The 'new art' of the knowledge-age business education teacher: Technological finger painting and collaborative modelling.

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Teaching like all other human endeavours, is not static. The process for shaping the next generation is evolving, along with the society as a whole. The nature and role of teaching are inextricably tied to the expectations that we have for students, to our understanding of the way that humans learn and to our beliefs about how adults, particularly teachers, can guide young people in their learning.

(Hargreaves, Earl, & Ryan, 1996)

A FRESH CANVAS

With this conference theme considering teaching as art - and taking the notion that before us is a fresh canvas – what as business educators will our 'artistic response' be. More importantly at this point in time what does it need to be?

It is argued in this paper that a fresh canvas demands a fresh art also - and the transition to this new art form may present a considerable challenge for some. Significantly business educators in the main have been aware of the extent to which technology is reshaping business operations and while there is a measure of challenge simply in keeping pace with 'new technologies' business educators have generally embraced these developments – particularly in the use of software applications. However as indicated by Kupritz (2000), "[i]nformation technology is changing so rapidly that we are behind in developing pedagogy to guide our experiences with technology" (p. 13). This paper therefore argues that the more significant challenge confronting business educators is in relation to pedagogy and in particular how we collectively come to understand what it is to be an educated person in the 21st Century (Bereiter, in press; Brown, 2002). Indeed how do individuals need to be equipped if they are to be suitably enculturated as full participants in knowledge-age work practices (Brown, Collins, & Duguid, 1989; Lave, 1997; Lave & Wenger, 1991).

The New Zealand Commercial and Economics Teachers Association's website quite correctly identifies that we are "educating young people who will be significantly different!" It will not come as a surprise to you if I suggest that much of this difference will be accounted for in terms the perceived mediating effect of technology on social and work practice. Without doubt any new fresh canvas will include digital components in large measure and the possibilities are still just being imagined. As Neuhauser, Bender, and Stromberg (2000) indicated "[e]ngineers developing the new communication systems predict that in a few years today's tools such as e-mail and video-conferencing 'will look as primitive as cave paintings'" (p. 175).

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POSSIBILITIES

In considering the technological possibilities in relation to new canvases - we obviously recognise the increased use of flat screen panels be it for televisions or computer monitors. Xerox's Palo Alto Research Centre is currently working on document displays that are thin, flexible, and portable like paper – but they can be connected to a network and written to thousands of times or alternatively interfaced with PDA's and mobile phones or used to provide wall size displays. In commercial use too is an electrically writeable and erasable Smartpaper™ (www.gyricon.com/technology.asp) and three dimensional printers (www.zcorp.com/home.asp). While mobile phones and PDA's have had graphic and video capabilities for some time, a new generation is being developed to project holographic images. Our clothing is being 'wired'! We can have computer displays embedded in our glasses - our shoes can be 'smart' adjusting their rigidity to the terrain we travel. The humble fridge can display the Internet and can be networked to other appliances such as the washing machine (unfortunately it still won't sort the washing and do the ironing). Cars, though typically not the cars I can afford, come standard with Global Positioning Systems (GPS) and DVD entertainment centres to placate the 'are we there yet' syndrome. In going to the Olympics use the

I-Navi PDA based navigation system to help you find your way around Athens or many of the world's top destinations. Another novel approach sees a mobile phone embedded in a wristwatch and by putting a finger in our ear, the bones of the hand conduct the sound from the 'watch-phone' to the ear. Other researches have developed a mobile phone that can be inserted (via a dental treatment) into a molar, with the bones of the jaw transferring the sound to the inner ear. Technology revolutions come in two flavours: jarringly fast and imperceptibly slow. We need recognise that with any advances we will have the quirky as well as the significant and there is a need to discern between what is novel and what is important.

It has been said that the 1980s were the decade of the PC, the 1990s the decade of the Internet. In the first decade of the 21st century William Halal (2004) writing in *The Futurist* suggests that we are at another major cusp in terms of technology development through the convergence of natural voice recognition softwares and flat panel screens. He suggests that this "should allow people everywhere to converse naturally and comfortably with life-sized, virtual people while shopping, working, learning, and conducting most social relationships" (p. 30). The car navigation systems we discussed will often prompt us with a voice to direct us which way we should go, or if we have missed a turn. Like me you may have already engaged with natural voice recognition software when wanting a phone number or most recently when I needed technical advice to help me install broadband cable at home in tandem with a wireless network. The initial filtering was done in conversation with a cyber-being until the artificial intelligence couldn't cope with my questions and thus transferred me to a real live person. Verbots or answer agents as they are also called are beginning to populate the Internet allowing for more 'personal' interactions and responses. So too they can be called upon at any point for a variety of tasks. Ananova for example, will read the news, just to you, any time you want! Yuki Terai is a virtual rock star who has a cult following. Now while I do not doubt that these technologies will make a significant - though often frustrating mark I am personally not convinced that this is where the major technology impact will be - we will return to this subsequently.

GATEKEEPERS OR GATEWAYS?

Just a few years ago I was speaking to a delightful elderly gentleman who suggested to me that all the problems of youth unemployment would be addressed if every student learnt to shoe a horse and splice a rope. These skills no doubt served him well in his era but they are clearly out of sync with current demands – not least of which is that there are simply too few horses these days to maintain a school program. Charles Handy, the well known management writer related the story of his son's training to become and actor. The son spent three years at the drama college learning the supposed 'craft' of an actor – how to strut the boards in a traditional sense, only to learn upon graduation that if he wanted to make enough money to eat he needed to do television work – something not covered in his training. How tedious to learn something for three years only to find that the skills provided are out of step with the current demands of the field. The greatest disservice we could do to students would be to sanctimoniously hold to a view of what is right and proper in terms of our art of teaching versus what is right and proper in terms of student learning and of equipping them to contend with the emerging knowledge. A great disservice would be to teach in a way that bears no relationship to the work of those engaged in professional practice. And indeed some times teachers, isolated from the field of practice, can become the keepers of tradition – the keepers of past practice rather than preparing students for emergent or, even current practice. Confronted with the fast paced changes, often driven by technology, we need be mindful that we do not similarly provide our students skills that are equally tantamount to those of shoeing horses and splicing ropes. In relation to the unimportant debate concerning the relative merits of face-to-face verus virtual learning abound, we need recognise that the most 'virtual' learning experiences possible (that is detached from reality) often takes place within our face-to-face classroom contexts – with teachers engaging students in an erroneous distorted view of the world. Sadly there are those teachers, who while espousing notions of the need for lifelong learning for their students have not embraced it as a principle in their own lives - they know all the answers, albeit to what now amount to old unimportant questions. In our own approaches, are we gatekeepers of the past, because it is the proper way to do it - or are we gateways to the future - remembering our students are destined to a different world than us.

THE TRADITIONAL ART

Traditional views of teaching within the analogy of art would typically place the teacher as the painter, the student(s) as the canvas, the paint as knowledge imparted to the student(s) and the painting as the some total of the knowledge and understanding that the student eventually has. The painter's brush strokes perhaps being seen as the learning activities blending and shaping the students final understanding. Implicit here is that the painter (teacher) will have a strong vision of the finished painting and in the process translates the vision to the canvas – the canvas is seen as a passive recipient of all that is applied to it. Perhaps in this style, better artists will in some measure be sensitive to the role of the canvas, recognising that such things as, the texture of the canvas and that the degree of humidity in the air can give life to the painting with unexpected effects resulting when the paint is applied - also that these effects can be incorporated into the developing

image. There will be those artists too, who have become less concerned with the demands of brush work or the canvas and liberate themselves to a freer approach dispensing with the brushes and instead hurling copious quantities of paint, as per the old adage, that eventually something will stick!

This notion of painting the blank canvas – where there is some discrete body of knowledge that can be somehow transferred has been with us for centuries. Approaches to teaching and learning often reflect the paradigm of work and employment at the time. The essentially mechanistic transference of knowledge has been especially ingrained in the past couple of hundred years where our education system, borne of the industrial age (and still much influenced by the approach) sees us essentially batch processing students – doing something to them each year as they progress through the factory until we endeavour to determine their worth for life against some sort of arbitrary measure - measures that also may be erroneous for the time. Often the processes in these 'school factories' have little to do with what awaits these students at the end of the production run. Thankfully many business teachers, because of their career trajectory, come to teaching with a lived experience and seeing the short comings of the highly virtual experience provided by text books look to ways to enhance the real learning for their students beyond the classroom. In making this comment I am not advocating that this is the only or necessarily the best path because work experience can be equally problematic to subsequent teaching if there is not adequate reflection of the new world of work. More important in my view is the extent to which we critically reflect upon the skill set our students will need.

The industrial age, process view of the school, draws to it the allied economic models that view teaching, teachers and yes students too, in terms of inputs and outputs. Just as machines (and certainly computers) have replaced or sped up the work of humans in manufacturing, administrators wishing to achieve the same output (students processed) with less input (teachers) have seen the wonder of technology. I am able to illustrate this quite graphically with an experience of my own. While working at a TAFE Institute, and given I had developed a mix of face-to-face and online approaches for my own students, I was asked to undertake an internal consultancy and report on the introduction of online learning approaches for this particular TAFE. In broad terms my final recommendations related to fostering small cycles of experimentation such that staff saw the opportunities possible and that over time we would develop capacity both as a staff and as an Institute. It was told to me that when the Director received the report and read the recommendations he literally threw the document across the room wanting to know how this 'rubbish' was going to help him. Albeit, that he had absented himself form every discussion leading up to the compiling of the report what the Director had apparently wanted was somewhere that thousand of 'any time – any where' students from all over the world could log on, study, and pay handsomely for the institute 'amazingly innovative' online approach of essentially information dumping – seemingly in a teacher free zone. That particular director was last heard of trying progress training initiatives in a mine in the highlands of Irian Jaya.

The desire to shortcut learning through technology is not new. There was of course the mythical Nurnberg Funnel – a device that allowed wisdom to be poured into the minds of the learner. A vision of the future in the year 2000 was seen in a 17th century woodcut where books were fed into a shredder device, and being wired to heads of the class allowed for instant learning of all the material the books contained. Currently in this similar vain we can find 'learn while you sleep' products and in a relatively recent film, The Matrix a scene shows the downloading via a mobile phone, the skills needed by an individual to fly a helicopter. While we might recognise the far fetched notions of these devices, even within what we might call mainstream technology the capabilities have been typically overstated. For example with regards to the use of educational film and television:

> I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks. It is possible to touch every branch of human knowledge through the motion picture. (Thomas Edison, 1922)
>
> The well-planned television program can motivate students, guide and sharpen their reading by providing background and demonstrations encourage responsibility for independent learning, arouse curiosity and develop new insights and the excitement of discovery. A school where these new devices are in use may find itself bursting out of old patterns (Asheim et al, 1962, p. 5)

Film and television have changed the way we perceive the world and have allowed society to gain insights and understandings that they would never have otherwise. However film and television did not prove to be the panacea for learning that was found in the rhetoric at the time of their introduction. Similar rhetoric and failings have been evident in relation to all technologies. Not surprisingly there has been a great deal of over inflated rhetoric surrounding the introduction of computers and in relation to the possibilities of Internet mediated learning. Computer based instruction as a means to speed up the transfer of knowledge were an abject failure and so too will be Internet approaches in the ilk of my TAFE Director where again it is meant to somehow shortcut the learning process – where we see learning as some sort of 'delivery' process. The click of the mouse and using a web browser as an electronic page turner or

skill drills are hardly engaging learning and these approaches are destined to fail. While to some extent it may sound like I am 'bagging' technologies in general – nothing could be further from the truth. What I am concerned about is the inappropriate use of technologies or the misapplication of technologies. Film, television, text books and other established technologies when appropriately integrated into learning are important elements in that learning. Generally early efforts - as has been the case with Computers and Internet mediated technologies - focused on satisfying the industrial input/output model with a view to efficiently 'delivering' or more particularly 'dumping' information. While technology is indeed one part of the equation, far more critical is the change in mindset educators need to make if we are to enhance learning with technologies – a paradigm shift in thinking is needed.

COMPUTERS, TELEVISION AND FINGERPAINTING?

So what is the way to move forward? Those who have dabbled in art (or writing) will appreciate that there is nothing more intimidating than a clear, white, stark space to which we are asked to apply and demonstrate our knowledge, skill and passion – that is, to show our art. In being challenged with a new canvas, the risk is that we will be so cautious we will simply work comfortably within ourselves - calling on our existing expert skills - particularly when these skills have been deemed to have produced good art in the past. However any replication of our past style will likely generate a 'work' that at very best will be judged as being passé and at worst totally irrelevant – in the ilk of horse shoeing and rope splicing. Or if we simply make a notional effort in an attempt to be a part of the avant-garde (the forward thinking) we may be tempted to overlay 'in-trend' media to our existing artistic style in a flimsy veneer of progress – a forgery of the necessary new art! Indeed as Laurillard (2002) admonishes "[w]e have begun at last to play with digital technologies as a way of meeting the demands of the digital age, but with an approach still born of the transmission model (p. 141).

Our perceptions of the way forward may be seen in how we respond to a question asked by Resnick. That is, which of the following three is the odd one out, computers, television or finger-painting? To some finger-painting might seem to be the most obvious choice, particularly given the prior discussion here relating to technologies, however, it is argued that we need to see computers akin to finger painting rather than the mere delivery of information such as that provided by televisions. Technology needs to be employed more as a 'tool to think with' (Bereiter, in press) and as affording a space for collaborative exploration rather than merely as a window to a range of pre-packaged information, a metaphor of use where computer technology and online communications is more closely analogous to finger painting than to television (Resnick, 2002) - where the major focus is on the building of conceptual artefacts rather than on the completion of tasks and/or the passive reception of pre-packaged ideas (Scardamalia & Bereiter, 1996, 1999). That is, the technology should allow for the active and creative 'messing' with ideas rather than the mere passive reception of ideas. This also highlights the important distinction between previous technologies and our current use of computers and Internet mediated communication. As Jonassen (1995) argues "[u]ntil we reform our conceptions of learning, technologies will continue to be delivery vehicles and not tools to think with". We need to see technologies as being something that we, together with students, use to explore and fiddle ideas and understandings.

There has been a significant shift from the transmission metaphor of learning (where the student is viewed as the passive canvas) to participative approaches (problem-based/case based/child centred) and more latterly to knowledge building approaches. For example Scardamalia and Berieter (In press):

> In what is coming to be called the 'knowledge age' the health and wealth of societies depends increasingly on their capacity to innovate" People in general, not just a specialised elite, need to work creatively with knowledge. As Peter Drucker put it "Innovation must be part and parcel of the ordinary, the norm, if not the routine" This presents a formidable new challenge: how to develop citizens who not only possess up-to-date knowledge but are able to participate in the creation of new knowledge as a normal part of their lives.

An ANTA National Industry Skills Report (April 2004) states:

> The networked society is here. The more structured society of the 20th century is being replaced by one where, networks, relationships, knowledge and integration will be the key features of success, both economically and socially. The way we work will fundamentally change. The context within which learners learn and enterprises skill their workers will also change. (p. 2)

Twigg and Miloff (1998) comment that:

> [t]he digital learning infrastructure is not intended to replace all traditional pedagogy, but rather to expand and transform it, creating a new blend of face-to-face and electronic interaction. Instead of being eliminated, traditional forms of teaching are revitalized. (p. 192)

A DEST report entitled Australia's Teachers: Australia's Future (2003) highlights the need for students to learn the skills of innovation and creativity and emphasises that the school of the future will:

- belong to the knowledge era, not the industrial era;
- exhibit new norms around questioning, trialling, evaluating - surmounting the old boundaries of rules and regulations;
- exhibit a radically changed design;
- nurture creative thinkers; and
- find ways to engage all students in learning that will become lifelong.

CALCULATORS, MOBILE PHONES & PDAs

Thirty years ago I purchased my first calculator and with the 10% student discount it cost me $180. Today you could probably find a calculator with the equivalent capacities in a Two Dollar shop, or given away as some promotional novelty. Remember the debates (some still continue them) about how calculators take away a students capacity to think. Calculators didn't though radically reshape education - they sped up the calculations and made learning more enjoyable and good educators continue to ensure students understand the principles. Indeed because students can process tedious calculations quickly it generally allows them opportunities to explore more and deeper mathematical ideas.

If you have a teenage son or daughter it is likely that you have already lost the debate re the need for them to have a mobile phone. Like me you may be intrigued to see 'Generation Y' using mobile phone technology to maintain far more fluid and consistent connections with their peers. Text messaging scores of communications in a day and while I struggled to learn to touch type these individuals touch text, where a key may represent three or four functions at a time. Already schools are having problems with these technologies – many taking what they see as appropriate action to curb their use. I am going to suggest to you however that this generation's use of the mobile phone in fact epitomise the connected networked society spoken of in much of the literature. Mobile phones represent what will be in my view the most significant trend of this decade – personal, wireless technologies and anywhere, anytime, capabilities. Like calculators, mobile phones or their derivatives will be ubiquitous.

The anywhere, anytime, any device capabilities of these phones are quite staggering – the penultimate test is that we can buy a Coca Cola from a vending machine with a mobile phone - and within the very near future will book hotels and travel. Embedded into these phones also is the bluethooth technologies, allowing data transfer between devices, within about a 10 metre radius but also generating new forms of distributed social connection. In a variation on and old theme, potential daters can now subscribe to a service that stores their personal profile, photograph and details about their perfect partner. When two phones (signed up to the system - symbian) get within a few metres of each other, the service compares their likes and dislikes. If there are enough similarities, the phones exchange personal details and photos, and indicate to their owners that it might be worth breaking the ice. A more speculative group of users on the London Underground known as "toothers" use this same technology to set up casual trysts. And if that is not enough for you, many of these phones have capabilities that indeed James Bond would envy – capable of taking videos playing music, sending emails surfing the net and running versions of Microsoft Office software... and interestingly you can also make phone calls!

These devices now essentially half the cost of my trusty old calculator and are destined to continue to fall in price to meet the Two Dollar Shop requirement. More importantly they provide what Walery (2004) believes is the one-to-one ratio – one student to one electronic device – that is necessary for true technological innovation in education. "By using handhelds, we can get technology to the point of learning such as on the bus or on the athletic field" (Walery). My own doctoral supervisor Dr Rod Nason of QUT is working with primary school students in maths classrooms where the students use PDAs to develop their mathematical ideas and then share their understandings with others via the Bluetooth link. As business educators we should appreciate that with PDA type technologies students already have on board one of the longest established mind tools – spreadsheets that enable the answering of 'what if questions'!

What if indeed! While our initial response to such technology approaches in the classroom (and beyond) is to see them as being somewhat 'pie in the sky' or of dubious value, I recall listening to David Loader some twelve years ago who as Principal of the Ladies Methodist College in Melbourne introduced the world's first 'laptop' program to the school in 1989. Some at the time may have bemoaned the erosion of cursive writing skills, few would now contest his foresight. He had a vision that he was educating young people who would be significantly different! No one thinks twice now if someone drags out a notebook computer at a meeting. My wife, using her wireless network enabled laptop, accesses her email, conducts searchers on the Internet or links to her office network where she can share files with colleagues – all while sitting watching TV at home if she so chooses.

CONCLUDING THOUGHTS

What then will a knowledge-age view be of the canvas and the art of good teaching? The most radical departure is that the canvas is no longer the students to which paint is applied. The canvas now needs to be seen as space where both teachers and students co-create knowledge and understanding – and it may be that a pivotal 'brush' in this process is the now ubiquitous mobile phone and its increasingly powerful derivatives. Above all though there must be

a change in the notion of what constitutes the art of good teaching. The last thing we want is 'art for art's sake' and poor art at that. Unless we are willing to understand the difference the risk is that we continue to apply the same art –irrelevant at that! We need to be driven by the fact that we are 'educating a generation that will be significantly different from ourselves'.

I am old enough to remember dollars and cents day – the day when the shift was made from pounds shillings and pence to the decimal system. While clearly there was a great deal of planning went in prior to the event, the day did effectively see the cessation of one approach and the beginning of another. Let me suggest to you that there will not be a specified day when governments, education departments or schools are suddenly going to make all the resources available to you and have provided you with all the appropriate training – where you feel comfortable with the change. You need to build your own capacity to change.

Are we in our own way going to continue to show students how to shoe horses, to be a gatekeeper of the past - or are YOU going to be a gateway to the future for your students?

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