# Knowledge, The Disciplines, and Learning in the Digital Age

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For many people, the Knowledge Age, the Information Age, and the Digital Age are all more or less the same thing: - all emerge from, and are inextricably connected with, recent developments in information and communications technologies (ICTs). ICTs are seen as playing a key role in education now and in the future. They are now widely used in schools, and are seen by many as a kind of "magic bullet" that will revolutionize teaching and learning, and solve all our problems. In this paper I argue that ICTs have *not* (as yet) revolutionized teaching and learning. Instead, our basic teaching practices haven't changed very much at all, and ICT use in schools is often little more than "digital busywork", preparing learners for the world of the past, not the world of the future. I outline why I think this is happening, and what I think we should do about it.

ICTs and Knowledge Society thinking are linked in the world outside education: however, inside education they are not - as yet. Knowledge Society ideas are not well understood by educationists. Our education systems – our ideas about what schools are for, what they should teach, why they should teach it, and what it means if students don't learn it – are still very much Industrial Age systems, developed to serve the needs of Industrial Age societies. Because the new ICTs have simply been added on to this model of education, they are being used to support Industrial Age - not Knowledge Age - goals. I want to argue that, if ICTs are to play a useful role in helping us re-develop our schools for the Knowledge Age, we will need to re-think some of our old ideas about knowledge. In particular, we need to re-examine the place and purpose of the traditional disciplinary knowledge that is the basis of the current school curriculum.

I begin by looking at two ideas that are central to Industrial Age education systems. I look at where they came from and why. I then explore some of the conflicts between these ideas, look how they are resolved, and explore why we need to do things differently if we want to build Knowledge Age education systems.

## Industrial Age education systems

Industrial Age education systems are based on two key ideas:
(1) the importance of traditional "disciplinary" knowledge; and
(2) the necessity to "sort" people according to their likely employment destination.

Where did these ideas come from?

In the Western European tradition, the first of these two ideas can be traced back to the work of the Ancient Greek philosophers, in particular Plato and Socrates. Plato wrote a great deal about education. He set out a model for education that, he thought, would produce a stable, secure, just society. This system, while open to all, was specifically designed to educate the "philosopher kings" – or future rulers - of his ideal state. The curriculum of this system was explicitly knowledge-centred. Plato thought that exposing individuals to *particular* kinds of knowledge – the best and greatest that human minds have been able to produce – would 'train their minds' in ways that would allow their development to parallel

the development of the best minds of the past. His model is the basis of the traditional 'academic' curriculum that has structured Western education systems for thousands of years.[1]

In most of the time since Plato, however, only a very small proportion of the population received any formal education. Mass education, in Western countries, is a relatively recent phenomenon. It is only in the last 150 years or so that public, state-funded, compulsory schooling for *everyone* has been the norm. Two imperatives drove this development:

(1) the political philosophy of *egalitarianism* (the idea that everyone should have an equal chance to succeed in life), and

(2) the *economic* need for people with the skills and dispositions necessary for work in the new Industrial Age enterprises.

While both of these ideas were probably necessary to the development of mass education, they conflict in important ways. This conflict was resolved through the use of a strategy which cleverly combines Plato's traditional academic curriculum with one of the Industrial Age's iconic concepts – the production line.

Industrial Age education systems are organised, like production lines, to mass-produce standardised products.[2] Students are 'processed' through the system in 'batches' (known as year groups or classes). A pre-set curriculum is 'delivered' to them in a pre-set order by people who specialise in different stages of the production. The tasks to be completed are broken down into bite-sized pieces. Students are guided through each stage in a way that allows them to gain certain specific skills ('the basics'), but which actively prevents them from "thinking between the tasks" - and from seeing and understanding the 'big picture' of what they are learning.[3] As they pass through the system, students are subjected to various 'quality control' devices, designed to assess whether or not they 'measure up' to the system's standards. This 'production line' approach is a very efficient way of dealing with large volumes of 'product'. It is also a reasonably efficient way of ensuring that most of the product meets certain basic standards, while at the same time allowing the system to sort out which of its products 'has what it takes' to go on for further processing. The main instrument of quality control – at the secondary level - is the traditional academic curriculum.

On the surface this 'one-size-fits-all' approach seems to resolve the tension between the need to meet the human resource needs of an industrialised society, and the need to produce equal opportunity. However, as education academics have long argued, it doesn't *actually* produce equal opportunity. In my country and many others, this system produces large spreads of achievement - large gaps between the highest achieving students and the lowest achieving students - and a great deal of 'wastage'. Large numbers of students do *not* 'measure up' to the system's standards. These students are rejected and allowed to drop off the production line. In my country this state of affairs was tolerated by most people for most of the 20th century - largely because there was no shortage of reasonably well-paid low-skill jobs (producing and processing the agricultural commodities that were until recently the backbone of our economy) for the system's rejects. However, this is no longer the case. Our economic environment has changed dramatically. Our government currently has a strong focus on re-building our economy so that we can be part of the Knowledge Society, and education is widely seen as having a key role to play in this. Current policy work is largely

1 See, for example, Popper (1966).
2 See, for example, Beare and Slaughter (1993), Senge *et al* (2000), Beare (2001).
3 Skilton-Silvester (2003).

focused on improving *what we do now* – reducing our "long tail of under-achievement", "closing the gaps" and "reducing disparities". However, because disparities are an integral feature of 'one-size-fits-all' systems, it is highly unlikely that they will be reduced by this approach.

**What should we do differently then?**

I think that the first thing we need to do is to acknowledge that we're not in the Industrial Age any more, and then, following from this, we need to move beyond Industrial Age ways of thinking about education.

What does this mean? Do we need to throw out Industrial Age education's two key ideas (the importance of traditional "disciplinary" knowledge, and the need to 'sort' people)? If so, what ideas should we have instead? To answer this, we need to look in more depth at the 'mental models' of knowledge, mind and learning that flow out of these two key ideas.

Industrial Age education systems are informed by certain 'mental models' of knowledge, mind, and learning. Put simply, these models are as follows:

- Learning happens in individuals;
- Knowledge is "stuff";
- Learning involves storing stuff away in individual minds (and some people are better at this than others);
- The curriculum is made up of different types of knowledge (disciplines). Some are harder than others. These harder forms of knowledge can be used to work out who will benefit from higher education and who won't.

These mental models might have been an appropriate basis for preparing people for life in the Industrial Age, but, if we accept what the Knowledge Age literature has to say, they are very definitely *not* a suitable basis for an education system designed to prepare people for life in the Knowledge Age.

**How is Knowledge Society thinking different from Industrial Age thinking?**

The Knowledge Society literature tells us that Knowledge Societies do not depend on exploiting natural resources for their economic growth: rather *knowledge* is the key driver of economic growth. The development of knowledge - or information - societies has long been a subject of discussion in the social science, philosophical and business literature.[4] According to this literature, these new kinds of societies are closely associated with the development of "fast" capitalism, new forms of production, and new management systems.[5] In this new work order there is a strong focus on knowledge and learning, and these terms are developing new and different meanings. Knowledge and learning are, in this context, closely associated with terms like 'innovation', 'change', and 'quality'. To 'innovate' is to re-make old knowledge in new ways - a process that destroys the 'old' knowledge, and 'quality' now means 'continuous improvement'.[6] Knowledge is now innovation, innovation is quality, and quality control is knowledge management. In other words, 'knowledge' is being used to mean something *different* from the meaning it has in educational contexts.

[4] See, for example, Toffler (1970), Touraine (1971), Bell (1973), Lyotard (1984), Stehr (1994), Champy (1993), Drucker (1993), Handy (1989, 1994 ).

[5] See, for example, Senge (1990), Drucker (1993), Gee et al (1996), Prichard et al (2000), Peters (2001).

[6] Neef (1998), Harvey (1990), Landes (1998).

The sociologist Manuel Castells in his massive empirical study of organisational transformation *The rise of the network society*,[7] says that knowledge is no longer thought of as if it were the static product of human thought, a kind of 'matter' that can be codified in 'disciplines' or 'expert individuals'. Rather, it is now widely understood as being more like 'energy', as something which is defined via its effectiveness *in action*, by the results it achieves. It is not a 'thing' that can be defined, pinned down, stored and measured, but a dynamic, fluid and generative 'force', or capacity to *do* things. For Castells, knowledge is now something that *causes things to happen*: it is no longer thought of as 'stuff' that can be learned and stored away for future use. It is something that is produced collaboratively, by teams of people, something that 'happens' in the relationships between those people. It is more like a 'process' than a product, it is constantly changing, evolving, 'flowing' and re-generating itself into new forms.

The development of the new meaning of knowledge described by Castells was predicted, in the mid-1970s, by the French philosopher Jean-François Lyotard. In *The Postmodern Condition*,[8] Lyotard argued that knowledge, in post-modernism will be important, not because of its relationship with truth, reason and certainty, but for what he calls its 'performativity', its 'energy' or ability to *do* things, its 'use-value'. It will be 'mobilised' on an 'as-and-when-needed' basis to produce innovative new products: that is, it will be produced in order to be sold, and its value will be determined by whether or not its results sell. For Lyotard, the idea of knowledge as a set of universal truths is obsolete. Instead *many* reasons, *many* truths, *many* knowledges are both possible - and desirable. As a consequence, he says, traditional disciplinary boundaries are likely to dissolve, traditional methods of representing knowledge (books, articles and so on) and 'expert' individuals will be far less important, and new conceptions of learning will develop. According to Lyotard, learners will be encouraged to develop an understanding of an organised stock of 'public' and/or 'professional' knowledge ('old' knowledge), not in order to add to it, but to pursue 'performativity': to apply it to new situations, to use it and replace it in the process of 'innovation'. They will be encouraged to understand the rules or established procedures of a discipline, profession or trade, not in order to follow them, but in order to see how they might be modified or 'improved'.

This work has obvious significance for educators.

To summarise, Knowledge Age ideas about knowledge, learning and minds are as follows:

Knowledge

- is a *process*, not a "thing" (or "stuff");
- *does* things - more like *energy* than matter;
- happens in *teams*, not in individual "experts"*;*
- can't be codified into *disciplines*;
- develops on as *as-and-when-needed* basis;
- develops *to be replaced*, not to be stored away.

Learning

- involves *generating new knowledge*, not storing it;
- is primarily a *group*, not an individual, activity;

[7] Castells (2000).

[8] Lyotard (1984).

- happens in real world problem-based contexts;
- should be just-in-time, not just-in-case;
- needs to be *á la carte*, not *en bloc*.

Minds

- are not containers, filing cabinets, or databases – places to store knowledge "just in case", but rather are *resources* that can be *connected* to other resources for the *purpose of generating new knowledge*.

Accepting these new "mental models" of knowledge, mind and learning, forces us to re-think the Industrial Age education system's two key ideas.

In the Knowledge Age model, *everyone* needs the kind of knowledge and skills traditionally only provided in "higher" education. We need new ways of organising education based, not on the one-size-fits-all, production-line model, but on new models that allow flexibility, multiplicity, and new ideas about 'ability'. Secondly, we need a new way of thinking about what we teach, and why we teach it, a new way of thinking about the traditional disciplines that underpin the school curriculum.

Much of the future-focussed educational literature emphasises *learning* – "learning skills", "life-long learning", "learning how to learn", and so on. Underlying this is the idea that it doesn't really matter *what* students are learning, as long as they are learning something, and that the 'old' disciplines no longer matter. I think it *does* matter what students are learning, and that the old disciplines are still important. However the *reasons* they are important (and what we do with them) are now very different from the reasons they were important in the past. In the traditional academic curriculum the disciplines are important as *ends in themselves*. Knowing about - and being disciplined into - the traditional disciplines developed the mind in particular ways. That was the goal. The extent to which this goal is achieved in any one individual is measured by the assessment system (and students and teachers are judged by the results).

In a Knowledge Age education system I think we need to re-think this. Following Lyotard, I think we need to see the traditional disciplines, not as ends in themselves, but as resources for "pursuing performativity". Performativity is the ability to take elements from one knowledge system, put them together with elements from another *different* knowledge system, re-arranging them to do something new and different. It involves *doing things with knowledge*: going *beyond* the mastery of existing knowledge to the generation of new knowledge. However, doing this obviously requires one to know quite a lot about the knowledge systems one is using. It requires one to know about these systems, not at the level of their detailed facts, but at the *systems* or *meta*-level - how different knowledge systems "work"; what assumptions underpin them; how experts in those systems generate and justify new knowledge; how one system is different from (and similar to) other systems – how meaning is made in different knowledge systems.[9]

**What does all this have to do with why ICTs haven't had much effect on basic teaching practices?**

[9] For an elaboration of this argument see Chapter 6 of my book *Catching the Knowledge Wave* (Gilbert 2006).

To go back to my earlier assertion, the reason ICTs haven't revolutionized teaching and learning, as they were expected to, is that they have been added to – and incorporated into – an existing educational model.

In Industrial Age education systems:

- there is a strong focus on the disciplines as ends in themselves;
- learners are disciplined by/subsumed into the disciplines;
- there is a strong focus on *print/text*-based ways of representing knowledge and developing *print literacy*.

ICTs used in this context tend to be used mainly for *finding* existing knowledge (e.g. from databases or the internet), and/or *presenting* existing knowledge (e.g. word-processing, PowerPoint, video/multi-media, web pages). These are 'old knowledge' skills. More significantly, however, they encourage learners to see themselves as passive *spectators* in relation to knowledge: - to see knowledge as something 'out there', already developed by others, and to see themselves as having no role to play in relation to knowledge - except to 'consume' it.

In my view, Knowledge Age education systems need to focus on:

- developing *new knowledge* – through real research[10] (not teacher-initiated projects);
- developing *multi-modal literacy*[11] (understanding and using non-print modes of making meaning – images, sounds, gestures/body language etc);
- *relationships*, *connections* and *interactions* between different knowledge systems and different modes of representation;
- *difference* and *diversity*, not sameness and/or one-size-fits-all approaches;
- *process* not product.

ICTs could be very useful in supporting this. They could:

- allow the kinds of relationships/connections/collaborations (global and local) that are needed to develop new knowledge (Knowledge Age schools need to be *producers* – not consumers - of knowledge);[12]
- provide the tools and resources needed for 'real research';
- allow learners to 'play' with different ways of making meaning – via multi-media tools – and different identities;
- help learners to build a sense of themselves as *active knowledge-builders* – as having a unique niche, role and/or point of difference/contribution to make.

ICTs *could* be the 'magic bullet' that revolutionizes teaching and learning for the Knowledge Age. However, when they are simply 'added into' our current Industrial Age system, this is very unlikely. If we *want* them to help us change our teaching practices, we need to take a step back. We need to take another look at our schools in the light of what they need to be able to do to prepare people for life in the Knowledge Society. We need to go back to some very basic questions, to ask ourselves what we think schools are *for*; what we think our schools should teach; why we think they should teach this; and what we think it means if students don't learn these things.

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10 See Bereiter (2002).

11 See Kress (2003), Lankshear and Knobel (2003).

12 Bigum (2003).

I think we need to focus:

- not on using ICTs for finding/presenting/mastering existing knowledge;
- but instead on using them to *generate new knowledge*.

- not on learners as passive consumers of knowledge;
- but on learners as *active producers* of knowledge.

- not only on print/text as the primary mode of representation;
- but on developing *multi-modal* literacy.

- not on learning the key facts of a discipline;
- but on developing *systems-level understanding*.

- not on disciplines as separate entities;
- but on exploring *relationships* and *connections*, *comparing* and *contrasting*.

- not on the 'old' disciplines as ends in themselves;
- but seeing the 'old' disciplines as *resources* for *new knowledge generation*.

- not on the necessity for long apprenticeships in the disciplines;
- but on allowing children to do things with knowledge *from an early age*.

- not on maintaining the 'old' hierarchies of knowledge (and the academic/applied split);
- but on exploring the use of different knowledge systems for *different purposes*.

- not on using the disciplines as gatekeepers of higher education;
- but developing systems that allow *everyone* to develop *higher order/critical thinking* skills.

You will have other ideas – these are just an attempt to begin the process of thinking about the kinds of changes we will need to make if we want to prepare learners for successful lives in the knowledge-based societies of the future.

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