Like tomorrow, the next generation never comes

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**Discussion Schedule**  
Discussion: 23 Nov. - 2 Dec. 98  
Summing up: 3 - 4 Dec. 98

**Pre-discussion paper**

With each successive generation of new educational technologies the dawn of a revolution in teaching and learning is heralded. There have been many such dawns in the last 30 years, during which the desktop computer and the Internet have been developed; but there have been similar dawns throughout the century - film, radio, records, broadcast television, audio-tape, videotape, programmed learning machines etc. Each time enthusiasts have announced the transformation or even the end of the school/college/university. In fact, the impact on the bulk of teaching and learning has been minimal. Developments in paper/printing technologies have had far more influence, with the consequence that face-to-face discussion and paper resources still dominate public education. Audio-visual media have been treated more as an icing-on-the-cake than as something at the very heart of learning - and likewise their long-suffering support services (though the new media, particularly video, have fared somewhat better in the development of corporate training programmes).

Is the current information and communication technology (ICT) revolution different from earlier audio-visual 'revolutions'? Possibly. Probably. But its success in public education may be compromised (yet again) by a failure to learn from past mistakes. As usual we have the problems of compatibility, standards changes, reliability, portability, flexibility, costs of access, obsolescence, inappropriate use etc. These are probably not insoluble. More deeply entrenched we have next-generationitis (hang on in, the solution is just round the corner) which impedes proper investment and embedding; we have failure to empower teachers (with those who provide and support technologies manouevring to retain their control, often only interested in working at the next technological frontier) which impedes autonomous use and wide diffusion; we have teaching staff who cannot use an overhead projector effectively, never mind use text-based cmc or combine text and images in a computer package (and who have never even learned to design reliable
multiple choice tests on paper, for example) - which discredits change through poor quality and failed effort.

I exaggerate for effect - but not much. There is, of course, excellent practice around on a continuum from the use of paper-based technologies through to today's frontiers on the Internet. There has always been excellent practice, but it has tended to remain, stubbornly, in limited pockets of expertise - often widely acknowledged, but still pockets nonetheless.

My question is, will we ever make ICT work for us ubiquitously in education - not just for interpersonal communication and data transfer, but in core teaching and learning - if we fail to make 'old' technologies work ubiquitously first? In other words, is in-depth pedagogical experience using old technologies (text, graphics, audio, film, video etc) a precondition for effective use of today's ICT? After all, multimedia is itself a mixture of all these old technologies, combining familiar methods with an unfamiliar rigour. And what implications for strategy, for investment, for staff development, for implementation, emerge from the different ways this question is answered?

Post-discussion summary

I was stimulated originally to propose this theme by a common perception that educational technologies have never really enjoyed the success that proponents of each new wave of technology have prefigured in their sometimes apocalyptic depictions of the "end of the teacher/school/university" and the dawn of "a new age of learning". Although the power of computer technologies seems to suggest that it could be different this time around, we might nevertheless be in danger of committing the same error that has hindered adoption of previous technologies - the mistake of "always looking into the future in expectation of a revolution that will liberate us and make everything suddenly easier." I asked, "Are champions of technology like ourselves guilty of this - a kind of laziness, of not really facing up to now, of avoiding the tedium of making what we have work well because it is more fun to work at pushing back the frontiers with the few explorers rather than to make the plains flourish?"

Ken Kahn came in quickly with a shot of technological optimism and the rhetorical question, "Should the world have mastered horse and buggy before proceeding to using automobiles?" As a matter of fact horse and buggy had been mastered. In those days change was slower, and I retorted, "Of course, technologies themselves build on previous technologies - at an ever increasing rate, and that is the problem. Are teachers keeping up with the changes? Are they making use of all the educational technologies that are available to them to facilitate learning?" Or is someone whispering, "Don't bother to learn to use a car, because helicopters will soon be cheap enough, and will solve all the problems of traffic jams?" Thus because of the rapid pace of development in educational technology, teachers never stop to learn to use any technology to its full potential.
The technological optimists tried to sidestep the question: it doesn’t matter whether teachers learn to use the technology, because as Ken Kahn put it, "Before there were books, it was very hard for someone to learn without a teacher ... I think the new technology represents real progress in enabling people to learn." Similarly, Arun Tripathi suggested that computers would completely replace teachers. P.A. Gantt said students "love using the Net for their course work," and Richard Jones thought that the older media were passive, while the new were interactive. Joe Beckman found some of this optimism represented a rather narrow view of computers. He argued that the teacher’s use of the computer can have a more significant impact on student learning than student uses, "whether because of teachers’ personal growth, professional expertise, or emotional development, or because of the relatively naive use of computers by students in lieu of more challenging tasks." And James Carr pointed out, "student surveys reveal that the majority still want a tutor to be on hand to answer questions and prefer a 50:50 mix of traditional and multimedia tutorials."

Likewise, Samantha Hobbs challenged Arun Tripathi’s claim that teachers could be completely replaced by the new technology, arguing that interaction with peers and teachers is vital. Such interaction may not always be possible, suggested Chris Eliot, even though it may be desirable: "I would not compare intelligent tutoring systems to the best human teachers or even to average ones, but there are quite a few terrible human teachers who are probably worse than nothing and definitely worse than a good computer tutor." And quite a few participants including Samantha, pointed to the significance of computers for enabling remote student-student and student-teacher dialogue.

Some further questions to the optimist position were posed in a thread that followed a philosophical/sociological level of debate, set in motion by Ruth Crawley and followed up by Martin Owen, which pointed out that learning is situated in social activity and suggesting that technology can hide "layers of management and control". In other words, the technological liberation of learning could be an illusion. I asked if this could be avoided: was this in effect a form of technological determinism? If not, how could we guarantee to harness the technology benevolently? Ruth referred to Latour’s (1987) depiction of science as Janus-faced, one face believing that "if we use the right representation of the world we will be able to manage its complexities and hence solve its problems" whereas the other "doesn’t know what the problems are ..." This is another version of one of the key dilemmas of technology: when a new technology is in its infancy it is eminently controllable but we don’t know what to control; when it is mature it is very evident what needs controlling but it is already too late and we can only at best ameliorate, not cure the problems. This dilemma is sometimes adduced to explain the impression of a ‘technological imperative’. Martin Owen sought to avoid the charge of technological determinism by a touch of (Sartrean?) ontology (via Braveman?): tool and user acquire aspects of each other in the act of use, though "modern technologies... have an even greater tendency to incorporate objectified labour."

What these Vygostkian perspectives suggest is that the notion of educational technology as a great liberator remains problematic; not because of technology per se, but because all
learning is socially situated however it is mediated. Martin Owen explained, "An artefact carries within it a social history, but the artefact by its very existence has created a social history. This is as true for the written text as it is for the intelligent tutorial system." This somewhat philosophical thread did obliquely illuminate the suggestion I made in my introduction to the conference, that expertise with more traditional methods/technologies might be a precondition of success with the new methods. Martin at one point commented that if we do have anything to learn from earlier technologists like Romiszovski, it is the simple message that modalities do matter: text on a web page is still text. Yet at another point he quoted from Winograd and Flores: "When we create new tools we create new conversation." I am still unsure whether these two observations are in contradiction, and I tried to make it more transparent, by rewriting John Milton’s famous jibe at Scottish Presbyterianism "Presbyter is but old priest writ new!" as the question, "Are New Learning Environments but old environments writ new?" This could be a critical question for staff developers as well as philosophers!

Bob Leamnson brought us down to earth with a bang with his off-the-cuff remark, that "No technology has ever caused learning," and I am glad to say the subsequent debate remained reasonably close to terra firma rather than diverging into philosophical notions of causality, though ‘cause’ was at the heart of the discussion as much as ‘learning’.

Mike Collett’s claim that "the book certainly changed learning ... I guess you can argue that the book did not ‘cause’ learning, but it is pretty close," was probably not entirely at odds with Bob’s, "The learner is the cause of learning, all else is facilitation and inspiration ... Good teaching will inspire the young to learn. In my opinion it makes no difference what technology they use." Mike replied by introducing the ‘quality’ of learning, and added: "To observe technologies that enable young children to collaborate to create their own multimedia report of a class field trip and to communicate the outcomes to their community - makes it hard for me to believe that it ‘makes no difference at all what technology they use’!" Clearly technology can enable new opportunities for learning, but I argued that this was hardly ‘causing’ learning and wondered whether "computers encourage surface learning, learning which is not properly integrated into the learner’s version of the world," because they can replace deep mental activity with a superficial interaction with a machine. In reply, J Ure argued that technology can facilitate learning. "Learning is dependent on feedback. Technology provides the loop. Someone else has to provide the feedback." And Scott Overmeyer thought that sometimes, though not always, intelligent software could provide the feedback without the need for human intervention.

Bob rejected any impression he might be a Luddite and moderated his argument by saying, "No one would deny that input and access are remarkably increased by more recent technology ... (but) ... Sensory input alone is not very efficient. A learned interest, a spell-binding teacher, a passioned debate with colleagues, a captivating book, or a website, can provide ‘gating’ signals that make learning faster and more permanent." I would add ‘and potentially deeper.’ Bill Braun and Chris Eliot further amplified this line of reasoning by pointing out that students exposed to the same teacher/technology stimuli - to the same instruction - clearly do not all learn the same amount or even the same
thing. This is because attention and awareness vary, and "prior knowledge affects the true impact of any stimulus."

Thus a constructivist view began to emerge which I further reinforced with a metaphor taken from Karl Popper. In seeking to identify a ‘scientific method’ he rejected the ‘bucket’ theory - that simply filling the mind with facts would lead to explanatory theories - and he proposed a ‘searchlight’ theory - the mind actively interrogating the world seeking selectively for something that fits the puzzle. I added, "On this (latter) model the activity is quite clearly internal and the external elements are merely accidental factors which may or may not be held in the gaze of the searchlight. Only the mind concerned can choose the puzzle pieces." I felt that computer-aided learning easily slipped into bucket mode. Samantha Hobbs found that this metaphor usefully supported the ‘discovery’ approach to learning, adding that concerns that by letting students flow through information they find interesting we’ll lose control of what they learn - thus rendering qualification meaningless - were not necessarily justified: "It is quite possible to define for a student the questions they need to answer....but allow them to find other information to fit their own puzzle too. After all, this is what we, as researchers or problem solvers, do all the time."

In fact, Carol Rice pointed out that "until someone sparks a real lust for an idea or a topic some students will never be stimulated to reflect on anything, or to express those reflections." Indeed, Popper’s ‘puzzle’ (or ‘conjecture’ as he called it) has to be stimulated from somewhere in the imagination, as he himself recognised.

And thus we return to the teacher as central, either as a real person or simulated (objectified/reified?) in a machine. Readers who might have been thinking we have been drifting away from the theme of this conference are right, but we can easily draw a connection. The technical glamour and potential of new technology are meaningless if teachers cannot use it to create sparks, to stimulate conjectures, in students. If skill with a variety of methods and modes of teaching or facilitating learning are critical to such stimulation, and if indeed modalities are relatively unchanged by technology, then my thesis stands: teachers are too low down on the learning curve, and if their pedagogical skills with a variety of individual media leave a lot to be desired, how can we expect them to suddenly jump the gap to multimedia? If their ability to stimulate dialogue, and listen as well as lecture, is weak, what use is computer-mediated communication to them? On the other hand, there is a belief (Arun Tripathi and others) that we can write teachers out of the learning scenario, but I think the debate "No technology ever caused learning" should make us hesitate before entirely throwing our hats into that particular ring.

Let us now return to considerations of what is hindering a well-developed use of the technologies available to teachers. Early on in the conference I posed the problem like this: do teachers have "the ability to use technologies like video, photography, graphics, or the ability to create new forms of assessment around the new media, or the ability to develop pedagogically effective resource-based learning? Without these skills the new technologies like the WWW (which uses all of the above media and methods) may be doomed to the margins, apart from unstructured, serendipitous use (as students may
explore a library for material not on the ‘Recommended’ list) but without the skills to separate the wheat from the chaff (which teachers and librarians explicitly or implicitly supply for print media.)" I did not dispute that there were notable uses of technologies in ‘pockets of expertise’. "But how deep does it go, how ubiquitous is it?" I asked.

George Free suggested that "the main obstacle to (technology’s) full and proper use.....is the social organisation of the schools." In particular he identified traditional, prescribed curricula as preventing teachers and students from exploring meaningful activities with both new and old technologies. Passive students and rigid course and class structures made it difficult to go beyond standard teaching practices. To break out of this vicious circle Bernard Harris suggested that there "needs to be continuous, appropriate teacher-training which links technological capability with modern learning theory and practices its blending in new forms of curriculum development and classroom management." (Though George pointed out that a barrier to doing this successfully in universities was the low status accorded to teaching in relation to research.) Bill Braun agreed that traditional attitudes were a problem: teachers’ technophobia was itself "merely symptomatic of a deeply ingrained model that a teacher’s job is to teach." On the other hand, Martin Owen pointed to the hermetic nature of classroom teaching and lecturing, observing that teachers are probably "the most disconnected group of professionals in the world. They work in secret worlds of classrooms where other teachers rarely see them work.....'Teachers talking with teachers’ is not a well structured aspect of the profession. Why should we expect new ideas to get through?" Indeed, teachers have not always been assisted in developing their skills by those who are supposed to support them, as Barbara Ross commented: "Time was when the classroom teacher was not even allowed to operate such 'technical equipment' and the man from the audio-visual department had to come to the classroom." Is the story apocryphal of the college where a Super-8 cine camera was kept in a glass case, to which only the principal had the key?

There was a potentially interesting thread that remained relatively underdeveloped - the conflict of social contexts in which technology is used (though it was discussed in a more abstract, philosophical form). Dale Havill asked, "Does the glowing tube evoke some deeply seated expectation of easy entertainment, or otherwise inhibit what has been considered constructive intellectual activity?" Indeed, I have long been highly critical of the demand that educational videos and television aspire to ‘broadcast standards’. As Martin Owen pointed out, xerography revolutionised teaching because it made "mixed ability and locally produced teaching resources possible. This changed practice and expectation completely." So if customised printed resources well below ‘publisher standards’ have produced a revolution, why not in other media? If we can likewise empower the teacher, the intellectual author, to use other technologies so readily and without ‘support’ staff demanding to supervise them perhaps we can further change ‘practice and expectation’. Above, Dale points the finger at students having domestic expectations of the ‘glowing tube’ (feet up, switch off the mind) if it is used similarly in educational settings. If printed learning materials were produced in the guise of a popular magazine, would we likewise stimulate an ‘expectation of easy entertainment’?

Understandably, high-cost production demands high sales/large audiences. This in turn can demand an element of ‘dumbing down’ or simplification of the material. In print
media, the concept of ‘fitness-for purpose’ is well-established, and teachers both use and produce a range of materials within a broad spectrum of surface qualities. This may be equally possible with media other than print, but is use of these other media far too conditioned by their use for entertainment purposes at the moment? Are we too much under the spell of the professional ‘producer’ and the ‘slick production’? If we could break the spell, would it help liberate teachers into these media?

Looking at it from another angle, we cannot ignore the learner’s awkwardness with unfamiliar methods. Chris Jones commented, "Learners constantly need help, reassurance etc. In their use of technology people left to their own devices often fail to use technology at all, even an old technology such as a library." This is possibly even more true for ‘non-traditional’ students. There is some evidence that discovery methods, project work, portfolios etc. are problematic for those for whom ‘study’ is something new. The new methods, trumpeted for increasing access, may actually militate against those students’ success. More research is needed. But again, the concept of fitness-for-purpose might help.

Bob Leamnson put his finger on another aspect of this ‘student learning ability’ problem when he proposed what he called a ‘strongly dichotomous question’. Does (new) technology work better at providing education, or at accommodating the previously educated? He added in explanation that "Cunningham and Starovich (American Educator, Spring/Sumer 1998) have clearly demonstrated that reading in and of itself provides a positive feedback. People who learn to read well do more of it, and people who read more learn more. This same question now needs to be posed and answered vis-a-vis newer technologies." And what if it turns out to be not so true of newer technologies? Mike Collett argued, "The key is balance....it is foolish not to make best use of existing technologies where they are appropriate but equally foolish not to also prepare for the future." But without studies like the one above on how technologies interact with learners to help to create the motivation to learn, how do we know which is ‘appropriate’ and which not? Peter Kandlbinder sagely observed, "Those who choose the teaching methodology need to be open to the idea that in certain circumstances older technologies may offer higher quality learning experiences than newer technologies." Maybe this is always true, when the newer technologies become older as the frontier advances! In which case, it is more than just disappointing that the newer older technologies (like video) are not more used by teachers, it is tragic!

We have now come full circle in the discussion, which participants will recognise I have pulled a bit out of chronological order to assist sense and clarity of argument for those readers who neither participated nor lurked. But what is chronological order in an asynchronous conference using standard email? I suspect if I tried to write this summary again I would come up with a slightly different spin on the same discussion. It is not unlike the writer B S Johnson’s famous novel (just re-issued) which came dismembered in a box, and the reader shuffled the sections before starting to read. Each re-reading produced a different version. Perhaps in a future conference we could have six summarisers and produce a whole edition of the journal dedicated to those six different write-ups. Would not that be a fascinating study in its own right?
But this is not the thought I wish to leave you with as a result of this lively conference and my summary of it. I prefer to hand the epilogue to Marlene Perkins, Training Specialist at Sony Electronics Inc, who came in close to the end of the conference to ask some highly pertinent questions: "Technology helps us to deliver more personalised, timely, service to students. It’s the definition of quality for existing and coming technologies that we need to define. What is quality education in today’s global society? What is quality use of technology in educational delivery?"

Indeed. Touché. Maybe the topic for that ‘B S Johnson’ conference?

Acknowledgement

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