



## Information technology in schools: Should the product be marked hazardous?

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### Abstract

*One of the things that make some tools hazardous is that when you plug them in you have considerable power in your hands. False moves and you may lose a body party. ICT, I argue in this paper, is such a tool and yes it should be marked hazardous. How powerful? Why hazardous?*

*The power and the hazard go together. By means of ICT we can do more quickly and comprehensively what we could only do more slowly before. And if aspects of what we were doing before were problematic, they will be even more so thanks to the amplification provided by ICT. The amplifying power of ICT is one of the central themes of this paper. If instruction is routine and boring, computers can make it much more so. If products for schools were driven by commercial considerations before, they can be much more so with ICT - the investments are much higher. If schools had ways of monitoring teachers and children before, computers enhance that many times. If technologies were thought to drive what happens in schools before, ICT magnifies that potential many times.*

*In short, computers allow us to do what we did before only more so - so if we did not do well before IT, we may well do worse with it. Or we may do better. We need to keep these questions open. The biggest danger is that in the rush to conform to visions of ICT we may stop asking them. We need a dialogue. The desire for dialogue has, however, frustrated many ICT advocates who see it as a form of resistance to change (Ameral, 1983; Papert, 2001; Yelland, 2002). From a philosophical point of view, we need a dialogue that considers the techniques of practices and the goods that such practices seek, as Macintyre (1981) and Strike (nd) point out. Practices involve skills and techniques - which do not once and for all define the practice and which over time change the practice as the goals of practice - in this case teaching - change over time.*

*In the first part of this paper I look at how ICT has come to play such a dominant role in schooling. Over the last 20 years we see a continuous press to adopt this technology. What we do not see is a debate about the plusses and minuses of computers in schools based on experience. This is a cause for concern. In the second part of the paper I look at what happened in schools over this time and the beginnings of concerns about ICT. In the third part of the paper I look at the response teachers might make to ICT as it evolves.*

## **THE LAST 20 YEARS: THE PRESSURE TO ADOPT ICT**

### **The 1980's**

Why this pressure to adopt? What were proponents seeking in pressing schools to use computers? We can see the themes amongst others: distrust of schooling and of teachers and an irrational love of technology: techno centrism. A reading of the visions that were afloat in the 80s suggests that there were indeed quite radical revisions being proposed along with criticisms of schools (Olson, 1988). Papert (1980) in proposing LOGO expressed impatience with school mathematics. Amersal (1983) in proposing that students should develop generic mental skills apart from traditional school subjects thought that IT rather than teachers would bring this about. Judd (1983) thought that teachers were reluctant to rise to the challenges to their work posed by IT, and that those that did not should be sued for not using computers. Scanland and Slattery (1983) thought IT would restore the mind and soul missing from the classroom.

The gist of these proposals is to transfer instruction from teachers to software programs. These programs would incorporate the latest ideas flowing from artificial intelligence theory and allied ideas in cognitive psychology. IT proponents argued that the work of the school could be given over in some large part to machines. In this sense I would say - taking the large view and perhaps risking over-generalization - that the vision was for automated schooling - students being taught by programmed machines.

In retrospect, these visions now seem to have much in common with the introduction of new technologies during the industrial revolution which also were based on programmed machines. The desire to automate production has a long history (Hobsbawm, 1968; Noble, 1995). Noble argues that application of engineering principles to control production is aimed at controlling supposedly inefficient workers even though experience has shown, as Noble argues, that the workers know better than the programmed machines. So adoption goes on even if it is unreasonable. Furthermore the values that inform work are supplanted by other values which had little to do with the craft. As MacIntyre (1981) notes, crafts like teaching involve skill but also a tradition of making things according to certain values. The parallels to adopt automated technology in industry that Noble has documented with those to adopt ICT are clear. Supplant the teacher with engineered solutions supposedly to more efficiently able to achieve sets of specific outcomes not controlled by the craftsperson. In short industrialize teaching.

As Noble notes, manufacturing work in certain industries was broken down into small parts and computer programs written to control those small parts so that items could be made automatically through computer control. Complex actions requiring judgment were thought to be capable of being automated. The craft universe workers/teachers inhabit, seen from an engineering point of view, are sources of imprecision, waste and interference. ICT enthusiasts in the 80s were proposing that engineered solutions to learning could be delivered directly to students avoiding teachers - whose role was to accommodate their practice to the dictates of the engineered solution and thus follow the dictates of the engineer - the one who designed the software. The automated approach entailed computers and students interacting one-on-one through IT mediated material. Schools had to rapidly obtain critical masses of computers to achieve this often by setting up labs. Seldom was there one computer for each student.

Behind the rhetoric that promoted this "computer rich environment" - as it was said then - lies a desire to supplant the mediation of the teacher and indeed transform the classroom into a locus for automated instruction based on more reliable instructional methods than the teacher could supply - a

greater expertise would prevail and "mind storms" as Papert put it - and others used similar language - would result. Have these goals changed in the last 20 years? Apparently not.

### **The 2000's**

Let us now move on 20 years. What now of the visions for computers. We should note at the outset that the political scene in which ICT visions are cast has changed dramatically as has the technology since the 1980s. There exists now a political climate focused on accountability - on so called "best practices" in which "value is added". The language of visioning has changed. Have the visions? As far as I can tell the visions are the same. The idea that ICT is radically transformative remains and with it the same impatience and undervaluing of the traditions of teacher practice. The same faith in machine-based instruction remains, but I can see also a re-emphasis on using computers in whole class setting and on incorporating ICT into existing practices. But ethical issues remain, of course.

So what is the vision? We can find statements in the literature like: "[Instead of] the mapping of new technologies on to old curricula...what we should be doing is reconceptualizing curricula in schools"( Yelland, 2002, p. 92). Reconceptualizing on what basis? According to the author: "The computer is used as an artifact of innovation and implies a reconstruction of existing curricula (p. 92). This author suggests that teachers should give over instructional decisions to those who design software and thus avoid "adding on" ICT activities to existing "experiences" (p. 99) - in other words diluting the potential benefits of what is embodied in software by those outside the classroom. This is a reprise of the anti-teacher craft views we saw in the 80s.

Likewise, in a preamble to an OECD report on ICT, the author of the report states: "[The computer] has the power to transform the process of teaching and learning....The young people who inhabit a technology-rich information society already question the relevance of the traditional approach" (OECD, 2001, p. 19). "Rich" in what way? These are questions of value left unanalyzed - "richness" is a slogan meant not to be analyzed but to rally support for the ICT cause.

Or Papert (2001) in much the same vein saying: "[T]eachers are being trained...to neutralize this technology, to undo whatever powerful effects it can have which is a waste to say the least" (p. 107).What "powerful effects"? Another slogan? Why should we believe that we should take our educational principles and values directly from this or that technology? Are not tools deployed by humans according to their interests and in the context of ongoing projects they value? Why should computers drive educational purposes? Why this antagonism to the traditions of teaching? This should be studied further. It is hard to understand the reasons for this love of the machine.

I would argue that such slogans are a restatement of the techno centrism that we saw 20 years ago. What stimulates this view now more than before is the much more complex software that is available; especially that with the capability to monitor the users of it. The possibilities for the automation are enhanced. Automation can be combined with surveillance.

Computers are said to "add value" to the curriculum (Yelland, 2002). What the value is of what is added is often not explained. What values? How are these to be justified in the absence of any respect for the craft of teachers? From where do assertions of best practice and added value get their moral force? From the dictates of technique? It isn't clear. Take the idea of added value.

This idea of added value is a buzzword from commerce and its use in education begs questions about what the added value is. In business it is profit; what is it in education? Is it success on government and international high stakes testing? Achievement of government mandated learning outcomes? External exam results? What gives these measures the status of value in the absence of debate in which teachers participate as partners rather than as objects of managerial control? While the visions have remained static, experience of computers in schools has evolved. Reality has set in. Questions about the emperor's clothes have arisen. Let us turn now to the schools and what happens to ICT in practice.

### **What happened in schools?**

Teachers did not abandon whole class teaching in favor of a child in front of every computer. They did not radically reconstruct the material they taught so that it could be mechanized. They adapted the technology to suit their work for a variety of instrumental and expressive reasons. In doing this they faced some of the power and hazards of ICT. First the distinction between instrumental and expressive aspects of teachers' work (Olson et al, 1999). What is it? Sometimes what teachers do to an outsider does not make sense instructionally (in terms of getting the job done). But it does to an insider if we consider what is at work expressively (how the teacher wishes to be viewed by others - the presentation of self). Teachers endured less than optimal settings (which made it harder to get the job done) but used computers anyway - expressing their modern approach. This expressive goal to be modern however has its downside.

The research on computers points to some issues (Olson 1992). Students may not receive full support because teachers lack the skill to use computers - so students waste time - either through not knowing what to do and doing nothing or doing the wrong thing; or through acting as technical assistants in the class when they should have been doing school work. Boys may have more access to computers and when access is shared, more often play leading roles than girls.

Students may work in computer labs that had little connection with the curriculum but seemed to be aimed at engendering computer awareness per se - what I called then "doing computers" (Olson, 1988). Doing computers has become very much a part of schools as a formal school subject, of course. Then it was informal and ad hoc. There were, as well, nascent issues of gender equity in the use of this technology which have over the last 20 years become much studied and discussed (Balka and Smith, 2000). Students more able to use computers were more often given access.

Here again we see pre-existing trends amplified but not driven by IT. The disadvantages of girls in science and the less able in schools are well documented. These problems existed long before the advent of IT, but IT has brought these issues into view in a more intensive way. Less dramatic problems which raised ethical issues arose as well. Certain students are disappointed by the gap between what they had been promised they could do and what they actually could do. Promises are made and not kept.

Teachers may use students to evaluate software not having as they thought time or skill to do this themselves. A rather desperate accommodation to the deskilling they were experiencing. Some people inside schools and out lauded the involvement of such students, but their role was really a response to the teacher deskilling that IT adoption represented under the circumstances of its implementation.

One disturbing aspect of this accommodation of teachers is a lack of critical assessment of their own performance that could be seen in how they reflected on their experience. Teachers I talked to seemed unaware of the slippage their classrooms were suffering as they attempted to accommodate to IT. This is an issue that is exacerbated by the advent of IT with the intense political pressures to adopt IT policy. Here again we see an intensification of pressure associated with IT. The pressure on teachers to express their accommodation with IT led, I believe, to an erosion of the ethical standards that are part of their practice. This is hazardous indeed.

As MacIntyre (1981) points out, practices exist within institutions - and teaching of course goes on in schools and school systems. He argues that institutions tend to undermine practices by seeking goods extrinsic to the practice and often in conflict with the goals of the practice. So one way to think about the ethical issues associated with IT is to see that IT plays a large role in the political aspects of education and that what is sought politically may not accord with the goods that teachers seek through their practice.

I am saying that teachers exist in an agonistic relationship to the institutions in which they work. Agonistic is a Greek word signifying a contest - and it is worth seeing what teachers do as often contesting in different ways what passes for received wisdom and desirable action. The goods teachers seek are not unknown to them, but are often tacit and often disrespected by outsiders when expressed - and in any case are often more embodied in action than in expositions of them as many have pointed out (Schon, 1983; Dreyfus, 1979; Freire, 1973). But sometimes teachers accommodated rather than contested: they used IT under conditions that should have been protested or in ways which did not enhance their practice.

## **WHAT IS IN THE PIPELINE: ICT IN THE FUTURE**

ICT in schools is evolving. In this part of the paper we look at two trends which well illustrate the power and the hazards of ICT and set the agenda for the debate that is needed.

### **ICT and the Management of Instruction**

Expectations for ICT have increased as technology becomes available to take over more and more aspects of instruction. Rather than CAI we now have ILS - computer-managed instruction as opposed to computer-aided instruction of the 1980s. There is a large leap here in the application of ICT in schools.

Computer-managed instruction is now commonplace. I do not need to detail the many forms that such management software takes. Such systems are variously called: Integrated Learning Systems (ILS) (OECD, 2001; Underwood, 2002); or Computer Mediated Communication (CMC) (Dore, 2002); or Learning Management systems (LMS) (Nordkvelle, 2003). Along with management of learning has gone the capacity of computers to monitor interactions amongst users and record and store traces of what users do. Such capacities fit well with the stress in school systems on assessment and system uniformity.

Computers enhance the capacity of systems to assess compliance and progression by documenting vast amounts of information about instructional activity in classrooms. Both the use of the program and the results in many cases can be monitored and the data can be used to discipline teachers if compliance and desired results are not obtained. This is not to say that this is everywhere the case, but the risk is there.

This is a development of the automation of classrooms, but at a level of intensity well beyond what we saw 20 years ago. It also places more power in the hands of the institution at the expense of the practice of teachers and intensifies the agonistic relationship between teachers and institutions of schooling. There are research studies to show that teachers are experiencing these agonies increasingly as school systems attempt to micromanage instruction (Black and Atkin, 1996; Olson, 2002).

To take one example of the monitoring functions of ICT, Nordkvelle (2003) notes that learning management systems can collect data on students and make that data easily available to administrators. Such systems are used in schools in language instruction and in distance education.

Now schools routinely gather data on students and they need to assess progress and amend instruction. Without feedback the system would collapse. So collecting data per se is not the issue. But what if these data were used for illicit purposes? Or that the collection of the data wasted time that could have been put to more productive use.

So on what basis can the judgment of illicit monitoring be made? When is gathering data about students and teachers illicit? In order to know this we must consider the purposes for collecting this data. The judgment of illicit use will have to be made on a case by case basis where intentions have to be examined. As MacIntyre (1981) and others point out you cannot decide on the good or ill of actions without knowing intentions.

So these must be examined in the case of the use of IT as a means of collecting data. Is the intention that the school system intends to achieve instructional success through enforcing compliance with the use of certain software? Who decided to use this software? Who says this software is valid educationally? How were these decisions made? Who says that school systems should demand and enforce compliance with instructional materials?

In the case of monitoring of instructional events through the use of computers teachers have to ask themselves whether they need this information to assist in instruction? What use is it? Will it allow them to assess the worth of the instructional materials viz. a viz. their educational goals? But there are larger questions at work here. Monitoring may or may not be useful, but are the materials themselves valid? Is this what they want their students to be doing?

Management of instruction can take other forms. Take the use of templates for presentation, for example. Many students are preparing presentations using PowerPoint (PP). Are we in danger of letting this utility shape our ideas of what it means to communicate with larger groups? What danger lies here regarding uniformity based on such templates as PP (see for example Tufte, 2003)? Here again we see the power of IT to amplify practice. PP is like overhead projection (OP), but it takes that modality to a different level of impact - the regulating idea behind PP is much more encompassing than what an OP represents.

Major advances in the use of software to promote literacy have been made since 20 years ago. These programs are multi-faceted and go well beyond the CAI of the 80s. Here too issues arise about the way learning is managed. What do we think of literacy software that attempts to develop reading ability, but does not promote writing? As Underwood (2002) notes: "Boys preferred working with SuccessMaker [a reading program] because they did not have to write stories" (p. 119).

Furthermore she found - as did Miller (1994) - that students were most attracted to animation features of the program which had little to do with the text (p.122). Here we see a parallel with PowerPoint - the availability of facilities

which may in fact distract from learning, but are there for commercial/marketing reasons. Are teachers editing out these facilities as the software is used? Is there feedback to makers to suggest that they keep their eyes on the main goals of the learning? Such software raises questions about the role of the teacher as editor and critic in control of what happens in the classroom. As it is, the software has the power to introduce what amounts to noise into the learning situation.

The danger is that there may be pressures from school systems to require certain forms of implementation of ICT which teachers know do not conform to their standards, but are so strongly pressed on them that they cannot be resisted. This is not to say that the standards of the profession must prevail. Teachers may be wrong about what to do. But these standards need to be brought forward into the commons where educational policy is discussed (Strike, nd).

### **The WWW as school text**

The other area of computer power and hazard I want to consider is the internet. Access to the internet has opened up new sources of information and a new means of communication between students and teachers. These technical possibilities have given rise to software utilities which manage internet use. The same issues arise here as they do for those systems which manage learning in the classroom. The question teachers face is on what basis is the system operating - what aspects of instruction are being promoted - what aspects are not. What templates are being used?

What is excluded from these templates? Are the templates driven by technical considerations? ICT is a Trojan horse (Olson, 2000). Instructional commitments are embedded in software - teachers need to disembodify these commitments and examine them: "Look inside the horse," is the message. "Does the instructional system accord with my own priorities?" teachers must ask. This question encompasses issues to do with safety, etiquette and reliability, but goes beyond them to consider the limits to internet use. Is the time students are spending on the internet well spent? Teachers might want to assess what this time actually yields.

It is up to the teacher to ask when the internet represents a valid instructional tool. The temptation is to use the internet uncritically because it appeared to promise much. But are those promises realized? How well do different children fare when using this medium? Do some fare less well for want of help? Can teachers realistically provide the help needed under prevailing school conditions? Are schools such that media like the internet can be used fairly? This is more than just asking about allowing access to safe sites; it is about issues of equity and opportunity costs of using the medium.

The proposals for ICT use seem to me to suppose quite ideal classrooms the like of which are scarce. Are teachers being set up for disappointment? I think this question needs to be asked: "Can schools realistically use ICT to achieve the goals that are promised?" (see Carvin (2002) for a discussion of this issue). Are those goals valid? The capacity for teachers to engage in discourse with school systems is being eroded not the least because of power imbalances as these systems seek to manage teachers rather than engage in discourse with them (Olson, 2002). So the trends are not encouraging if we value what teachers have to say to educational practice out of their traditions.

## **ICT AND THE ETHICS OF PRACTICE: WHERE NOW?**

So where do these concerns about power and hazard leave us? School systems are moving to what is called systemic reform (Black and Atkin, 1996) in which all aspects of reform are managed by school systems and their experts. In a review of literature documenting teacher reaction to such reform efforts (Olson, 2002), I noted that elements of the process are irrational because they are insensitive to critical differences in different parts of school systems and regressive in relation to teacher skill as well as being in some cases technically unrealistic. Here again the demand for system technical uniformity overrides teacher traditions of practice. The systems are in effect promoting irrational methods much as industrialists did in seeking to automate production as Noble noted. Policies for ICT are taken up in these reform efforts and teachers are involved in a major way in assessing these policies and responding to them.

MacIntyre (1981) argues that traditions - such as those that inform the practice of teachers - provide the moral framework in which to assess questions of educational policies as they affect instruction. However, more needs to be said about the process of debate: Can there be a fair and reasonable debate about educational policy in which teachers can participate? Such a debate will not take place when there are skewered power relationships. And such imbalances of power now exist between school systems and teacher groups (see Strike (nd ) for a discussion about the settings needed for rational debate about educational policies).

Moral frameworks unfortunately do not always deal with the politics involved in challenging institutions: the problems that professionals face in defending their practice. Teachers need to examine the moral values inherent in their practices and use those values as bases for debate. Not taking up these issues and instead adopting defensive stances is dangerous to the profession. The danger is that defensiveness can be seen by others outside the school as rigidity and play into the hands of those who are impatient with teachers.

Presupposed in this account of practice is a strong capability on the part of teachers to defend their subjects for educational purposes - to have skill in didactics (Carlgren, 1999). How able are teachers to make the arguments they need to make? Strength is needed here, for example, to assess the ICT packages which abound, some of which they are mandated to deploy. Are teachers able to assess these packages? Can they amend them to make them work? Can they strike out against ones which violate their standards of worth and efficacy?

Teachers need to be able to deal with negative feedback as a basis for assessing the work they do (Olson et al, 1999) - the sort of feedback that we saw students expressing earlier as they experienced disappointment. Can they do this? Klette (1997) notes that when confronted with evidence of lack of success teachers may romanticize their work and not attend to the difficulties. The psychic demands of teaching are high and it is not surprising that teachers defend themselves. Some of what they say is intended to manage perception more than an actual accounting of their reaction to difficulties. Nonetheless, it would serve teachers well if they had a more robust ability to communicate the nature of the difficulties they face and how they deal with them.

What can teachers do? One thing they can do is point to the irrationalities involved in the press for ICT in schools and to the gap between expectations and the system's capacity to deliver. Most importantly, they can point to the ethical problems that exist in this unilateral pressure, and go on to debate with institutions the validity of the policies that are proposed. Teachers need to mobilize the moral bases of their traditions of practice to challenge school

systems to engage with them in debate about the validity of school reforms and the allocation of resources.

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