A ICT 'Literacy' Revisited:or What the Literate Citizen Really Needs to Know[1]

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Use of the term 'literacy' to describe various sorts of competence in information and communication technologies (ICTs) has been widespread (e.g. digital literacy, media literacy) but this is usually little more than a vaguely defined metaphorical usage. The paper revisits the notion of literacy and uses British educational sociologist Basil Bernstein's analysis of codes and of classification and framing practices in order to suggest that there is a desirable form of ICT literacy that is more than a metaphor for a general level of competence. This ICT literacy is characterized as an ability to grasp both the objects of ICT and their conditions of possibility (e.g. with reference to Open Source as a specific configuration of such conditions). Spinosa, Flores and Dreyfus's concepts of articulation, reconfiguration and cross-appropriation are re-defined as framing practices and their strategic importance is argued for within the field of 'conditions of possibility' defining today's ICTs. In making this case, the paper addresses the nature of the genuinely 'elaborated code' that, it is argued, must replace the pseudo-elaborated code of general technical competence at the core of ICT literacy if the ICT-literate citizen is to be capable of meeting contemporary challenges.

ICT - literacy - Open Source - education - technology

L'utilisation du terme 'literacy' pour décrire plusieurs types de compétence dans les technologies de l'information et de communication (TICs) a été répandue, mais l'expression n'est habituellement qu'une utilisation métaphorique vaguement définie. Le texte revisite la notion de literacy et emploie le sociologue de l'éducation Basil Bernstein, et ses analyses des codes et de classification et de pratiques d'encadrement (framing), afin de suggérer qu'il y ait une forme souhaitable de "literacy" dans le domaine des TICs qui est plus qu'une métaphore pour un niveau général de compétence. Cette literacy dans les TICs est caractérisée comme une capacité de saisir aussi bien

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les objets des TICs, comme leurs conditions de possibilité (par exemple, concernant les logiciels "source ouverte" comme une configuration spécifique de tels états). Des concepts d'articulation, de reconfiguration et appropriation croisée de Spinoza, de Flores et de Dreyfus sont redéfinis comme pratiques d'encadrement et leur importance stratégique est plaidée dans le champ des conditions de possibilités définissant les TICs 'aujourd'hui. L'article met en relief la nature du code 'véritablement' élaboré que doit remplacer le code pseudo élaboré des compétences techniques générales.

ICT - literacy - *"source ouverte"* - education - *technologies*

É amplo o uso do termo "alfabetização" (*literacy*) para descrever diversas competências na área de tecnologias de informação e comunicação (TICs), como nos casos de alfabetização digital (comumente, em português, inclusão digital) e alfabetização mediática (em português associada ao exercício da leitura crítica), mas em geral o uso é vago e metafórico. Este trabalho retoma a noção da alfabetização e lança mão das análises do sociólogo britânico da educação, Basil Bernstein, de códigos e das práticas de classificação e enquadramento, para sugerir que existe, sim, uma forma desejável de alfabetização em TICs que é mais do que uma metáfora que descreve um nível geral de competência. Essa alfabetização em TICs é definida pela capacidade de entender os objetos de TICs e suas condições de possibilidade (p.e. com relação à *Open Source* como configuração específica de tais condições). Os conceitos de articulação, reconfiguração e trans-apropriação de Spinosa, Flores e Dreyfus são redefinidos como práticas de enquadramento e defende-se sua importância estratégica dentro do campo das "condições de possibilidade" que definem as TCIs atuais. Ao desenvolver esse argumento, o trabalho discute a natureza do código verdadeiramente "elaborado" que, afirma-se, deve substituir o código pseudo-elaborado de competência técnica geral no âmago da alfabetização em TICs, para que os cidadãos alfabetizados sejam capazes de enfrentar desafios contemporâneos.

TCIs - alfabetização - "open source" - educação - tecnologias

El término "alfabetización" es usado ampliamente para describir varias clases de competencia en las tecnologías de información y comunicación (TICs) (ej.. Alfabetización digital, alfabetización mediática), pero éste es en general apenas algo más que un uso metafórico vagamente definido. El artículo revisita la noción de alfabetización y recurre al análisis de los códigos y de la clasificación y de las técnicas de enmarcar del sociólogo educacional británico basil bernstein para sugerir que hay una forma deseable de alfabetización en tics que es más que una metáfora para un nivel general de competencia. Esta alfabetización tic se caracteriza como una habilidad para captar los objetos del tic y sus condiciones de posibilidad (ej.. En referecia a open source como una configuración específica de tales condiciones). Los conceptos de articulación, reconfiguración, y apropiación transversal de spinosa, flores y dreyfus son redefinidos como prácticas enmarcadoras y su importancia estratégica es defendida dentro del campo de "las condiciones de posibilidad" que definen las actuales tics. Al argumentar así, el trabajo se ocupa de la naturaleza del "código elaborado" genuinamente que, se sostiene, debe reemplazar el código seudo-elaborado de la competencia técnica general que está en el corazón de la alfabetización TIC, si es que el ciudadano que es tic-alfabetizado ha de ser capaz de enfrentar los desafíos contemporáneos..

TCIs - alfabetización - "open source" - educacion - tecnologías

The term 'literacy' has been frequently used to refer to a general level of competences in information and communication technologies (ICTs). It has been popularized by Paul Gilster (1997) and frequently instrumentalized in lists of the constituent competences (e.g. Larsson, 2000). Various policy-shaping initiatives in various countries and internationally seek to define and/or promote digital literacy (see for example the Global Digital Literacy Council) and the notion is often evoked (as something unevenly achieved) in discussions of the so-called digital divide. Critical interrogation of these deployments of the notion of literacy is still relatively rare. Warschauer (2002) is a good exception, challenging as he does the reduction of literacy to skills in favour of understanding literacy as a complex set of social practices. Such broadly Freirean critiques are invaluable in the current context of renewed interest in ICT literacy promotion of various sorts, not least where such promotion is embedded in rhetoric about revitalizing the creative industries (an increasingly frequent refrain of many governments).

Two recent documents demonstrate, in their different ways, how the technological, social and cultural domain of ICTs has seen renewed interest both in this intransigently ill-defined notion of ICT literacy and in reconfigurations of the domain to create new contexts in which such a literacy might be more effective. That effectiveness may be conceived in terms of releasing more entrepreneurial energy, more citizen engagement or more creativity through ICTs, but the common thread is that a wider form of literacy can be developed that will be capable of sustaining such aspirations. Indeed *A Wider Literacy* is the title of the first document – a policy statement and road map from the Northern Ireland Film and Television Commission/British Film Institute's joint Policy Working Group (2004). From the angle of the contemporary screen industries, and of screen education and training, *A Wider Literacy* makes the case (currently proving influential in the UK) for an expanded notion of literacy capable of embracing the new communication technologies generally. The second document is last year's report of the US government-funded National Research Council's Committee on Information Technology and Creativity. *Beyond Productivity: Information Technology, Innovation and Creativity* makes the case for sustaining and extending what the committee sees as

an emerging reconfiguration of the domain to create "an exciting new domain of information technology and creative practices" (Mitchell, 2003: 1) that they label ITCP.

Extensions of the term or the idea of literacy to embrace non-linguistic cultural forms are not uncommon, and indeed analyses of literacy as conventionally conceived (i.e. in relation to written language) have often encouraged this sort of generalization, thus: "it is conceivable that there are general aspects of the analysis which might provide a starting point for the consideration of symbolic orders other than languages" (Bernstein, 1972: 110). We might note, however, that both documents quoted above provide evidence of a larger trend – that of largely ignoring any kind of 'literacy' involved in grasping the conditions of possibility of an object (say a piece of ICT hardware or software or the things produced with it) in favour of advocating 'literacy' in (i.e. ability to use) the object itself, for example to generate new forms of creative practice (ITCP).

Unexamined ideas about computer literacy, or media literacy more generally, are often floating about in discussions of whether ICTs are empowering people or entrapping them in new regimes of power, as if the degree to which some new form of literacy has been achieved is the key determinant in positioning ourselves on that scale – from empowerment to entrapment. The more 'literate' we are in ICTs the more potentially empowered. This notion of literacy's key role and its consequent expansion beyond traditional print-based definitions is too seldom underpinned by clear headed consideration of why a simple equation of that sort has never really worked out so simply in relation to print-based literacy. This has been in part because empowerment and entrapment are less mutually exclusive than bound up with each other by complex mutual feedback loops; but that proves quite hard to grasp without paying due attention to the conditions of possibility of the object in which we might want ourselves and others to be 'literate', whether book or software.

Literacy is a matter of competence in handling the codified resources that mediate access to a language, its rules of deployment and the cultures built with and around it. The British educational sociologist Basil Bernstein,

whose work is so indispensable to any understanding of literacy, spent much of the latter period of his working life defending his theory of restricted and elaborated codes against the easy assumption that restricted is bad and elaborated good; or that facility in the elaborated codes of spoken and written language is inherently empowering. For Bernstein, one code was not deficient in relation to the other; rather both were rooted in a division of labour that produced a restricted code in contexts of production where the context-dependence of the language used was vital, and an elaborated code in contexts of production where context-independence characterized the most useful language. In the social contexts studied by Bernstein (urban Britain in the second half of the twentieth century), these distinctions tended to map neatly onto social class divisions; but they need not necessarily do so in other contexts. Thus, as new contexts of production and class re-mappings evolve in ICT-saturated economies, we have to look beyond the old duality of relatively context-dependent manual labour (restricted code) and relatively context-independent professional labour (elaborated code) in order to include, at least, the new highly context-dependent forms of IT-based production that require what appear to be elaborated codes due to their sheer complexity, based as they are on software and networking that give physical form to abstractions. The language of ISPs, email protocols, 3D modeling, GUIs, operating systems, Firewire devices, wireless networking, SQL databases, etc., etc. is clearly not a restricted one in any useful sense of the term.

In Britain after the Second World War, facility in an elaborated code of English usage dovetailed neatly with the development of an affluent middle class who worked in contexts of production where that kind of literacy was productive. It was the conjunction of class position and code, not the elaborated code on its own, that helped fuel their affluence and, thereby, generated the impression that the elaborated code per se was empowering, contributing to the mystique around literacy as the driver of individual empowerment. Definitions of that 'literacy' changed considerably, from an early emphasis on basics that the restricted code could share to much more abstract notions of how language should be deployed, many of which were so conspicuously class-biased that they propagated the very

inequalities they were ostensibly intended to dispel. This phenomenon - of class bias in the very conceptualization of what counts as literacy - tends to be even more apparent where the concept of literacy is enlarged to become 'cultural literacy', although this has still perhaps been a more deliberate turn amongst some would-be policy shapers in the US than elsewhere (e.g. since Hirsch, 1988).

Translate this way of thinking about literacy into the domain of ICTs and a few things start to become clear. If the notion of ICT literacy is to be of any use to us at all, it will only be as a way of identifying how ICT access, the practices of ICT deployment and the resulting ICT 'cultures' are always mediated by the codified resources that people use to enter (or fail to enter) the domains of ICT-based activity, whether for leisure, social and cultural participation or work. And the codification of these resources may usefully be examined for indications that the restricted/elaborated distinction applies as much here as it has done in relation to spoken and written language. Much of what we see in how people and organizations actually use ICTs can be thought of as their realizations of the codes available to them. If there are new things – new capabilities mediated by ICTs – that we would like to see, the same may be no less true of these as well.

Bernstein offers a further insight that we can borrow. Codes function by regulating the processes that he termed classification and framing. Indeed, in a sense, that function is a perfectly satisfactory definition of the term 'code' in this context. Classification is the power to maintain distinctions, to allocate resources to discrete spaces, to separate categories, to define 'inside' and 'outside' etc. Elaborated codes are based in part on their capacity to maintain high levels of classification, whether it's a middle class elaborated code in England in the 1950s distinguishing between a doily and a serviette or today's (seemingly) elaborated code of ICTs distinguishing between 'industry standard' or 'professional' software and 'consumer' products. Framing is the controlling of access, expectations, deployment of resources, their articulation and configuration, the filling out and management of the 'inside' defined by classification. So in the

two examples offered here, it is framing that saw the English working class's 'erroneous' use of 'doily' instead of 'serviette' once carry deep connotations of social and cultural deficiency (Collins, 2004), and that currently sees training in 'industry standard' software carry such considerable weight as embodied cultural capital, while expertise with all sorts of equally powerful 'consumer' and/or free software running on people's desktops at home counts for little.

So as not to get mired too deeply, however, in this process of translating concepts from the study of traditionally defined literacy into today's notions of ICT literacy, I want to jump straight to applying Bernstein's concepts of classification and framing to an urgent issue in the contemporary world of ICTs. This whole 'world' can currently be represented, for the sake of argument, as follows (Fig.1), with some of the major players in the market indicated here in order to clarify what is at stake.

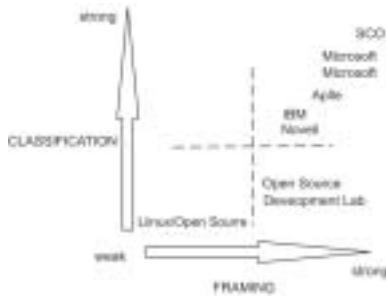

Fig.1. The field of contemporary ICT

The classification of ICT providers is here largely a matter of the degree of insulation of technologies from each other – with highly insulated, proprietary technologies representing strong classification. The interoperability of technologies is not at stake here. Highly insulated, proprietary technologies can still be made to interoperate with each other because the market demands this. The technologies of both Microsoft and Apple operate this way, although Apple's market share is still fairly modest due in part to its historically low level of commitment to

interoperability and the company's almost obsessive commitment to insularity. Sun has equivocated in recent years about whether or not its interests do lie in strong classification but it has recently allied itself more clearly with Microsoft, despite a history of enmity, in part in order to signal its position more clearly in this regard. IBM and Novell, historically major players in the world of ICTs who seemed to belong immovably on the high end of the classification scale, have moved quite clearly down the scale by courting the Open Source movement. Linux, at the heart of the Open Source movement, has never been anywhere but low on that scale, representing a technology so uninsulated that it has hybridized and cross-fertilized in multifarious ways and continues to do so.

Framing is, perhaps, a less immediately obvious phenomenon than classification in this context but it is certainly no less important. Framing in this context is embodied, for instance, in the use of patents to realize the insulation of technologies: Software patents, for example, are an important means by which a position on the classification scale is realized, maintained, defended and actively promoted. Framing, more abstractly, is about *managing* one's position on the classification scale to shape and control the field as a whole. In Bernstein's educational situations, a teacher exercising a high degree of control over learning activities and classroom content was operating through strong framing. Where combined with a highly defined, centralized curriculum with hard, impermeable boundaries around acceptable curriculum content (strong classification), a traditional, conservative, even authoritarian form of schooling tended to be the result. In our context, the result of similarly strong classification and framing is that ICTs are always effectively prone to being controlled by a small number of (mostly US) corporations. And just as the classroom determined the sort of literacy that was possible, so too any meaningful concept of 'ICT literacy' cannot be conceived of outside the determination of the field by the actually existing configurations of classification and framing produced by players on that field – the configurations that constitute 'the real' of ICT today.

It is this context that makes a statement such as the following about

'data processing literacy' so pertinent, and at the same time so unlike the generalities that often characterize notions of 'IT literacy' or 'media literacy':

> The Foundation for a Free Information Infrastructure (FFII) is a non-profit association registered in Munich, which is dedicated to the spread of data processing literacy. FFII supports the development of public information goods based on copyright, free competition, open standards. More than 400 members, 1,000 companies and 60,000 supporters have entrusted the FFII to act as their voice in public policy questions in the area of exclusion rights (intellectual property) in data processing (FFII, 2004).

In Europe FFII is at the forefront of the current campaign to resist extensions of US-style software patents. Their website currently carries the following explanation:

> For the last few years the European Patent Office (EPO) has, contrary to the letter and spirit of the existing law, granted more than 30,000 patents on rules of organization and calculation claimed in terms of general-purpose computing equipment, called "programs for computers" in the law of 1973 and "computer-implemented inventions" in EPO Newspeak since 2000. Europe's patent movement is pressing to legitimate this practice by writing a new law. Although the patent movement has lost major battles in November 2000 and September 2003, Europe's programmers and citizens are still facing considerable risks.

Later it is noted that: "A closed community of patent lawyers is creating, breaking and rewriting its own rules without much supervision from the outside."

This patent movement is a perfect example of strong framing in action in the domain of ICTs and in the service of strong classification. Patent lawyers serving the interests of this worldwide 'movement', focused at the moment on Europe but spearheaded by major US corporations, work to frame strongly the latter's interests through global extensions of US-style patents. The FFII is a weak classification, strong framing kind of organization, seeking as it does to shape how policy and legislation might robustly assure (frame) the maintenance of more 'uninsulated' and 'open' ICTs as public information goods. Otherwise we will see the rampant extension of US-style patents, where an extremely generous attitude to patentability currently grants over 90% of all patent applications in the ICT realm (are Americans really that inventive?). This would ensure that every entrepreneurially-minded invention of new and better ways of doing things with ICTs will only be achieved against the dead weight of having to

second-guess patent litigation risks. The oft-quoted axiom is: It is doubtful whether anyone would have bothered trying to invent a better mousetrap if the idea of a mousetrap had been patented. If most innovation in ICTs could be confined to those with the biggest army of patent lawyers, the process would, no doubt, then proceed to the patentability of ways of using the technologies (e.g. so-called 'business method' patents). Doing things the Microsoft way – as we all already do with Powerpoint, David Byrne (2003) notwithstanding – would become well nigh inescapable (Byrne has imaginatively challenged the hegemony of Powerpoint principles in the visual presentation of information).

The key point that I do not want to lose sight of in all of this is the FFII's – that there is a 'literate' citizen who is capable of understanding these things. Before returning, though, to the task of further defining the literacy thus entailed, it will be useful to complete the picture of ICTs as a field defined by particular configurations of classification and framing. Retaining that perspective – and those terms from Bernstein – will permit our looping back to the question of literacy in due course.

The central organizing axis in this field right now – the axis around which the emerging regime of power will be defined – is the one that links SCO and Linux/Open Source. Those particular actors might not remain themselves forever linked on this axis but the defining axis itself will probably now persist for some considerable time.

SCO lurched in 2003 from a position defined by weak classification and weak framing to the mirror-opposite position it currently occupies. In 2002 SCO (named for a precursor company, Santa Cruz Operation) was trading as Caldera Systems, and Caldera Linux was one of a then proliferating number of distributions of Linux. Linux is, of course, the Open Source operating system derived from the work of Finnish research student Linus Torvalds in the early 1990s. Distributions (or particular 'flavours' of Linux) rap the operating system core in a vast range of other Open Source packages that provide additional functionality – from web serving to running databases – and add an installer so that the end user can load the whole thing easily onto a computer. Dispersed communities of developers work

on these packages, and on the core. So resellers, such as Caldera in 2002, have been an essential means for users to stay easily updated on available package enhancements, rather than hunting them all down themselves. Various distributions are sold at a price reflecting particular forms of added value, including support: so Xandros sell and support probably the best desktop implementation while Red Hat sell and support one of the best server-oriented distributions. These are typically much less expensive than non Open Source alternatives because one is only paying for the added value. Other distributions – such as Debian – remain essentially free and are maintained by idealistic devotees. It is a model of entrepreneurship in the realm of ICTs that has stimulated real innovation and choice and has made the results readily accessible to millions of users worldwide for whom the traditionally produced 'industry standard' alternatives were economically unattainable or perhaps ideologically objectionable. It is important too not to underestimate the quality that has been achieved. For example, a Xandros Desktop is fully as capable of getting the most out of today's computers and peripherals as WindowsXP or Mac OSX and in several ways Linux-based servers now have an edge over the once dominant alternatives.

Caldera Systems, however, found itself unable or unwilling to add enough value around the Linux core and was losing money. The story is becoming familiar as the implications of what SCO is attempting become increasingly clear. Under new CEO Darl McBride the company re-branded and repositioned itself by invoking a moment in its own corporate past when, as Santa Cruz Operation, it was involved in the development of Unix, the corporate operating system that Linux resembles in some ways. It charges that, over the years, Linux programmers have contributed code to Linux that was modeled on Unix. Therefore, every user of Linux today, in whatever form, owes SCO money that it intends to collect one way or another (with financial backing of its own, we might note, from the Royal Bank of Canada).

The Linux community has responded both legally (by establishing fighting funds and launching counter suits) and illegally (by mounting denial of

service attacks on SCO's systems and sending McBride objectionable things through the post). More importantly in the long run perhaps, it has begun to shift quadrant, as defined by our diagram of classification and framing. The early development of Linux was undocumented and driven by individual enthusiasms, and so is proving relatively difficult to defend against litigation of the sort propelled by SCO. The numerous early contributors did not claim or transfer copyrights on their code – it simply was not an issue for them. But it is now. The Open Source Development Lab has been formed in order to document all code submissions to Linux, although whether this can or should be done retrospectively is in doubt. It also now employs Linus Torvalds. This is a discernible move away from the old laissez faire position of Linux and Open Source towards a position characterized by what we have termed strong framing. The principles, the values and the achievements, rather than sustaining a cult of the pioneering individual, are now being collectively framed within legal and institutional structures and policy-shaping initiatives designed to maintain and promote them, rather than being left to fend for themselves as simply good things in an increasingly hostile environment.

Despite scaremongering headlines, SCO will probably not win. The transfer of any Unix copyrights that existed from Santa Cruz Operation to the post-Caldera SCO is shrouded in ambiguity and Unix was never one thing in any case, but a lump of code that existed in several distinct 'flavours'. Linux remains something quite different and an honourable achievement by all concerned, while SCO's current management have a long prior history of doing business through litigation. The real impact of the SCO assault is more likely to be the defining of that core axis around which the power relations in the ICT field will increasingly be worked out - at one end the ideal of open tools for all, at the other the obsessively proprietorial. The huge longer term significance of the FFII's agenda becomes clearer around that axis. The extension of US-style patents will be a more powerful weapon for the proprietorial than anything in SCO's current armoury.

To what extent then can we further define the 'data processing literacy' advocated by the FFII and generalize it, not just as a model for ICT literacy

more broadly conceived but as a model with inbuilt sensitivity to the force field just described?

I want to address this by first offering six vignettes from the contemporary world of ICTs.

(1) Describing itself as 'one of the most advanced teaching environments in Europe', Castello Neve, Cortona, Tuscany, Italy, makes much of its proximity to Siena and Florence and of the inspirational cultural resources available in the region, not least the works of great Italian painters such as Antonio da Correggio or Piero della Francesca, who knew the Cortona area well. Castello Neve is one among many of the 3D graphics, multimedia and visual effects schools that are beginning to proliferate in Europe and North America to feed the global media industries' hunger for content generated using these technologies. It is not yet entirely clear whether such advanced – and presumably profitable - training initiatives are responding more to an actual skills shortage as perceived by the industries or to an anticipated demand for skills as perceived by learners. Nor is it any more clear whether the marketed short-term learning outcomes (such as competence with today's Maya, 3ds max, LightWave or Director software) will translate into longer term, transferable competences or any kind of long term job security for those who learn the particular skills in question. Certainly, 'employability' is the chief message being deployed by these course providers to sell their often very expensive package deals of intensive residential training, delivered with cutting edge technology in attractive, often culturally 'loaded', locations. 'You can get there from here' is the cleverly enticing, if handily ambiguous, promotional line of another such school in the US. So the complex construction of a marketable notion of cultural capital that is going on around sites such as Castello Neve is highly revealing of how narrowly defined the role of ICTs actually is here.

(2) I was looking over a colleagues' shoulder recently as he worked on something at his computer. In the course of an intervention around some minor on-screen editing decision I happened to say 'right click' and brought him up short. This was somebody who had used computers for

over a decade for the routine daily tasks of writing and email but had never discovered the right mouse button or the concept of contextual property menus and short-cuts that are accessed that way (never mind keyboard short-cuts). Only a few days later, a conversation with another colleague revealed that when our employer moved from a proprietary email system to web-based standards, in order to give users the extra flexibility of browser access to email, she assumed that this was the only form of access she now had, and that all the additional functionality of her old email client program had been taken away from her. A quick informal poll among a dozen others in the same workplace revealed that over half of them had stopped using their email software because they too had simply assumed it no longer worked, now that they had been given 'web mail'. None understood that, in fact, the move to IMAP4-based mail had given them a large choice of alternative email client programs, including their web browser, and thus an opportunity to find one that particularly suited their own preferences for screen layout, drag and drop functionality, filtering, folder organization, etc. All of this information was available in an (unread) user manual provided by their IT department.

(3) In May this year, we saw for a few days proliferating copies being circulated on the web of the Nick Berg beheading video from Iraq. The young American was slowly beheaded with a knife, wielded (according to the CIA) by either Jordanian Abu Musab al-Zarqawi or by one of his followers, while four other hooded men chanted 'Allahu Akbar' ('God is Great'). The videotaping, digital encoding and posting on the web of a media file of the beheading demonstrated a high degree of technical competence, effectively deployed with propagandist's intent and exemplifying the web's emerging role as a communication medium of choice for such tactics. We saw the medium used in similar ways during the Balkans war, including the posting of massacre pictures as 'evidence' to back up claims and counter-claims around events such as those in Reçak in January 2001. (Reçak was the site of an apparent massacre of civilians, with contested versions of the event appearing on the web within days, complete with visual 'evidence'). Unedited versions of the Berg video are slightly harder to find on the web now, (some three months on at the

time of writing) and the Muntada al-Ansar website (http://www.al-ansar.biz/) that hosted the original, highly graphic version is now offline. (Fox News' site includes an edited version showing Berg in front of his captors but not the act itself). More common than copies of the video, in fact, are postings to various discussion forums questioning the authenticity of the tape, speculating about Nick Berg's identity or proposing that the whole thing was a CIA psy-ops exercise to counterbalance emerging accusations of American mistreatment of prisoners. That Berg's beheaded body was found on a highway outside Baghdad on 8 May 2004 and the video appeared on the web three days later suggests, however, that there is little reason to doubt its authenticity.

(4) A curious student of mine, undertaking a multimedia design workshop, had a look at the original Berg beheading video when it first appeared on the web and was deeply upset by what she saw. Clicking casually on the link, she was unprepared for the slowness, not of the download but of the execution itself, the distinct sound of the young man choking on his own blood and the image of his head being placed on his blood-soaked chest in the video's final, awful image. Given the rapid cross-referencing of the video in chat rooms and discussion forums that week, and the ease with which Google found unedited versions using just the terms 'Berg beheading video', there must have been hundreds of thousands of curious young people all over the world, including many too young not to have been profoundly affected by it, who were viewing this tape online in May 2004. Not long after, I participated in a *Media Education in Europe* conference. None of the media educators who attended my seminar session had seen or, if they had tried, had been able to locate the original Berg video themselves, although many suspected that their students (of all ages, from elementary to university levels) had.

(5) For the last three or four years a number of interesting community-based new media arts projects have cropped up in England and elsewhere that have had one thing in common – their use of a simple piece of free authoring software called 'Linker', produced by Mongrel, a London-based artists' collective. In fact Linker is really just a standalone

template created with Macromedia Director, the complex 'industry-standard' multimedia design software, and is used to generate technically simple but often richly layered multimedia presentations. It was used by artists and residents to map some of the hidden geography of English urban environments in London and Bristol (e.g. *Invisible Geographies Exhibition and Workshops*, Watershed, Bristol, England, 8-31 October 1999). And, as a further example, Mongrel co-founder Richard Pierre-Davis worked for six weeks in Australia in 2001 at Oak Valley Aboriginal School, Raukkan Aboriginal School in the Coorong and the Nunga IT at the Parks Community Health Centre, where his local students used Linker to make interactive computer based stories about their communities. Linker allows an author to input nine core images around which additional audio-visual and textual content is assembled. Authoring is simply done within the presentational interface itself by pressing 'e' on the keyboard at a point where one wants to add something and then choosing from a small but conceptually powerful set of editing functions (such as 'jump' or 'sound'). Users typically take only an hour or less to master the idea and then move on to focus on content, rather than on the software's functionality per se.

(6) My curious and then troubled student, described in vignette 4 above, briefly abandoned Director, the software we were in the process of teaching her (in a workshop curriculum not unlike those sold by Castello Neve) and turned to Linker in order to do something quickly – and one suspects self-therapeutically – with the Berg beheading video that she had just stumbled upon and was having difficulty simply setting aside. She stripped the soundtrack ('Allahu Akbar, Allahu Akbar'…) off the video and dropped sound and video into the Linker template as separate elements, triggered by mouse rollovers on a simple grid. To these she added stills grabbed with a digital camera from a tape of *The Thief of Baghdad* (UK, 1940) a lavish Alexander Korda production, in which the key scene, for this purpose, was an execution by a hooded scimitar-wielding executioner in a public square below the palace walls. High above the scene, atop those walls, the young and distinctly English-looking and sounding Prince Ahmed (John Justin) muses over good and evil and whether there isn't a better way, while the Grand Vizier, Jaffer (Conrad Veidt) stands behind

him and whispers in his ear that men only understand pain, punishment and vengeance. At the outbreak of the Second World War, the coding of the Anglicized Prince and the Germanic Vizier is all too obvious. But further resonance was added, in this reactivation of the film's imagery, when the student included in her Linker layout a scan of the cover of *Time* magazine, August 20, 1990, where Saddam Hussein is represented as the shadowy Other, the evil presence in the darkness beyond American president George Bush senior, in a visual configuration strangely reminiscent of one protracted close-up from that 1940 film, where the dark and evil Vizier stands just behind the Prince like a shadow. Among the textual shards that the student added to her Linker mix was this: 'The scimitar-wielding Arab has long been an iconic image in Western popular culture, representing something both compelling and repulsive, a fantasy of sheer ruthlessness and blind conviction'. But where her textual elements could not explain the interconnections, the Linker assemblage of the Berg beheading video, a popular cinematic version of Orientalism's projection of self and other onto a fantasy landscape of exotically enticing cruelties, an American news magazine's iconography, and the visceral effect of the 'Allahu Akbar' chanting (which could now accompany any or all of the other visual elements) added up to a tracing of dense cultural interconnections in what we call below a 'disclosive space' that the young woman could certainly not have articulated in any other way. The hooded perpetrators of the Berg beheading video on the web already instinctively or consciously understood those interconnections and had touched a collective raw nerve – had penetrated that space - by tapping into them so powerfully.

There are other ways to connect the cultural capital packaged by Castello Neve in Tuscany with my student struggling to find a way of representing what for her first seemed unrepresentable. From Tuscan painter Corregio's early 16th century painting of the Adoration of the Magi, where the Arab princes are supplicants before the Europeanized Christ-child but the shadowy figures of their entourage hint at a repressed fear of less easily assimilated otherness, through to the iconography of Orientalism being

turned against its creators in the Berg web video, we have a cultural topography that might deserve more sustained exploration, beyond simply noting that today's web video file is no less likely to be caught up in all those cultural trappings than the 16th century canvas. But my point is elsewhere.

What we have in these snapshots of ICTs in living contexts, as distinct from the abstractions of technologists, policy makers and some of their critics, is a set of implied propositions about restricted and elaborated codes.

The obvious point is the generational one about the educators who cannot master their email, mouse or Google, contrasted with the young learner who realizes that Linker can say what she wants to say and teaches herself how to use it in a day. But that is less interesting than the possibility that what we have here are, in fact, demonstrations of three codes: the restricted, the genuinely elaborated and the pseudo-elaborated. What is taught at Castello Neve and elsewhere and conventionally conceived of as 'advanced' mastery of ICTs is a pseudo-elaborated code of technical complexities that are only, in fact, the features of particular software packages. Their 'industry-standard' status is very provisional, the exchange value of their mastery in the marketplace highly precarious. The jump from a restricted ICT code – say the basic ability to input text into a wordprocessor and to send and receive emails – to the pseudo-elaborated ICT code of advanced software and hardware mastery (whether keyboard and right-click shortcuts or Maya menu manipulation) bypasses the genuinely elaborated code that the young learner using Linker to deal with the Berg web video perhaps knew she needed more than anything else.

Indeed it may be an instinctive distrust of the pseudo-elaborated code that holds many older, wiser ICT users back (and some not so old) from expending too much time and energy acquiring mastery over it; but their 'making do' with the restricted code of basic competence or of given and obvious functionality leaves them none the less disadvantaged. It should not be about reading thick 'bibles' on this or that piece of software because

its moment has momentarily come. But nor should it be about making do.

So the remainder of this paper is about a fairly straightforward proposition: We need to figure out what the genuinely elaborated code is for unleashing something of the real power of ICTs as media for citizen engagement and for the entrepreneurship involved in ongoing cultural revitalization - and then how to teach, learn, develop and sustain it. Along the way, however, we would be wise to consider what the forces are that conspire always to supplant that genuinely elaborated code with the pseudo-elaborated code of technicist jiggery-pokery. We have already characterized these forces diagrammatically.

One further note of caution may be called for. If, as the whole tenor of this paper will undoubtedly suggest, we should be sympathetic to a 'rhizomatic' ideal of cultural knowledges, literacies and participation (see Fernandez, 2001) as opposed to monolithic notions of culture and cultural competence and restrictive means of cultural access, it may be tempting simply to map onto that ideal the networks and the participative and hypertextual forms of current and emerging ICTs. In other words, it is tempting to assume that we have to hand today the tools for making and communicating 'rhizomatic' knowledges, for accessing the non-unified, dispersed cultural resources, the meaning-making of the multitude, on which such knowledges depend and for democratizing participation. We do not; at least not in any straightforward sense. That easy assumption glorifies small achievements that have been mediated by current information technologies, chief among them the internet, in moving us towards some more diverse ways and means of doing things, culturally, socially, entrepreneurially. But it's early days. I have suggested elsewhere (Fleming, 2003) that the 'rhizomatic' ideal, the acknowledgement of multitude, of a post-mass social ensemble, is prefigured, for example, every time we click on a hyperlink on the web without being certain where it will take us. Hopefully that is not the case, however, when we click 'submit' with our credit card details (unless we are looking to redistribute wealth unexpectedly). The very real and necessary utilitarian drag on these

technologies, and the attendant conservatism, render their symbolism more potent still than anything we are achieving with them.

I want to ally the suggestion that there is a genuinely elaborated code of ICT 'literacy' (for which we have mistaken the pseudo-elaborated code of technical knowledge and equipmental fetishism) with the suggestion made by Spinoza, Flores and Dreyfus that there is "a skill that is essential for being an entrepreneur, a virtuous citizen, and a solidarity cultivator – that is, for regularly and as a matter of course seeing yourself and the world anew" (1997: 1). They find this skill at work in three interlocked processes: (1) articulation, (2) reconfiguration, (3) cross-appropriation. Through these processes we achieve the potential to open up a new 'disclosive space' around ourselves - more colloquially, seeing things anew, but a better definition of such a space would be a site or location for knowledge-informed and/or knowledge-making practices where the conventional genuinely gives way to real and helpful insights. This already begins to sound like a more useful approach than, say, an evocation of 'creativity' as some sort of inherent capacity that can somehow be triggered given the right encouragement.

Will we recognize a disclosive space when we see it? I have already set up an answer to this question in the six vignettes above. Castello Neve is probably not such a space, however hard it tries to marshal cultural ambience, geography and 'industry-standard' high-tech in the interests of constructing 'one of the most advanced teaching environments in Europe'. Linker self-taught and used to make some sense of the Berg video probably is. Let us unpack this distinction more carefully, first by considering each of the disclosive constituents in turn, but specifically here in relation to ICTs.

Articulation

Energetic practices – human activities with a higher than usual level of momentum - tend to proliferate in any domain where expectations are

high, new resources are available, rhetoric is turbo-charged and new blood is being attracted in. Both the ICT industries and ICT studies share these characteristics at various levels. Potential problems arises however with proliferating sub-domains of activity. This is not necessarily a problem in and of itself – tighter coordination can mean the stifling of autonomous developments and innovations – but produces the difficulty that when energies wane in some areas, or rhetoric begins to sound hollow, or ultimately limited resources cannot be shared out satisfactorily, a disarticulated confusion can result where little is being achieved and opportunities squandered in some areas. Examples abound in the ICT domain: for instance, 'push' technology (remember *Wired*'s 'Kiss your browser goodbye' cover story?) died and almost took with it the elegant idea of lightweight information feeds, until RSS ('Really Simple Syndication') rescued it. Articulation, for Spinoza, Flores and Dreyfus is less about coordination and connection per se, more about identifying – articulating – the underlying things that are important. So RSS, in this example, is a lucky instance of articulation in precisely the sort of sub-domain of activity – push technologies – that is prone to disappear into its own cloud of overblown expectations. Why? Because the pseudo-elaborated code is an ideal breeding environment for inflated technological aspirations that lose sight of the often simpler good idea. Spinoza, Flores and Dreyfus identify two forms of articulation: 'gathering from dispersion', where the good idea has never quite been identified amidst the proliferating activities, and 'retrieval', where the idea was there but got swamped (as with RSS-style 'push').

But we are more concerned here with scholarly work on ICTs where activity has been proliferating exponentially in recent years. In particular we can point to three sub-domains of activity that constitute a field in 'dispersion' and that may require, to some degree, a deliberate effort directed towards the first form of articulation. These are: (a) studies in the political economy of networks, social movements and forms of participation; (b) studies in new media arts; and (c) studies in the digital archiving and reconstruction of cultural resources.

Each of these three areas of work is marked by exciting contemporary developments but it is notable how few researchers or practitioners one meets in any one sub-domain these days who demonstrate much real knowledge about what is happening in the other two. Again, though, this is not necessarily a problem in and of itself. Specialization is a necessary characteristic of the academic maturing process. The problem arises if we become collectively incapable on occasion of discovering the 'disclosive spaces' that we need to inhabit if we are to make real progress. Articulation – in the sense of recognizing what is important within all the sub-domains simultaneously, or the *integrity* of our collective efforts – will contribute to such moments of disclosure.

Reconfiguration

Processes of reconfiguration are characterized by precisely their lack of integrity, in the sense just evoked. Typically, a marginal practice or a marginal aspect of an existing practice jumps centre stage and everything else has to reposition itself. Articulation may 'prime' this sort of reconfiguration – e.g. by clarifying where a domain of activity or inquiry has got to as a whole, so that the significance of something marginal and new suddenly becomes apparent.

The meteoric rise of the Open Source MySQL database is an example of this in the ICT industries. The articulation of data-driven web practices (as distinct from the initial static publishing model of the web derived as much from the magazine industry as from anything else) cleared the way for a reconfiguration that produced the powerful Open Source LAMP architecture (Linux, Apache, MySQL, PHP/Perl), an articulation of separately existing elements that, in turn, became indispensable both to today's much more flexible, data-rich and usable web and, at the same time, to maintenance of the low cost of entry that still facilitates competition with the big corporate players. The rather unexpected positioning of a hitherto marginal Swedish startup's MySQL database (and a few lookalikes)

at the centre of this reconfiguration undoubtedly released a great deal of entrepreneurial energy of the best kind. This, in turn, has generated its own integrity (which 'LAMP' currently names). From time to time, as specific technologies and bits of software come and go, it may well be necessary to re-articulate that integrity in some way if the gains are not to be dissipated. The Open Source movement may be an effective means for such articulation to take place. But, as the SCO story has suggested, this particular configuration may remain susceptible to some future reconfiguration that cannot be predicted.

In ICT scholarship, we may not have seen many major reconfigurations of this kind, with new 'disclosive spaces' opening up for us as a result. Some of the most exciting developments in the three sub-domains identified above remain fairly marginal to each other. So for instance we have revealing and innovative contemporary work on precarious labour and new social networks, on the post-film cinematic imaginary, and on open archiving and new creative ways of using databases. Whether there is anything happening in all of this that might – or should - jump centre stage and reconfigure much of the field for us remains to be seen. The sense that the gains being made in such areas – their own 'disclosive spaces' - are rather wasted on each other right now may suggest that the time is right.

Cross-appropriation

This is perhaps, in Spinosa, Flores and Dreyfus' analysis, the most potent constituent: "Cross-appropriation takes place when one disclosive space takes over from another disclosive space a practice that it could not generate on its own but that it finds useful" (1997: 27).

They give the example of mobile phones jumping rapidly from the business domain to the family domain, where we can extend the analysis and suggest that in effect they then triggered a fairly major reconfiguration, based around the articulation of multiple coordinated activities (with a

high tolerance for individual independence) as a core value of the family in affluent societies today. The family saw efficiency gains in coordinating the activities of its members, as in turn did family members in coordinating activity within their own peer groups etc. Such groupings now tend to stay in more coordinated touch with each other even while engaging in a more diverse range of separate activities than ever before, and email has also clearly found its niche in support of these sorts of reconfiguration.

There are already some striking examples of cross-appropriation in ICT scholarship. For example, recent work on the creative reinvention of databases (V2_Publishing, 2003) has seen cross-appropriation of practices between the second and third of our sub-domains (new media arts and digital archiving/database initiatives) and has, as a result, generated new scholarly insights in relation to both. Similarly, work on computer games within the sub-domain of new media arts may cross-appropriate with work on new social networks to generate some real insights into the construction of precarious labour around the games industry (e.g. the way in which young game designers, programmers and artists circulate through short-term employment networks that are subject to the vagaries of fashion-driven demand and an ever changing skill-set). These sorts of insight remain relatively rare though.

If articulation, reconfiguration and cross-appropriation are signs of disclosive skill at work, then our examples all – in their different ways – suggest a fairly limited role for agency in acquiring and deploying such skill. In other words, people did not first become articulators, reconfigurers and cross-appropriators in order then to produce the situations in which RSS, MySQL or mobile phones emerged as important, along with the even more important re-shapings of our activity that such things facilitate.

Rather, in those situations of emergence we can see that the skill of changing 'disclosive spaces' is the skill to seize opportunities for articulation, reconfiguration and cross appropriation as they are unfolding within the very situations we find ourselves in, not necessarily the production of such opportunities out of thin air as it were. And this 'skill to seize' may

not itself be something that can be taught so much as a product of another situation – a pedagogical situation that offers practice in responding to such opportunities and access to the resources needed to effect a response. So the challenge then becomes creating the pedagogical situations where this will occur, informed by the hope that we can thereby revitalize, in relation to ICTs, some of the practices of entrepreneurship, citizen participation, cultural production and knowledge making in which we are interested.

We come then to a conclusion of sorts. We have defined a code, the medium through which literacies express their specific capabilities, their strengths and weaknesses, as that which regulates the processes of classification and framing. Articulation, reconfiguration and cross-appropriation are then concrete framing practices and, as such, are constitutive of and constituted by an elaborated code through which weak classification/strong framing practices achieve some of their most desirable goals. Those goals have tended to remain out of reach because they have so often been pursued from positions characterized by weak classification/ weak framing (e.g. the casually neo-liberal, individualistic position of the typical Open Source devotee; see Lovink, 2003: 222) and have been opposed by the forces of strong classification/strong framing (e.g. proprietary ICTs defended by the growing institutionalization of low patentability standards). Without a deliberate and sustained effort to develop and deploy framing practices such as articulation, reconfiguration and cross-appropriation, the regime of power that characterizes the domain as a whole will increasingly favour the framing practices of, for example, the 'closed community of patent lawyers' that the FFII is currently taking on in Europe and the similar forces that confront the Open Source Development Lab in the US. It might be interesting in the future to look back at the successes and failures of the FFII and the Open Source Development Lab and gauge the extent to which they pursued tactics and activities that realized the strong framing practices of articulation, reconfiguration and cross-appropriation.

A little bit of Greek goes a long way, so I want to draw things together

finally around the suggestion that we need an *elaborated exophoric code of ICT literacy* in order to achieve the following. If ICT literacy is to be anything more than a vaguely useful metaphor, it must identify the development of ICT-related knowledges that simultaneously grasp *both* the conditions of possibility of the object and the potential of the object itself. The object here may be a piece of software, something achieved with that piece of software, the ICT literate citizen herself doing the achieving, a theory that we use to explain ICTs to her and to ourselves or the ICT domain as a whole: this layered literacy has no 'outside' from which we can advocate it without living it. It is exophoric in the sense that it always does its best to refer both to object and – exophorically – to the conditions of possibility of the object, that is to the regime of power and practices in which the object takes shape and to the larger force field that determines that regime.

This extends a very simple observation from the earliest studies of restricted and elaborated codes by Bernstein and others, where exophoric reference was often observed as a characteristic of restricted codes (and remember Bernstein's insistence that restricted codes are not necessarily deficient). Given some pictures and asked to tell the story that they represented, users of an elaborated code tended to tell the story in a way that would make sense even if the pictures were no longer there, whereas users of a restricted code told the story with reference to the specific pictures. The given pictures were the conditions of possibility of the story. The elaborated code told a good story but without any reference to its conditions of possibility. How much of academic discourse is built around early training in that non-exophoric way of telling a good story? The proposal that we need an elaborated exophoric code – a way of telling that both handles the abstract complexities of an object (elaborated) and roots them in their material conditions of possibility (exophoric), while recognizing the mutually determining relationships at work between object and conditions, is really just a fancy way of saying the following about the ICT literate citizen.

Considering once again the young woman using Linker to make sense of that disturbing Berg video on the web, we should want her to know (a)

why Linker exists, (b) why it is different from 'industry standard' tools, which she temporarily set aside to use Linker, (c) why that choice might not always be available to her, (d) what she can do with this choice of tools, both right away and in her future, from creative expression and personal meaning-making to inquiry-based practical research, collaboration and employment (i.e. what disclosive spaces she might make for herself), (e) where and how she can access the digital cultural 'archive' that she needs as raw material and what she can do with such resources, (f) where her own best interests lie as a genuinely ICT literate person, (g) where her means of solidarity are with other similarly ICT literate citizens, (h) what she can do to protect her own and their best interests, whether joining something like the FFII or just generally keeping herself informed about what is going on, (i) finally, how to recognize and seize opportunities for articulation, reconfiguration and cross-appropriation; which in fact she has already instinctively done with Linker and the Berg video. Now that would be an ICT literate citizen to be proud of.

Our own task is to ensure that as educators and scholars of ICT we can do as much with the tools at our disposal.

Notes

[1] A version of this paper was presented at the *International Colloquium on Communication and Democracy: Technology and Citizen Engagement*, August 5, 2004, Frederiction, New Brunswick, Canada.

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