a crisis of affordability of public education, and with higher competition for post-school job opportunities, many people now focus on the vocational aspects of education: according to that viewpoint, education’s main role is to provide a sure route to a job. “Learning how to learn” was accepted as a major part of that, but “learning how to earn” now takes precedence.

That vocational perspective on education shapes what some school stakeholders tend to want from ICT in schools. Consider education from the perspective of those parents who rely on their children to provide them with financial security for their old age; as they see it, education must enable their children to find a well-paid

job. On this line of reasoning, if there are not enough such jobs for everyone then they will need their children to be more employable than their fellow students. One route to achieving that is to make their children and the children of their friends and relatives stand out from other classmates by appearing to offer more value to prospective employers. This pressure to favor immediate family and friends (and to treat school as a place to compete with non-friends/non-family rather than cooperate at a community level) is giving rise to a shift in how we treat others and how we use ICT. Instead of (or in addition to) using the Internet to achieve a modern version of the “new education” of 1970 (arguably a desirable goal), unscrupulous or desperate parents are now seeking to get their children to emulate people with any skills, behaviors and capabilities that lead to “success in earning”. Hence today’s zeitgeist term, the “emulation economy”. Emulation skills may give a false impression of what a learner can do, but extend the range of opportunities a learner can target, increasing the career options nominally open to them. In highly-competitive times, none of this may be questioned unless stakeholders take an information ethics course (Chang, 2011).

This “learn to earn” pressure is leading to the emergence of ICT-based services for social elites and others aspiring to social mobility. Those services can help a rich minority of school-leavers to establish and exploit any social connections and personal introductions needed to get an interview and can enable them to demonstrate persuasively that they can “perform” in the skilled manner required in 2011. They include:

- Job hunting for today and tomorrow, using databases of current job opportunities and databases of innovations and trends (e.g., to help today’s teachers and their students to find out where the opportunities will be for newly-qualified job applicants)
- SEO, Search Engine Optimization (e.g., to raise the employability of school or college leavers who seek jobs, by using SEO techniques to make sure that their ePortfolio / Curriculum Vitae / Facebook page / Blog includes all the terms used by the strongest candidates for jobs)
- Profile-tuning (e.g., to provide users with unpaid work experience during vacations, for a fee, to differentiate them from students with similar paper qualifications but no work experience)
- E-Rehearsal skills (e.g., using IT-based “Serious Games” to allow learners to practice “set piece” demonstrations of particular skills, analogous to a musical performance, which they can use to persuade their job interviewers that they are highly competent).

This, then, is the kind of world that ICT is making possible. But it will not be a sustainable world if it creates class divisions. Social justice suggests that consideration be given to extending to the mass of school students the skills and opportunities that ICT is imparting to the few. Much of the scientific and technical groundwork for this has already been done. For example, there is a substantial literature on how to use ICT to help learners to achieve a characteristic aspect of skilled performance: namely, that it is error-free. ICT can help here by helping learners of all social classes to find appropriate mentors and study partners; to work with them to identify appropriate skills to acquire; and then to find the shortest “time to competence” (path to achieving the desired skills), by giving learners personalized and appropriate feedback as they practice. The old saying applies: “practice makes perfect”, in the sense of error-free judgments and smooth performance. Everyone can benefit from this.

The next section looks at equality at the level of organizations rather than individual learners, specifically at how organizations of all types, poor as well as rich, can learn from their own practice and from the experiences of other organizations, to get faster at learning how to handle new demands and how to become more efficient at handling current demands.

## **2. From learning organization to learning school**

At the level of an organization, practice (or bought-in experience) can lead to a series of improvements in efficiency and productivity (see e.g., [http://en.wikipedia.org/wiki/Experience\\_curve\\_effects](http://en.wikipedia.org/wiki/Experience_curve_effects), retrieved on July 22, 2011). In a “learning organization” (Senge, 1990), the time between improvements may get shorter, as people become more familiar with the process of first introducing an improvement, then becoming competent with it, then sharing their experiences of that process and their insights into it. Members of a learning organization may find that they become more capable of generalizing their experiences from one task to another; that “transfer of process knowledge” may lead to further reductions in the time between improvements, and can help the organization to become increasingly agile and able to improve its performance on a wider and wider range of tasks: it “gets better at getting better”.

### ***Learning schools***

The term “learning schools” in the title of this chapter refers to the notion that schools and their stakeholders can acquire and embody the principles and practices of learning organizations. Not everyone agrees with the view that this is a useful concept to apply to schools, or agrees about the characteristics and processes that might define a school as a learning organization (Silins, Zarins, & Mulford, 2002). The notion of a learning

organization, and by extension the notion of a school as a particular kind of learning organization (a “learning school”), is usually attributed to Senge (Senge et al., 2000). For simplicity of writing, this chapter will accept Senge as the originator of the modern meanings of the terms “learning organizations” and “learning schools”, although other views exist on this (e.g., (Jackson, 2000).

One important feature of a learning organization, relevant to a learning school, is that learning how to improve is not limited to a few individuals in the senior management but is distributed across all levels in the organization. This is in accordance with the view that organizations are better able to develop organic (natural, self-sustaining) ways to learn how to improve, if managers get out of the way when experiences and ideas are being shared, and if workers who begin to share in that way are not then micro-managed in their work (as can happen in a traditional bureaucracy), but instead are treated as stakeholders who are listened to, and are given responsibility for some form of self-management as part of learning to improve.

Self-management is a feature of an “adhocracy” (<http://en.wikipedia.org/wiki/Adhocracy>, retrieved on July 22, 2011), which “cuts across normal bureaucratic lines to capture opportunities, solve problems, and get results”. An egalitarian adhocracy combines cross-cutting ways of working and the practice of giving decision-making authority to the workers, as in the Brazilian company Semco, which famously was allowed by its owners to be “managed without managers” (Semler, 1989), unlike the usual 20th Century “scientifically-managed” approach, with its rules, control and efficiency. Gradually, Semco evolved away from scientific management and its staff learned to manage themselves; that self-organized approach is seen today as more appropriate for the chaos of the 21st Century (Tetenbaum and Laurence 2011). By analogy, it could be that self-directed learning will become more appropriate for some learners than the traditional forms of teaching on offer in many schools.

### ***The UNESCO Four Pillars of Education***

Gerjoux and Toffler’s vision of “new education” of 1970 was not feasible at that time, but such thinking led to a deeper vision, the “Four Pillars of Education” (learning to know, to do, to live together and to be), developed by the UNESCO International Commission on Education for the Twenty-first Century; see <http://www.unesco.org/delors/fourpil.htm>, retrieved on July 22, 2011.

For the purposes of this chapter, one point to note is that ICT can make it easier for a learning school to link to other such schools and thereby broaden the range of resources and experiences available to help people to progress.

A second point to note is the importance attached by the UNESCO International Commission to empowering learners, for example helping them “with the mastery of learning tools” (such as tools based on ICT), “learning how to learn by developing one's concentration, memory skills and ability to think”, in a world “...of instant information” with a “vast amount of information storage and distribution capacity available”. In that vision, ICT is subservient to the learner, and learners take care to not become dependent on it to the extent that they lose their long-term memory skills and other cognitive abilities, and begin to compromise their ability to learn to learn.

Recently it has been claimed that the high use of ICT in a lazy way (like using a TV remote instead of getting out of one's chair) is constraining US citizens' ability to innovate and to change, because they are delegating thinking tasks to IT systems to such an extent that they are at risk of losing their ability to recall the details of the delegated tasks and make sense of them (Carr, 2010) and may be at risk of becoming easily distracted (as in ADHD, [http://en.wikipedia.org/wiki/Attention\\_deficit\\_hyperactivity\\_disorder](http://en.wikipedia.org/wiki/Attention_deficit_hyperactivity_disorder), retrieved on July 22, 2011). Those claims are contentious. They are reminiscent of reactions to earlier generations of technology, such as the advent of books, which were felt to be harmful to the mind by making it unnecessary to remember sagas by heart. Whether those claims are true or not, such claims are becoming used as justifications for limiting or banning IT in education. A more thoughtful response would surely consider the views of the UNESCO International Commission about balanced long-term roles for ICT.

The UNESCO pillars were set as goals for a private school in Sao Paulo, called Lumiar. What was interesting was the link with Semco. Ricardo Semler (the CEO of Semco) set up the school via a foundation he established to extend his learning organization ideas to education. In accordance with Semco principles and the notion of a learning school, Lumiar aims to be democratic and yet meet the learning requirements of the 21st century. As part of that, it is flexible in its goals and in how to improve, within UNESCO's “Four Pillars”.

Care must be taken in extrapolating from what is possible in a school with a rich sponsor, to what is possible for the population as a whole. Yet experience around the world shows that the UNESCO goals can be achieved at scale through sharing experiences and insights into how to effect change with modest resources. Moreover, ICT is a valuable asset in identifying people and schools with the ability to share learning journeys and to nurture the wisdom of *Learning to Live Together* (Carneiro & Draxler, 2008).

### ***Sharing information as part of effecting change***

Semco's journey to becoming a learning organization is relevant to disadvantaged schools of today which start with little or no ICT, because the Semco story began in pre-internet times, akin to the information-poor setting of those disadvantaged schools. Without ICT, it becomes hard to get access to up-to-date and relevant sources of information, or to track and quickly analyze the effects of one's actions. Semco realized the importance of sharing information, and gave groups of staff discretion to take action, provided that each workgroup agreed on what the problems or opportunities were, and provided that they kept everyone informed. That same approach (encouraging self-reliance via delegated authority) can work today, even without ICT.

Thanks to ICT, most of today's organizations find it far easier to share information. Today's learning organization is likely to use multiple IT-based and non IT-based channels for Knowledge Sharing and Codification, KSC, and multiple channels for intra-organizational and inter-organizational messages (channels that may be bottom-up, top-down, peer-to-peer or any mixture of these, and include the ubiquitous mobile phone).

Today's organizations have many ways to configure and exploit their formal and informal communication channels to help to promote and sustain desired change. The existence of multiple channels for KSC, especially ICT-based channels that everyone can use, presents some dangers. For example, if managers are not sincere and not focused on helping all staff to meet the key objectives of the organization, this will show in the reactions to their messaging. A new social science of "impression management" has emerged to enable leaders to be more effective in their ICT-based messaging (Norris & Porter, 2011). Even so, lies can be detected or suspected. If staff feel that they are not accurately briefed about changes and new ideas that could affect them, it is likely that some people will use today's "social networking" forms of ICT to speculate about what is "really" going on – they may take gaps in their knowledge as signifying that "managers must have something to hide" and may then spread false rumors and other negative messages.

Similar messaging options and challenges exist in schools and affect how ICT can be used to promote KSC. In pre-ICT times, schools had fewer channels for Knowledge Sharing and Codification than commercial organizations, and communications of significance tended to be top-down (e.g., from ministry to school, or from school leaders to staff and to students).

In the pre-ICT era, it could fairly be said that bottom-up KSC was rare: "The school is not currently a learning organization. And teaching is not yet a learning profession. ...schools and teachers are stalled in their efforts to become more learning oriented" (Fullan, 1995): 230). Today by contrast, most school stakeholders

have access via ICT to multiple communication channels. This creates many possible routes for schools to become learning schools, although some schools close off those routes (e.g., their management does not allow staff to recharge or use “unofficial” forms of IT such as mobile phones, and requires staff to confiscate IT devices which students bring into school such as iPads and camera phones with SMS and internet access).

The 40-year delay in introducing Gerjuoy’s “new education” is consistent with the view that until recently it has been hard to bring about radical change in schools. For decades, the argument seemed to run that “it is not worth attempting radical change because there are few or no reports of any school that has achieved radical change”. Since 2010 or so, that cautious approach has been replaced in some schools by embracing of radical ICT-based innovations such as the Khan Academy (<http://www.khanacademy.org>, retrieved on July 22, 2011), which allows schools to use external resources to fill gaps in curriculum provision. It is no accident that those schools are learning schools and use ICT for KSC.

Knowledge sharing is routine in learning organizations. Using free and externally-supplied materials which students enjoy and learn from (such as videos from the Khan Academy) is a safe small step in learning to change. It is better to have a series of successful tiny changes, each of which needs few or no resources and takes a short time to achieve, than to begin with a Grand Project that will take years, could require significant negotiations with others and could have high visibility and consequences if it fails.

An example of a Grand Project encountered by the author is switching from a local syllabus that was familiar to schools, to an externally-commissioned and high-profile syllabus with the following elements: claims to be the route to making the local schools “world class”, with a dramatic promised rise in the performance of teachers and students; required high familiarity with a second language (English); developed by international consultants with no experience of teaching in that country; made extensive use of sophisticated forms of ICT and other novel elements. The results so far have been much below the sponsor’s expectations. So in contemplating how best to use ICT in schools, a major challenge is to learn how to be appropriately ambitious. This includes choosing the right problems to solve and the right level of change to attempt, to enable a school to reduce its risks of failure at any point, yet move swiftly but surely towards becoming a fully-capable learning school, better able to learn from each of its experiences and so prepare itself and its stakeholders to anticipate change and prepare well for it.

Some of the challenges facing us here involve a paradox, to bear in mind in introducing ICT:

“Learning is always embedded in a practice, we have been told, accomplished frequently by several interlocutors, using physical and cultural artefacts, notably language. Learning, when seen in this way, appears as just one aspect of complex social situations, imbued by specific cultural patterns of speaking and acting, an aspect which is not easily separated from the situation which it is an aspect of. On the other hand, we are also told, presumably by others, that the main task of education and of the learning that is supposed to take place, is to prepare the students for an increasingly unknown future, to enable them to handle novel situations in powerful ways. Given we accept both these dictums (and in fact it seems hard not to), we are facing a paradox: we have to prepare students for situations that we cannot even imagine, by means of learning that is a seemingly inseparable aspect of the situations in which it is taking place... [yet] to become able to deal with unknown situations in powerful ways the learner has to learn to tell apart one situation from another and one aspect of a situation from another aspect of the same situation.” (Marton, 2008): 10).

### **3. Using ICT to look back and to look ahead, to raise the quality of learning**

#### ***Looking back***

One way of raising the quality of learning is to use IT to reflect on the practice in which learning is embedded: to collate the experiences of schools, teachers and learners, interpret that data using insights from practitioners, policy-makers and educational theorists, and then identify successful practices and ways of transferring those practices to other schools. This is a good basis for achieving improvements based upon the best of past practice.

An example of a systematic attempt to learn from past practice is the sponsorship by the US National Academy of Education of a book entitled “Preparing teachers for a changing world: what teachers should learn and be able to do”. Despite the title, the book did not predict changes in the wider world (outside the school). Instead, the “changing world” of the title was the internal world of school renewal.

The book served a very useful function in enabling schools to renew themselves by improving the quality of teaching incrementally so that fewer students had problems in learning what they were taught. It provided teachers with an organized body of class-proven knowledge, the “How People Learn” (HPL) framework, setting out key findings of the time about past successes and failures with non-ICT forms of teaching and learning (Darling-Hammond, Bransford, LePage, Hammerness, & Duffy, 2005). It assumed a slow-changing context that did not involve ICT explicitly. An example of such a context is the periodic (every few years) updating of a

syllabus that is followed by all schools in a region; they are expected to teach the syllabus in a traditional face-to-face way and assess it in the same way as other schools. Typically, schools in such groupings have little or no discretion about varying the teaching methods to make allowances for differences between individual students, teachers and schools. In such a context, “what teachers should learn and be able to do” implies “within the system”. Knowledge sharing is then necessarily constrained to ways in which teachers can achieve incremental improvements in how a syllabus is taught and can be learned from.

HPL was a landmark framework that is still relevant to classroom practice. It is arguable that it would be even more valuable if it could be revised to pay attention to other factors that have become seen as important, obviously including ICT but also including the literature on engagement in the sense of motivation to learn (Eberwein, 2011); the literature on “telling apart” (in the sense of Marton); and insights into how best to keep parents informed about the progress and needs of their children, as part of gaining their commitment to supporting their children as learners. ICT is clearly relevant to that information flow.

### ***Looking ahead***

Some emerging challenges facing schools are not immediately apparent, and by the time they are apparent, there may be little choice about what to do in response. Schools can use ICT to get earlier notice of such challenges, and to identify possible paths to making those changes. Increasing a school’s time horizon from months to years may be possible if it has inputs from futurists and other experts, using techniques such as Delphi studies. Policy makers or school leaders can use those inputs to decide on which trends to pay attention to in a school context. Armed with such judgments, a school can then use ICT to augment its practices and modify its syllabus focus, to help learners to prepare adequately for their futures.

Once it has become apparent that a change is needed, the question arises of how to make the change. ICT can be used to smooth the path to change: data mining can help to analyze databases of successful past practice in introducing innovations and exploiting research findings that were recent at that time, thereby to speed up the transition to prospective future good practice, starting with today’s good practice and today’s recent research findings.

There is growing acceptance of the need to prepare for change in such ways, as well as to learn from the best of current and past practice and to deploy technologies in ways that increase equity in education by reaching much larger audiences in increasingly affordable ways, e.g., (Daniel, 2010; Darling-Hammond, 2010).

As an example of shifting attitudes to the need for change, it is increasingly claimed that much of what schools and colleges teach today is seriously outdated and irrelevant to the kinds of jobs that students will need to apply for when they leave school or college. Yet school leaders cannot be sure what they should be doing, because the future is not here yet. The dilemma has been captured like this in a video presentation:

“[today’s] top 10 in-demand jobs didn’t exist in 2004... We are currently preparing students for jobs that don’t yet exist... Using technologies that haven’t been invented... In order to solve problems we don’t even know are problems yet” (<http://www.youtube.com/watch?v=sMTzTX7IEKM>, retrieved on July 22, 2011).

Those words come from a transcript of the video, online at the above URL and retrieved on July 22, 2011. It is an Internet version, updated in 2009, of a slide presentation to a school board in 2006, entitled “Did You Know? (Shift Happens)”. The history of Shift Happens is presented by its authors at (Fisch & McLeod, 2009). ICT is partly to blame for the shift, in the sense that factors such as advances in the capabilities of ICT and falls in the cost of ICT have reduced demand for entry-level jobs in both traditional sectors (e.g., office work) and knowledge-based industries (e.g., information analyst or trainee), cutting the number of vacancies in those sectors for people entering the workforce. New types of job are on the way, in other sectors (e.g., genetic testing technician) but they require different types of knowledge, insights, skills and approaches than schools typically provide. ICT can help here by speeding up the flow to school stakeholders of information about those changes and likely further changes, and about responses that others have found appropriate and useful.

In the absence of sure foreknowledge of the details of changes in society, traditionalists may argue for retaining most of the traditional elements of the curriculum and raising the proportion of timeless elements in the curriculum, such as critical thinking skills and problem solving skills. That debate will not be considered further here. Instead, we now turn to ways to improve our foreknowledge: specifically, by using ICT to track so-called “weak signals” (early harbingers or precursors of impending major innovations). For example, the precursor to today’s Internet was the ArpaNet of nearly 40 years ago.

Scanning of the external environment for weak signals suggests that schools may need to prepare for much larger changes than ICT has so far given rise to (see e.g., NEXT-TELL<sup>1</sup>, which is a project focused on the

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<sup>1</sup> European Commission Seventh Framework Project IST-285114, <http://www.next-tell.eu>

integration of current and prospective ICT innovations in the classroom, and TELMAP<sup>2</sup>, which is a project to map weak signals of impending change and identify possible futures for education). Through future-directed use of ICT, as in those projects, it is becoming feasible for a school (or a group of schools or a ministry) to spot trends early enough to change direction or to find possible sources of supplementary teaching that may help students to meet any new demands on them.

We now turn to the five types of ICT-enabled change that were listed in this chapter's Abstract.

#### **4. Examples of ICT-enabled change**

##### **4.1. Using ICT to find appropriate practices**

As a result of international cooperation, there are many online partnerships between schools and multilingual databases of free and class-proven ICT-based teaching materials, tools and processes from around the world (see e.g., <http://www.etwinning.net>, retrieved on July 22, 2011). Through such partnerships, schools in developing nations can collaborate to develop and enhance local versions of educational pedagogies (Kort & Reilly, 2001) (Kort & Reilly, 2002) and eventually can graduate to using ICT in transformative ways (Radda, 2011). An example is the development in Brazil of so-called Component Objects, tiny versions of Learning Objects, LOs, which are easier than LOs to re-combine and re-sequence, making it easier to re-purpose learning content and to localize related practices (Helena et al., 2011 (in press)).

In many cases, such innovations are shared via online databases, run with the support of education ministries and the participation of experienced teachers. This makes it more likely that locally-relevant advice will be readily available on how to choose materials and processes that will be a good fit to the goals and nature of the school and will be worth the school's effort to adopt or adapt to support common metaphors for learning such as learning as acquisition, participation or knowledge creation (Ralston, 1998; Sfard, 1998); (Paavola, Lipponen et al. 2004); (Hong & Sullivan, 2009).

Through the work of projects on ICT-based innovation in schools, school leaders can use ICT to become more aware of, and increasingly better-placed to benefit from, national and international experience in using ICT. As an example, projects like NEXT-TELL provide school principals and teachers with support for ICT-based innovations such as Evidence-centered Activity and Assessment Design (ECAAD), which help schools to integrate

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<sup>2</sup> European Commission Seventh Framework Project IST-257822, <http://www.telmap.org>

formative assessment into their teaching, by combining an authentic context for teaching and learning; data from portfolios, self-appraisals, presentations, etc.; and global and specific feedback.

An important issue is when to use ICT-based methods of teaching and learning, to augment or to replace other methods. One promising area is in the context of an impasse during learning; ICT can give a learner privacy at that point and this can give them the peace of mind to relax, pay attention to instructional explanations, and thereby succeed with their studies (Sánchez, García-Rodicio, & Acuña, 2009). Other students may find it more helpful to reveal their problems to their peers, and get help from their peers through a “Web 2.0” form of collaborative learning (Simões & Borges Gouveia, 2008). In addition, the experiences reported by teachers in online discussions, e.g. using the eTwinning portal, suggest that IT-based tools can help teachers and students when they are developing lesson plans (for teachers) or individual learning plans (for learners), then carrying out their plans.

The goals of many educational institutions include helping their students to develop a concern for disadvantaged communities and learners and then to take appropriate action, for example through voluntary teacher-led or student-led “community service” projects whose details can be publicized in communities of practice, made widely available both through the use of computers and through the use of interactive digital television, IDTV. Brazil is a leader in using IDTV in that socially-responsible way, e.g., (Braga, Santos, Vinicius, Ferreira, & Dantas, 2010; Recchioni, Castello, Sancin, Roscani, & Bijmens, 2008). The USA has similar social responsibility programs in education, but with less emphasis on IDTV and more on the Internet as a tool to share resources and experiences and to sensitize learners to the needs of people they can help. An example is the University of Pennsylvania’s Center for Community Partnerships, where “the university has helped to create a set of community schools that function as centers of education, services, engagement, and activity for students, their parents, and other community members within a specified geographic area. With its community and school collaborators, the center has developed significant K-16 service-learning programs that engage students at all levels in work designed to advance civic skills and abilities through service to and advocacy on behalf of their schools, families, and communities.” (Bloomfield et al., 2005)

#### **4.2. Change management – strategy, tactics and benefits**

In many cases, hoped-for changes are not prepared for adequately, do not turn out as planned, and are not sustainable. Common reasons for those failures are as listed (Ditkoff, 2010). So much goes wrong that it seems appropriate to use the term “failure management” to describe such cases, rather than change management.

Positive outcomes are far more likely in learning organizations. From their own experience or from the experiences of others, people in those organizations learn the importance of developing a collaborative strategy and matching tactics. Their mode of knowledge-sharing can also be a major factor. For example, the key features of an innovation may be easier for people to identify and to adapt to their circumstances, if group storytelling is used to add an emotional (and hence strongly memorable) element to the event where the knowledge is shared (Escalfoni, Braganholo, & Borges, 2011).

For leaders, such factors, coupled with findings from multiple research literatures, imply combining community-orientation; a collaborative decision-making style (Hameyer, 2007; Lopez, 2003); and using ICT to share practices, tools and information that, taken together, help individual stakeholders and their communities to achieve goals of particular importance to them, such as teachers' professional development (OECD, 2001). This attention to helping others to succeed will help leaders to gain their commitment. Gaining their trust as well will facilitate access to local knowledge that can help leaders to identify changes that are achievable (maybe if certain obstacles are removed). Another critical success factor is the need to build in resilience (via the commitment of key stakeholders) so that a change project has enough momentum to overcome any small setback.

An additional way for school leaders to enhance their chances of success is to avoid sources of failure associated with a lack of full understanding of the parameters of a situation, as in the "Too-Much-of-a-Good-Thing" effect:

"The TMGT effect occurs when ordinarily beneficial antecedents (i.e., predictor variables) reach inflection points after which their relations with desired outcomes (i.e., criterion variables) cease to be linear and positive. Exceeding these inflection points is always undesirable because it leads either to waste (no additional benefit) or, worse, to undesirable outcomes (e.g., decreased individual or organizational performance). The philosophical tenet underlying the TMGT effect is that too much of any good thing is ultimately bad." (Pierce & Aguinis, 2011):3).

The symptoms of the TMGT effect include the occurrence of seriously negative outcomes after management actions that had worked in other contexts, such as worker empowerment. The TMGT effect can be avoided by recognizing and not exceeding the inflexion points, as per that article.

### 4.3. Using ICT to find and share interesting innovations

Personalized newspapers (“The Daily Me”) and similar forms of personalized information channels have been anticipated for decades, and today there are various ways to gain access to syndicated sources of information and to use those sources to create daily updates and briefing notes, for example “My Daily News about new educational projects, technologies and related matters”. However, it is not widely appreciated that the sources freely available to us are often filtered in ways that are different for each of us, but are hidden from us. This is done to maximize the income that information providers can derive from each personalized channel: we either pay for information to come to us, or others pay to get information about us. In the words of Andrew Lewis, quoted in (Pariser, 2011): 24), “if you’re not paying for something, you’re not the customer; you’re the product being sold”.

It is not readily possible to work around that filtering using today’s search engines. Their search results are filtered before you see them, as Pariser explains. Filtering of information before it reaches us is becoming commonplace. It is different in nature from the filtering that we may choose to do, if we use search phrases that return too many results to be useful, such as “educational innovations”. In such a case, we need to select from the results, to make them relevant to our current requirements. The selection can be done in various ways including the use of additional search terms, which characterize our personal context and needs, or the context and needs of a particular school or stakeholder that we are acting for. There is no explicit personalization option to simplify the search (like using the search term “results relevant to my school”).

Pre-filtering without our knowledge will distort our search results. As yet, there seems to be no pre-filtering of the results of searches that use Social Networking tools (e.g., Facebook, Google+, Twitter), so those tools provide a more predictable way to track and share news of what others are doing or what they have found.

The heading of this sub-section mentions “Interesting Innovations”. What others rate as Interesting Innovations depends on what they have seen already. If pre-filtering has constrained their knowledge of the world, they may perceive something as very innovative when in reality it is well known to many people. Despite knowing this in theory, most of us pay some attention to choices made by others, when we select from the same options. This is because the survival of our ancestors depended on observing what their peers did or did not eat, or when and how they hid from predators. Humans are social animals (see book chapter B.1 by Cullen, and its references to mirror neurons). The behavior of each of us is influenced by what we find out about the behavior of other people, whether through direct observation or through accounts of what those other people did.

Today, our tendency to be influenced in those ways is exploited by online retailers. Thus, the bookseller Amazon tells prospective customers who visit its web site that “Customers Who Viewed This Item Also Viewed...” Subsequent decisions on whether to buy or not are affected by that information.

By analogy, we could expect an Internet search engine to become preferred by a user if the feedback from the search engine suggested that the search results were rated highly by similar users who undertook similar searches. (Technically, Google uses a different method of ranking its search results, but the judged-adequacy of its results, as indicated by the proxy measure of frequency of use of Google on future occasions, is as-if it had been able to track many similar users making similar searches, and selected for future use only the search results that were highly rated by those other users).

All those factors need to be taken into account when we set out to use ICT to track and share news of emerging good practices and other innovations. Some people may want to find ways to compensate for pre-filtering. Others may not care, or may widen their search to include information about the choices made by many more groups, including what they download, whom they cite, who gets criticized or recommended and by whom, etc.

To make this concrete, consider the saying that “a picture is worth a thousand words”. How could we become aware of interesting innovations, relevant to finding or creating such pictures and using them in ways that dramatically reduced the need for written explanations?

A good first step might be to figuratively “take a snapshot” of current information about educational pictures. We could use search engines to find online databases of pictures relevant to the needs of our school and recommended by people whose opinions we trust. Also, if we could not find the pictures we wanted then we might look for cheap or free web-based services, linking us to artists or computer scientists or teachers or photographers who could create new pictures for us (e.g., <http://visual.ly>, retrieved on July 22, 2011). In addition, we might want to find a summary of practitioner knowledge or research findings about pictures, such as (Carifio & Perla, 2009).

Those various actions will give us a good impression of what exists today. How, though, could we track subsequent changes in the content and direction of this information domain? How could we track “interesting innovations” fast and economically? Those questions frame a long-standing dilemma. Today’s best solution seems to be to share the various tasks within a community of practice.

#### **4.4. Using ICT to effect change and give credit where it is due**

ICT can be used to find change management projects that are like the ones that a school is engaged with. Where those other projects resulted in relevant good ideas, the school can appropriate those ideas. Then ICT can be used to publicize and acknowledge the value of those ideas, so that their originators are recognized.

Taking care to recognize others is an important part of managing change, for it encourages people to facilitate change rather than hinder it, and to be part of the change, hence proactive in sustaining the change in a systemic way, if that proves necessary. This emotional engagement encourages continued interest in the fate of the change, which can help to ensure its acceptance and continuance. In some ways this is like the community effort of jointly “raising a barn” (playing a part in building it, for later shared use). Contrast this with project management, where people are assigned to tasks that have an explicit end date, and involvement past that date is discouraged (Crawford & Nahmias, 2010).

#### **4.5. Accentuate the positive, eliminate the negative**

Where people involved in change projects are known as individuals and are valued as such, the conditions are right for the positive attitudinal changes described above. Dangers arise when people are treated as ciphers, of no consequence, in a system that allows them to act in anonymous ways or to pretend to be someone else. Many ICT systems can be mis-used in those ways, permitting negative behaviors to emerge, analogous to the antisocial actions of students who engage in “cyber-bullying” or other actions that are counter to the goals of a school.

School leaders have the option of pretending that such problems do not exist, or aiming for high standards and lasting solutions: importing insights from learning organizations that have encountered such problems and have developed solutions that respect individuals and encourage ethical conduct, as in (Bazerman & Tenbrubsel, 2011) and (Paine, Deshpande, Margolis, & Bettcher, 2005).

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