X-literacies: beyond digital literacy

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Abstract: Dozens, if not hundreds, of literacies have been identified by academic researchers, from digital- to musical- to health- to network- literacy, as well as combinatorial terms like new-, multi-, 21st Century-, and media-literacy. Proponents seek ways to support the acquisition of such literacies but, if they are to be successful, we must first agree what we mean by 'literacy'. Unfortunately, the term is used in many inconsistent and incompatible ways, from simple lists of skills to broad characteristics or tendencies that are either ubiquitous or meaninglessly vague. I argue that 'literacy' is most usefully thought of as the set of learned techniques needed to participate in the technologies of a given culture. Through use and application of a culture's techniques, increasing literacy also leads to increasing knowledge of the associated facts and adoption of the values that come with that culture. Literacy is thus contextually situated, mutates over time as a culture and its technologies evolve, and participates in that co-evolution. As well as subsuming and eliminating much of the confusion caused by the proliferation of x-literacies, this opens the door to more accurately recognizing the literacies that we wish to use, promote and teach for any given individual or group.

Introduction

It is commonly argued that, to engage effectively in our increasingly digitally mediated culture, we need more than the basic skills of reading, writing, and arithmetic. Particular emphasis tends to be placed on digital, new media, networking, and similar skills. Almost all of us teaching online can probably identify countless occasions where difficulties using the technologies with which we teach have hampered or scuppered our intended program of teaching. Perhaps our own limitations in such areas have thwarted our intentions. The world is replete with initiatives intended to improve a wide range of literacies, from digital literacy to new media literacy, and much in between. However, I shall be arguing in this paper, such initiatives are weakened by vague, inconsistent, and constantly shifting definitions of the word 'literacy' that tend to either shrivel it to an arbitrarily chosen set of ephemeral mundane skills, or that are so vague, broad and all-encompassing that there can be no possible way to measure their success or failure and, arguably, no value in applying the term at all. The purpose of this paper is to provide a clearer and more useful definition, consistent with common usages, that will enable us to more effectively choose methods and models to improve literacies, without ambiguity or contradiction, without identifying side-effects or precursors as literacies in themselves, and without mistaking the trees for the wood.

Reading and Writing

Until the 19th Century, to be literate meant that one was educated and well-read (UNESCO, 2006). From the end of the Victorian era onwards, 'literacy' came to mean, literally, the ability to read and write. It mattered enough to warrant its own term because reading and writing was and is central to the organization of society and a person's ability to participate in it. From filling in forms to reading warnings on medicines, from communicating with distant friends to being entertained by books, from understanding *how* to behave to understanding *why* people behave as they do, reading and writing are pervasive necessities for almost anyone to play a full part in any modern society. Being *more* literate, though, does not *only* mean that someone is able to read and write more words than someone who is less literate (though they probably can), nor that they can *necessarily* do so faster or more accurately than one with less literacy (though they probably do), but that, echoing its original meaning, they have *read* more and thus have a richer, deeper, more nuanced understanding of the societies in which they dwell, and that they can apply their knowledge more effectively. This speaks to the central cultural value of literacy (Hirsch Jr, Kett, & Trefil, 1988). Greater literacy is as much about having greater cultural knowledge as it is about having greater technical competence. It concerns a set of shared (sometimes contested) values and a shared body of knowledge. Especially where there is a body of literature that is assumed to be shared cultural knowledge (e.g., fiction, plays, etc) or that emerges from the functioning of a culture (e.g. the press, legislature, etc) literacy supports a shared vocabulary and sets of metaphors that may be assumed to be meaningful to most members of the culture, binding, shaping, and delineating it.

Text occupies a privileged place in the technologies of almost all cultures, not just because it is an essential glue that embodies and enables culture, but (more fundamentally) because it is difficult to learn. Any two-year old can appreciate *something* of most other media technologies apart from text, and virtually all can be used and presented in a way that a two year-old can appreciate well. This is even true of that most complex of technologies, language. Most children learn to speak without much, if any, intentional tuition. Moreover, most two-year-olds (and, for the most part, most chimpanzees) can dance, paint, take videos and photographs, talk on the phone, and act out dramas. They may not be able to do so particularly effectively, but they can do it, and can learn to do so simply through imitation, interaction, and experimentation. Later, they may more intentionally learn more complex skills – playing or writing music, for instance - but the threshold for getting started tends to be quite low. However relatively few two-year-olds can accurately interpret even the simplest *written* sentence – or even an individual word - without direct and intentional tuition. Indeed, around the world, far too many adults are unable to do so. This is why education needs to focus on literacy, in its conventional meaning of 'reading and writing'. Literacy is needed by everyone, and it underpins many of the other things we do, but reading and writing are sufficiently *difficult* technologies to learn that many do not.

Literacy – in the sense of the ability to read and write - is not the only complex technological skillset of this nature needed in a modern society. Numeracy also

deserves its own name because it is similarly difficult to learn without assistance and plays a large role in participation in a culture, quite apart from its critical role in more specialist areas. Like literacy, numeracy is an essential foundation for doing many of the other things we want or need to do in a society. While simple concepts of number can be understood with little or no intentional direction, manipulating numbers involves techniques that must, at least to some extent, be taught. Over the past century or so, for what are perceived as other foundational skillsets of this nature we have tended to purloin and extend the term 'literacy' rather than to invent new terms. Because this opens up the potential for misunderstanding, misapplication, and confusion, for the remainder of this paper I will capitalize the first letter when talking of text communication.

Other literacies

Beyond Literacy and numeracy, we also need to understand other complex technologies that demand more than imitative behaviour: technologies of time, technologies of law (including crucial ones for survival like laws of the road), technologies of health (from first aid to health services), technologies of taxation, technologies of food, technologies of banking, technologies of sports & games and, of course, digital technologies. Such technologies can be almost as fundamental and foundational for further action as reading and writing and, for at least a few, the word 'literacy' has been appended – health literacy, financial literacy, digital literacy, and so on. Though some of this literacy may be gained by participation and imitation, most relies on Literacy and numeracy as a fundamental underpinning, and must be intentionally learned. Indeed, at more advanced levels, attaining competence almost always relies on a complex multitude of prior knowledge, skills, and techniques. We can begin to discern a hierarchy of literacies, each building on others.

At the less complex end of the spectrum, there is also a vast host of other technologies to which we seldom give a second thought after childhood but that are essential to successful living in a society: how to buy and sell goods, how to navigate our cities, how to use washrooms, how to dress, care for our teeth, brush our hair, lock a door, safely plug in electrical devices, and so on. It is interesting to speculate on why these are not normally considered to be literacies. In part, and in some cases, it may be due to the simplicity of the technologies: brushing hair and teeth are not even close to the complexity of reading and writing and may easily be achieved through imitation, pictures, or simple verbal instruction. Perhaps more significantly, though, I believe that it is because they play a relatively minor role in achieving other skills. It is true that they tend to be skills without which we might die or, at least, suffer rejection or be unsafe within our society but they are not foundations: they are prerequisites, much as opening a door is a prerequisite for entering a room, not a foundation for what we do within that room. It seems to me that, to be worthy of the term 'literacy', the skills and/or values and/or knowledge we attain must in some way form a part of or directly affect the acquisition of higher level skills/literacies, or our ability to perform further activities.

Technological literacies

Complex modern societies arguably demand complex foundational skills other than reading, writing and basic arithmetic. Precisely which ones matter, however, is a matter of some contention. In an attempt to signify the importance of these skills, many researchers have identified new literacies (indeed, 'new literacies' itself is a label for one example of the genre). Many newer uses of the term 'literacy' echo some of the meaning of the original as relating to the acquisition of techniques: the tangible skills needed to operate any given technology. A great many are concerned with technology use: digital literacy (Gilster & Glister, 1997), computer literacy (Selber, 2004), media literacy (Potter, 2013), music literacy (Waller, 2010), legal literacy (Schimmel & Militello, 2007), for example, all, to a greater or lesser extent, relate in at least some important ways to an individual's ability, like in the areas of reading, writing and arithmetic, to manipulate the technologies both of consumption and production. It is useful, therefore, to reflect for a moment on the nature of technologies in general and, in particular, the nature of those that seem relevant to literacies.

The nature of technology

Though there have been many definitions of the ever-evolving term 'technology' over the years, perhaps the most compelling comes from W. Brian Arthur who describes it as the orchestration of phenomena to some use (Arthur, 2009). Part of the elegance of Arthur's definition is that it speaks both to the assembled nature of technologies and the ways they are made to work together. Phenomena can be anything from assumptions about state of mind to the effects of friction on a piece of wood but, and perhaps most importantly, many phenomena are provided by *other* technologies. Arthur observes that almost all technologies are assemblies, whether physically interconnected or assembled with technique, and almost all rely upon other technologies for their existence. Technologies use technologies and are typically constituted from other technologies. From obvious examples like parts of machinery to the complex interactions of laws or the connections between rules and the objects they operate upon (e.g. vehicle use on roads), technologies are mutually constituted and mutually interdependent, orchestrated to work together to achieve their ends.

Soft and hard technologies

Drawing on Arthur's definition, I have previously observed a continuum between harder technologies, in which the orchestration is predesigned, and softer technologies, in which orchestration is performed by the users of the technology at the time of use (Dron, 2013). Examples of harder technologies, that rigidly proscribe

or embed processes, include production lines, rigid rule sets, engines, laws, and bureaucratic forms. Examples of softer technologies, where processes are flexible and constantly invented by their users, include language, writing, painting, and teaching. However, virtually all technologies are a complex mix - an assembly – of soft and hard. The poet needs to be able to use rules of grammar, words, letters, and so on, in order to orchestrate the poem, for example.

It is important to note that your point of view makes a huge difference. A learning management system (LMS) is, on the whole, a very much softer technology to a learning designer than it is to a student, for example. It orchestrates different phenomena for different purposes. When we speak of an LMS it is in fact a synecdoche: not a single technology but a part of an indefinitely large number of assemblies that are different for at least every role, and likely for every individual that uses it. Its softness (for learning designers and teachers) means that it can be used in a vast variety of ways. For harder technologies with one well-defined function, like cash registers, we can reasonably ask whether they perform that function well and, as often as not, measure their effectiveness because they are intended to work consistently every time but, for softer technologies like an LMS we cannot. At best, we can describe the hard functions (communication tool, presentation medium, etc) and measure the effectiveness of those, but we cannot measure an indefinitely large number of possible assemblies of which it is a part, because a complete list of the adjacent possibles is inherently unknowable and changes with every new use we invent (Kauffman, 2000). For this reason it makes little more sense to ask whether an LMS can improve learning than it does to ask whether a transistor can improve learning. It depends entirely on the assembly of which it is a part. It ain't what you do, it's the way that you do it.

In the context of literacies, those that appear to matter most are those in which we are required to play a role in a predetermined orchestration: hard technologies that are not embedded in machinery or software. The ability to spell, apply formulae, use correct grammar, and so on are the hard elements of Literacy and numeracy, that must be enacted correctly or not at all. Similarly, for computer literacy we need to know things like how to move, copy, rename, or delete files, to create folders, to log on correctly, and so on: the human role for such activities is well defined, and creativity would be a positive handicap. Note that these hard skills are often essential to achieving creative purposes - the softer technologies that they are used to support – though they can support equally hard technologies (typical bureaucratic form-filling, for example). It is significant that, increasingly and especially in digitally enabled systems, many of those hard technology skills (techniques) that used to need to be performed by people are becoming embedded in software, from self-driving cars to photo filters, from file organization to computer disk repair.

Is 'digital literacy' really a literacy?

Empirically, the answer to whether the (fuzzily expressed) ability to use digital technologies is essential for participation in a culture is (as I write this) a tentative 'no'. While it may be very inconvenient to be unable to operate a computer, tablet, smartphone or net-connected TV, it is still more or less possible to play an effective role in most modern cultures without knowing a lot about digital technologies, even though it may be extremely hard to avoid actually *using* them, a point to which we shall return shortly. Digital skills are very useful when you need them, but it is quite possible to get by without them for some people most of the time. But this is changing, and changing fast. The answer may very soon be a tentative 'yes'. Already there are societies where digital voting, for example, is required to participate in an electoral process, and it is increasingly the only way to get an ever burgeoning amount of information, as well as becoming the primary means of distance communication, supplanting letters and conventional telephones and faxes in almost every area. It is difficult to even enter or leave a country without encountering, and using, digital systems. Our very survival may depend on it: disaster warning systems, for instance, assume near ubiquity of smart phones. Indeed, it is hard to imagine many roles in life that would not demand at least a passing familiarity with digital devices, and those who are completely unable to use them are significantly disadvantaged in many areas. But, though we need to use digital technologies, can that be described as a literacy?

Diverse technologies

Part of the problem in attempting to pin down digital literacy is the huge diversity of digital technologies. There is a vastly different set of skills needed to operate an ATM (automated teller machine) than, say, the rendering software Blender, and few of the lessons from either would have much value to a typical Facebook user. Some people are challenged using a TV remote control, smartphone, or microwave oven, including people who make a living programming computers. The invention of digital technologies is accelerating at a breathtaking rate so that, even when we have grasped the essentials of one, it may not predict our ability to deal with the next. This is increasingly beyond our control, as cloud apps or connected devices update themselves, adding new functions, hiding or removing old ones, changing interfaces, and often breaking what we have configured before. Preventing this in an era of ever increasing security and privacy risks would be foolhardy.

Technologies in hiding

Another part of the problem is that much of the power of almost all digital devices is devoted to making them as easy and transparent as images or cinematography to consume, and easier than handwriting to create. This is an ever growing trend, with embedded hardening replacing human skill wherever possible. Even allowing for the complexities of setting up relevant accounts in the first place, it is orders of magnitude easier to make and share digital images and video, for example, than it is to write even the simplest of written messages: It might not seem that way to those who have been Literate since childhood and for whom such tools are endlessly

novel but, viewed as a set of tasks, the process is simple, mechanical, and demands only a very few steps. Compare that with having to learn a full alphabet, rules of punctuation, and clarity of written expression. It is possible to learn to take and share digital images online in minutes, even for one with almost no experience of such technologies because (and this is a matter of central importance) many of the complexities are hardened and embedded in the tools themselves. While it may be quite complex (and complicated) to make full use of a digital SLR, many digital cameras require little more skill than the ability to press a button. Pre-literate children can easily do this. The soft technologies of photography – manipulable aspects such as focus, exposure, aperture, film speed, shutter speed, and so on – can be hardened within the microchips and servo motors of modern cameras to the click of a single button. The machine may not interpret the wishes of the photographer well for, as Sloman & Fernbach (Sloman & Fernbach, 2017, p.140) observe, no machine yet created can share in our intentionality, but it takes away the need to make choices by orchestrating phenomena itself.

Telephones, TVs, heating systems, stoves, music players, cars, clocks and ATMs all have digital interfaces and what would only a decade ago have been seen as very powerful computers inside, but that demand fairly limited skills of their users. This pattern is progressively and exponentially increasing in strength. My cat is quite capable of operating a fair number of digital tools on my iPad – he is a dab paw at Fruit Ninja - and needs no training at all to do so although, in fairness, he may have significant difficulties selecting the appropriate app in the first place, or managing backups.

Ephemeral technologies

Another problem with the notion of digital literacy is that skills grow stale. Such skills are deictic, bound to a specific context in which they are meaningful, and many are virtually irrelevant outside that context. An ability to skilfully manipulate the config.sys of a DOS machine is completely and utterly redundant for most people nowadays, and many of digital skills learned in the past are actually worse than useless. As one that learned to program in BASIC in the early 1980s, I even now (after decades of practice) find it more difficult to grasp object oriented, let alone aspect oriented or other more recent programming paradigms, than those that are taught such things from scratch (or from Scratch). Perhaps more significantly, the patterns of thought that I have developed in order to use an LMS have deeply affected my thinking about how people learn online, making it more difficult for me to recognize alternatives (from Google Search to Twitter) that depart from that pattern. As fast as we develop skills in using digital tools, those tools change so that we no longer need them. Unlike the slow-changing technologies of reading and writing, digital technologies change quite literally daily, and effloresce into constantly evolving new niches on a rapidly accelerating basis. Of all the skills we can learn, by far the most important remains, as it always has been, the skill to learn itself.

Alternative literacies

Perhaps in despair of keeping up with such rapidly changing literacies, some have sought to uncover an alternative set of skills and competencies that may remain stable enough to be worth cultivating or, relatedly, that are anchored in a socio-cultural context that goes beyond simple technological skills. Those who have written of new literacies (Lankshear & Knobel, 2006), new media literacies (Jenkins, 2006), or multiliteracies (Cope & Kalantzis, 2009), have accepted the ephemeral nature of skills in digital tool use and have instead focused on generic skills or capabilities and/or adopting a situated view of the tools (conceptual, procedural, and physical) that need to be learned.

Jenkins's new media literacies include things that are not at all technical, like multitasking, social skills, judgement, analysis, synthesis and even, bizarrely, play (Jenkins, 2006). It is worth noting that a) these are not in any way new requirements of modern societies and b) they may emerge from as well as, in many cases, precede the use of other skills. Pre-literate cultures need such skills just as much as complex digitally supported societies, and children have all of them. In fact, children are likely more literate in play than most adults. Such capabilities are a part of what it means to be human, a consequence of living in a human society. We can be taught/teach ourselves to do them better, but they are not in any way similar to the technical skills of reading and writing, nor are they learned in anything like the same way. Traditional literacy is about becoming part of a machine, the enactor of the technologies of reading and writing. Skills of interpretation, judgement, creativity, design, and analysis (for instance) are at once secondary to the basic mechanical skills of creating and interpreting letters and words, and at the same time prerequisites of coming to learn them effectively in the first place. They are both higher order and lower order skills: emergent and foundational. They might be described as metaliteracies, inasmuch as they are concerned with the ways that actual literacies may be gained and what those literacies might sustain and nurture, but that seems to be stretching a point. Even very small children can judge, discern, interpret, create and, of course, play. So, notwithstanding the many ways in which they can be cultivated and refined, these are not literacies that need to be learned in the same manner as reading and writing, or even managing a computer operating system. They are propensities and capabilities that might need to be developed and modified in a cultural context but that are only fully absent in a few people with specific mental disabilities or illnesses. Indeed, they are also present in most cats and dogs. Moreover, in different cultures such values have different emphasis and, as the proponents of the model would agree, different cultures have different and often rapidly evolving needs. In some cultures, playfulness is far more valued than it is in others, for example.

For those in the New London Group, whose members coined the term 'multiliteracies', the focus is primarily on pedagogical support for not just new media forms but the diversity of linguistic and cultural forms that exist within a global society, the value of which is primarily rooted in social inclusion (Group,

1996). This speaks to both the richness and rapidly changing nature of our communication forms and needs, and to the cultural embeddedness of all literacies. However, when operationalized, it boils down to a set of distinct skills for design, comprehension, and practice across different (and combinations of different) media. Though recognizing the deeply situated nature of literacies, and notwithstanding some excellent rich analysis and innovative pedagogical approaches, the literacies themselves largely extrapolate those of Literacy, and wrap them with a culturally situated veneer.

Those in the fuzzier field of new literacies tend to adopt an eclectic perspective, admitting anything from new social practices, to new discourses, to new semiotic contexts, often with a focus on social and cultural issues, as long as it is some way connected with the creation and consumption of digital content, especially in an online context. While the scope of this field makes it difficult to pin down any particular notion of what such a literacy might entail, that very breadth is one of its strengths. As Coiro et al put it, "the notion of literacy may have to be conceived in a situationally specific fashion, since it is no longer possible for anyone to be fully literate in every technology of literacy now available on the Internet." (Coiro, Knobel, Lankshear, & Leu, 2008, p.5). This seems a more promising approach, recognizing the rapidly changing nature of the technological and social substrate that we all find ourselves in makes all digital skills ephemeral. Unfortunately, it is less than clear how specific a situation might need to be to warrant the term 'literacy': a context of, say, being a contributor to Jon Dron's website seems a little too specific to count (though specific skills, values, and ideas matter), though it may not be unreasonable to talk of, say, Facebook literacy (albeit that such literacy may be highly transient, not least because of constant changes in algorithms, terms and conditions, privacy invasion techniques, and so on). It is also difficult to disentangle such thinking from a tools focus. One might conceivably talk of Moodle literacy, though (because of differences in configuration, policy, pedagogy, community, etc) it would make more sense to talk of literacy in the specific Moodle instance installed at one's institution. But this, too, is too broad, inasmuch as very different skills, attitudes, and social engagement are needed for different roles. Like most social technologies 'Moodle' is a deictic term, its meaning changing according to its context of use. Moodle literacy for a student is very different from Moodle literacy for a teacher.

X-literacies

The techniques demanded of learners change rapidly as the tools with which they are required to work evolve. These skills are either too transient or too broad to matter, so what is left for the term 'literacy'? There are two obvious motivations behind using the label 'literacy'. The first is to embiggen whatever skills we believe to be important by granting them the status of 'literacy'. This is all too common and not at all useful thank to the deictic nature of literacies, but it can be persuasive enough to lead to research grants and even government initiatives to needlessly pump money into absurdly fuzzy and ultimately pointless short-term initiatives like

digital or computer literacy when what is needed is continuous reflective use and mindful learning. The second reason for using the term is more interesting: to explain differences and seek commonalities within technologically distinct or related areas that go beyond simple notions of 'skill' or 'competence'.

It seems clear that, for whatever literacy we seek, it is possible to find people who seem better at it than others, as well as those that are totally inept, and that those who use technologies well have sometimes large advantages over those that do not. People that are described as (say) 'computer literate' are apparently able to come to terms with new computer technologies with greater ease than those that are not. This suggests that either there are some underlying learned or innate competences or aptitudes or, far more likely, that regular engagement with a gradually changing set of technologies within a specific cultural context makes it easier to transition from one instance or generation to the next. This is because of the nature of technology evolution, in which new technologies are built on and assembled from older ones (Arthur, 2009), so we rarely if ever have to learn a whole new skill set when we move from one technology to the next. True paradigm shifts in technology are extremely rare, if indeed they occur at all. If Arthur is even partially correct about the ways technologies evolve, they are as likely to be completely novel as it is likely that life will not only evolve again within our existing ecosystem, but thrive. The effect is magnified by the fact that computer manufacturers, in particular, have very deliberately sought to enforce guidelines and interface rules that make different tools behave consistently.

Such a focus on such specific technologies, albeit ones that have value to many people is, I suggest, counter-productive. Instead, I propose that it would be more useful to focus on what makes 'literacy' worth distinguishing in the first place: that *it is concerned with the techniques needed to operate the technologies that are fundamental to any given culture*. It is about acquiring skills without which engagement in the culture would be impossible. This is similar in some ways to the established notion of cultural literacy (Hirsch Jr, Kett, & Trefil, 1988) but differs in a couple of very important respects: that we are only concerned with the technological skillsets needed, not with broader concerns about values, attitudes and other non-technological aspects of what it means to be part of a given culture, nor with knowledge *about* a culture, though all of these are important consequences, as well as drivers, of any x-literacy. I also entertain a far broader definition of 'culture' than that of Hirsch and his followers, admitting subcultures of any form or description into the mix, big, small, cross-cutting and intersecting and, importantly, hierarchical: our membership of a broader culture in which we are Literate, for instance, serves as an essential foundation for being a member of a sub-culture.

The literacies of cultures

Technologies are not only distinctive of cultures and subcultures, but tend to be definitional: ethnographers typically distinguish one from another by describing the tools, structures, norms, rituals, and processes that the culture uses, including

language and other communication technologies. They are far from a full definition of any culture, but they are often the signals that we use to differentiate them. For obvious pragmatic reasons (the survival of artefacts) archeologists often refer to cultures by the name of their distinctive technologies, from broad-brush terms like 'Iron Age' or Bronze Age' to 'Linear-B', which refers to a particular decorative style used on pottery. Values, attitudes, beliefs and interactions almost certainly matter more, but these are not literacies – they are both the effects of literacies, and what drives them. Technologies emerge from the needs, values, and conventions of a culture and, in turn, affect them. But the laws, customs, architectural peculiarities, clothing, language, conventions and other technologically enacted aspects of any culture are what make it distinctive, from hipsters to geeks to Canadians. Anyone who is not able to operate and enact such technologies is not yet a full member of any culture that requires them. Such an individual is not yet literate within that culture.

The value of this perspective

Most prior attempts at defining new literacies have focused either on values and attitudes that precede and proceed from skills, or (predominantly) have focused on a particular subset of skills needed to operate a given set of technologies. My clarification (not a redefinition) of the term 'literacy' restores the focus of the original use of the word to refer to those skills that are prerequisite to participation in any given culture, whether it be as small as a community of practice or as large as a nation. This is far more consistent with the original meaning of the word and has both descriptive and generative power. In the first place it makes it easier to distinguish one culture from another: we can explore nuances of differences between the cultures of, say, cultural historians and philosophers, or computer scientists and data scientists, as well as the many subcultures that exist within and that cross boundaries between them, by examining the technologies (including theories, models, methods, tools, etc) in which they must be skilled. In the second place, it helps us to identify the techniques and skills that matter within a given culture, allowing us to explore what kind of training, education or enculturation might be needed in order to participate in any particular culture. In the third place, it allows us to predict what kinds of behaviour might be exhibited within any given culture. Knowing the tools – and especially the hard techniques needed to use them - helps us to anticipate their effects.

Researching literacy

One of the first problems that emerges from this shifted perspective is that of determining the boundaries between one culture and the next. The simplest approach to doing this is to seek differences in clusters of technologies that define them, though there are risks of begging the question in doing this. It is possible because cultures are not normally solely defined by technologies - values, beliefs and attitudes, though deeply bound up with and codependent on technologies (from religions to languages), are in most ways more significant - and because there are seldom if ever single technologies that define a culture. Even those that appear obvious differentiators, such as country divisions, or individual occupations, are

actually markers for clusters that include distinctive laws, norms, patterns and tools. We should be suspicious of (though not necessarily dismiss) cultures that appear to relate to a single fuzzy technological dimension, such as 'digital' or '21st Century' or 'new media' that are not associated with other technologies or distinctive attitudes and values. It is important to distinguish such usage from genuine cultures that develop around particular technologies. For instance, Apple fanboys and fangirls are distinct cultures that are linked by a love of Apple technologies. They use language that is idiosyncratic to the community (when talking with others in the culture, 'Steve' only means one thing, for instance, and the distinction between x86 and PPC is clearly understood by all), there are distinctive design paradigms that tend to inform their websites and other publications, and their attitudes to many other technological artefacts are coloured by their love of Apple. What counts as 'literacy' in an Apple fanboy/girl culture mainly relates to relative skills in using Apple products, software that runs on Apple products, and ability to identify small distinctions between Apple products. It is harder to identify the values and technologies of, say, a generic social network or social media culture, though it may often be possible to identify them within a particular system. In the first place, social media are very far from being a single thing: there is a world of difference between, say, Facebook, Twitter, and LinkedIn, and there are subcultures within all of them. If all that is shared by people that use social networks is the fact that they use social networks then it is not a culture at all. It would be considerably more useful to consider subcultures that make use of social networks, to focus on the skills needed to participate in those.

It is easiest to distinguish cultures when they form into deliberately segregated sets. For instance, among the vast proliferation of subreddits there exist many distinctive cultures that differ from their counterparts outside the platform, which are conveniently separated from others by their labels and a technology that isolates them from other subreddits. These exist in a hierarchy. To be literate in the culture of a subreddit it is first necessary to have skills using Reddit. There are also plentiful common technological skills needed to participate in any subreddit. Reading and writing are, of course, a given, as are abilities to use a browser or app, navigate around the site, post messages, and so on. It is necessary, for any subreddit, to know the rules, to understand how messages are rated up or down, to operate the editor and its arcane and complex syntax (for example, use of tags to hide spoilers). It is also important to know the rules and norms of each particular subreddit. At this point, cultures within Reddit divide. To participate fully in a subreddit about, say, Existentialism, demands knowledge of existentialist literature, methods, concepts and terminology, to know how to debate in this vernacular, or at least to have the intention of doing so. The fact that many do participate in such discussions without such knowledge confirms this: they are either newcomers to the culture or cultural outsiders, and tend to be recognized as such, notwithstanding the recognized value of legitimate peripheral participation (Lave & Wenger, 1991). This leads to an important means to distinguish which skills are part of the literacy of a given culture: they are the ones that must be learned in order to be a full participant. One of the advantages of looking at a technologically mediated culture like those of

subreddit is that Reddit's mechanisms make it very easy for outsiders to be excluded and to identify those that are outside the culture: for the most part, in a sufficiently active subreddit, those that do not get any upvotes, or that are actively downvoted, simply disappear. There are some cultural invaders that are so proficient in the use of Reddit that they are able to invade – trolls, for example - and there are usually paths to participation that are recognized and accepted by the community but, on the whole, the system helps to parcellate the culture from others. There are also mechanisms to allow seepage from one subreddit into the general population which, mostly quite slowly, affects the super-culture of Reddit itself.

It is not unlikely that there may be useful lessons to be drawn from this for those of us seeking to both establish or support the development of literacies in our online teaching, and to break away from the sterile hegemony of the traditional course while retaining its strength for learning support. Most Reddit communities are not social networks but social sets: people gathered around an idea, belief, or interest, not one another (Dron & Anderson 2014). It is notable that one particular subreddit – 'Change my view' (more commonly abbreviated to CMV) – has evolved to be one of the very few set-oriented communities on the Internet that, with a relatively low level of technological support and relatively restrained moderation, is positively civilized, that seldom if ever devolves into trolling or abuse, and that is a model of intelligent, enlightening learning discourse. CMV's basic premise – that individuals post deeply held beliefs or convictions and invite others to challenge them – has firmly established a culture of respectful, positive, formative dialogue. Learning the technologies of this culture – most of which take the form of norms and methods of debate but, above all, are embodied in the subreddit's basic premise – can be a powerful educational experience, a highly transferable literacy that might have great value in many other cultures.

Conclusion

In an increasingly complex networked world it no longer makes sense to focus on isolated categories of competence of the kind that have emerged over the past few centuries. In the first place, within any culture there will be constantly changing technologies and skills that are needed to participate within it. In the second place, now more than ever, we need to recognize the value of diversity, of merging between cultures, cross-cutting cleavages between them, and connections through which creative cross-semination can occur. Beyond Literacy and numeracy, the deictic nature of skills in new media and technologies make it a fool's errand to seek to inculcate or nurture specific 'literacies' in them, because they evolve too fast and are inherently transient. Part of the problem is that this means that they become redundant almost as soon as we acquire them. Part of the problem is that they evolve to suit us rather than (as in the case of text and number) requiring us to adapt to suit them: the hard techniques that we originally needed to learn often become embedded within the machinery of the system itself. None the less, whether or not they are in constant flux, there are hard skills needed to participate in any given culture that help to form and that are in turn formed by that culture. The

definition that I have presented here provides a possible direction that will enable us both to identify those skills and, ultimately, to assist in acquiring them. Unlike previous definitions, mine avoids absolute classifications that ossify particular tools and cultures: it allows the definition of culture to remain, as it must ever be, fuzzy and shifting while still enabling us to identify our place and our needs for x-literacies within it.

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