Lifelong learning in the Information Age

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Over the last two decades there has been profound change in how we work and how we equip ourselves for professional careers. The Information Age arrived with computers in the workplace during the late 1980s, and networking workplaces and households during the 1990s. Information and communications technology, now often indistinguishable, have become pervasive and ubiquitous – impacting on our workplaces, career development and personal lives.

In an environment where change is continuous, success and survival itself depends critically upon the individual's ability to rapidly adapt, and upon the ability of communities to adapt quickly. Adaptation depends upon the ability to learn, and to learn quickly – and where change is continuous, adaptation must be continuous therefore learning must be continuous.

In the domain of warfare and the industries that support warfare, digitization and networking are no less pervasive than in the civilian community. War, being the most destructive form of competitive social behaviour, has historically been the focal point, where rapidly evolving technologies and the human element must work together effectively. Nations that have mastered this technique have historically prevailed over those less able to do so. The Cold War is the classic case study, where the US drive into sophisticated digital technologies ahead of the Soviet Bloc rendered the latter unable to compete, and ultimately bankrupt.

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In the environment of today technological evolution is continuous and rapid, which is likely to continue for the foreseeable future. This is because the driving force behind this evolution is technological, and the technology base being now digital, is in turn driven by the laws governing the evolution of Information and Communications Technology, or ICT.

These behaviours were first identified during the 1960s, with the discovery of Moore's Law, and analogues have since been defined for disk storage capacity and network communications. In a nutshell, Moore's Law named after Gordon Moore a cofounder of Intel Corp, states that per dollar expended computing power doubles every 18 to 24 months. The current benchmark is that a commodity personal computer today has a clock speed of several Gigahertz, one, two or four processing cores, at least a Gigabyte of main memory, all unthinkable a mere decade ago. Kryder's Law says much the same for hard disk drive capacity, with the current benchmark being Terabyte sized drives in the market at $130 to $150 per unit, again unthinkable a mere decade ago. Nielsen's Bandwidth Law, which applies to digital networks, also follows the two-year doubling rule.

In the absence of any hard limits presented by the physics of the technologies used to build ICT equipment, there is no end in sight to this evolutionary process. Multicore processor technology, and the emergence of Grid Computing, where up to thousands of networked processors can be used to solve increasingly large computing problems or applications, present a future where the current mechanisms of change will become even more pervasive, with digital computing power and storage capacity becoming commodified 'utilities' no different from the electricity grid, the water and sewerage systems, the telephone network and the road infrastructure.

When American sociologist Alvin Toffler published his now famous book 'Future Shock' in 1970, it created a minor storm. Toffler argued that much of the social turmoil and chaos of that period could be directly related to the very rapid rate of change in people's lives, as progressing industrialization resulted in an ever increasing rate of change across many if not most aspects of people's lives. This resulted, in turn, in stress and disorientation, with resulting symptoms impacting the lives of individuals and communities. Toffler also coined the term 'information overload' to describe situations where individuals are simply overwhelmed by the volume of information they need to absorb and comprehend in their daily lives, resulting in distress, anxiety and ultimately a form of paralysis.

A compelling argument can be produced now that many if not most of the social and institutional dysfunctions and breakdowns we now observe in the developed world can be directly or indirectly related back to the systemic impact of 'information overload' arising from an incessant deluge of digital data across all levels of society, but especially the management and governance tiers of the machinery of government and industry.

An advanced degree in psychology is not required to make the simple observation that people who are subjected to incessant bombardment with excessive volumes of data, at some point simply lapse into a state of indifference and cease to react or respond to inputs effectively.

This effect has been identified and described by UK psychologist David Lewis, although often credited to industry analyst Edmund Tan, as 'Information Fatigue Syndrome', or IFS. This is described in a number of web references as "a weariness or overwhelming feeling of being faced with an indigestible or incomprehensible amount of information" with symptoms including "paralysis of analytical capacity", "a hyper-aroused psychological condition", and "anxiety and self-doubt", leading to "foolish decisions and flawed conclusions." (Refer Lewis D, Dying for Information? An Investigation into the Effects of Information Overload in the USA and Worldwide, Reuters Ltd, 1996).

Whether we prefer Toffler's 'information overload' or Lewis' IFS as labels, the material reality is that the explosive Moore's Law driven growth and penetration of advanced information and communications technologies into every aspect of life and society is producing unwanted and often destructive side effects.

The damage effects are most pronounced in occupations where decisions impacting large and important matters must be made frequently, and good examples are the management tiers in civil and military organisations, and the political system. The paralysis we observe in much of the industry, public service, military staffs and political systems in the developed world today can be directly related to a defacto epidemic of 'information overload'. Anybody who has in recent times attempted a discussion on a basic policy issue with almost any politician will see these symptoms, and more than one Canberra parliamentarian has complained to this author of exactly this problem in recent years.

It is worth observing that 'information overload' is effectively what is experienced in repeated military engagements by the side with the slower Observation Orientation Decision Action (OODA) loop, which will lapse into 'analytical paralysis' and

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eventual military defeat. Ample examples exist in the commercial world.

Solving the problems arising from the 'information overload' epidemic presents interesting challenges. Perhaps the biggest is that legislators and senior managers who need to make important policy decisions to deal with this effect are more than often IFS victims themselves and in a state of 'analytical paralysis'. The result is emotional denial, inability to understand the problem and, more than often, little acknowledgment that they themselves are both victims and part of the problem.

The Luddite approach to the problem, which amounts to rejecting and ignoring advanced technology and its various effects appears to be increasingly popular. But this approach is equally futile – as individuals, organisations or nations which play the Luddite game will simply fall behind those who choose to act.

There is ample literature which discusses how to overcome 'information overload', and in every instance the solution lies in learning effective techniques for filtering information from clutter and focusing on what matters rather than the intentional or incidental distractions contained within the information deluge.

It is at this point where the 'information overload' epidemic collides with the deleterious effects of declining educational quality and standards in the developed world. People who are properly taught critical thinking, problem solving and decision making techniques appear to be the least susceptible to IFS, because their habitual thinking process is exactly what is needed to filter substance from clutter most effectively. People who are not taught critical thinking, problem solving and decision-making techniques quickly fall into the black hole of 'information overload', which in turn impairs their ability to learn the techniques needed to overcome the problem. The latter is also why we observe so frequently people lapsing into a state of indifference, and a propensity to become infatuated with foolish ideas, which are easy to grasp yet often bear little resemblance to the realities at hand.

It is no accident that 'analytical paralysis' and problems of indifference resulting from 'information overload' arise least frequently in those groups which are most skilled at hard critical analytical thinking techniques, and most frequently in those who are not. The failure of the public education system in delivering proper science and humanities education at high school level has produced a generation or more of people who are not equipped to cope, and has effectively fed the 'information overload' epidemic in the developed world.

Overcoming this problem is critical to the ability of individuals, organisations and nations to adapt effectively and quickly in a complex and rapidly changing global environment.

Educational theorists often use Bloom's taxonomy (refer Bloom, Benjamin, et al. Taxonomy of Educational Objectives: The Classification of Educational Goals. New York: McKay, 1956) to describe the steps of phases in the learning process. This model is important both from the perspective of the learning process, but also illustrates why 'information overload' has collided so effectively with the ongoing reduction in the quality of education across the developed world.

Bloom's model assumes that the learning process has six steps or phases (cite Bloom):

1. Knowledge of (based on recall)
2. Comprehension (grasp)
3. Application (having a go)
4. Analysis
5. Synthesis
6. Evaluation (judging worth, etc)

An individual learning about anything must first

acquire knowledge, comprehend what it means and how it works, then apply that knowledge and comprehension to solving problems, upon which further problems can be analysed and understood, new solutions devised, and judgements formed about alternatives.

A pattern we see far too frequently across our communities today is a propensity for people to become mired in the first or second steps of this learning process. The Internet has become a key problem in this respect as it provides often hundreds of references or documents dealing with any given matter, yet more than often 99 per cent of this material is inaccurate, simply wrong, based on subjective/biased opinion or commonly held but not correct beliefs (aka 'urban myths'). More than often the Internet itself becomes a direct cause of 'information overload', as the convenience it affords makes it a more popular solution to trying to learn something than going to a library to find an academic textbook.

Learning anything today is much more difficult than in the era predating the Internet, because the individual trying to learn has to contend with a deluge of competing data on any given subject, much of which is simply clutter with no actual substance to it.

A particular problem has been the intensive use of the Internet for marketing commercial, political, religious or ideological agendas, and where these agendas clash with the factual realities determined by science or other academic disciplines, many people become lost quickly.

Wikipedia presents a good case study. Pages covering basic science topics are often superbly accurate and more than often as good as any university textbook. Pages covering topics where agendas collide are often full of ideologically motivated nonsense, and frequently in a state of flux as agenda driven parties chop out content and replace it with their own ideas of reality. The propensity of political, ideological, religious and commercial groups to systematically work at corrupting this valuable public resource makes for a good story in its own right.

The challenge presented by this environment is exacerbated by poor quality public education in the contemporary developed world. The ability to separate fact and substance from conjecture, opinion, and propaganda is predicated on the ability of an individual to form critical judgements, which in turn requires a good measure of prior understanding, encapsulated in the latter three phases of Bloom's learning model. One cannot easily sort fact from well crafted fiction if one cannot produce informed critical judgements on a topic, based on the ability to analyse, synthesize and evaluate. The manner in which much of the educational system in the developed world has focused on teaching models centred in the first phase of Bloom's model, rather than focusing on deeper understanding of fundamentals and associated critical thinking skills, primes its victims to fall into the black hole of 'information overload' and resulting professional incompetence.

The solution to this problem is to change fundamentally how students are taught, at primary school, high school, technical college, university undergraduate or graduate coursework levels: to focus on developing the ability to think critically, and instilling a better understanding of fundamentals. This is easier said than done because educational bureaucracies across the developed world are deeply enamoured with ideas centred in the avoidance of classroom competition and not exposing students to the distress of failure. This ideological bias has coincided with a propensity for governments to try to reduce the cost of teaching at all levels, which results more than often in less time available per student for teachers to instill deeper understanding – usually gained through experimentation, practical work and one-on-one discussion. Hiring less qualified teaching staff to save money simply makes this problem worse.

The Information Age is thus a blessing and a curse. The future is one where learning throughout life is an unavoidable necessity for success in any discipline or professional specialization. The challenge we collectively face is changing the educational systems of the developed world to enable the population to learn effectively and not fall victim to 'information overload' effects. To date little or no effort has been expended on solving this problem, with generally damaging and often disastrous effects as a result.