Thinking beyond massive, open and online programmed instruction

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MOOPI is nowhere near as catchy as MOOC but is probably a better descriptor of what you experience with a MOOCx. Programmed instruction has been something of a holy grail for the educational technorati that dates back to not long after the very first computers were built. In many respects, all courses might be seen as a program, and as a programming of students. We lose sight of this when our teaching gets clothed in the vogue, wishful namings (McDermott, 1976) of various education discourses, such as student-centred pedagogy or personal learning environments, constructivist learning, real-world learning, experiential learning and so on. However, if it is dressed up, we simplify the process by which students have mastered, or not, the required content, something we call learning, to decision points at which judgments are made that we call feedback and assessment. The judgments reward right thinking, right answers, correct or acceptable methods for doing things. People who are deemed to know a great deal about the content do the judging. Although with the increasing casualisation of the academic workforce, claims about expertise become a little fuzzier. Tutors, like students, need to be programmed and so you find large and clunky bureaucratic structures that somehow are meant to ensure that everything works as intended. In an era where we see the loss of the middle in so many fields of human activity, higher education appears hell bent on adding more and more middle people.

What is interesting is that while the production, preservation/curation and dissemination of knowledge has changed hugely for most disciplines (Constable, 2006), how we think about the ways people acquire knowledge remains unchanged. We have yet to come to terms with the simple fact that to know something is not the old notion of what is solely in the mind/body of the so-called learner. Knowing involves a kind of partnership with machines, a human-machine hybrid if you like. So, how we think about this relationship is an important element in any re-thinking of what it means to teach, learn, and know. The tricky part of the puzzle is that while human thinking/computational grunt is more or less fixed, machines continue to obey Moore’s law. To make the point, I draw on Kurzweil’s (2001) calculations comparing the number of calculations per second in the human brain versus that of computers into the future, assuming Moore’s law holds. There are many reasons to object to this kind of simplification but I think it serves to make an important point, however crude, about the rate at which one side of the human-machine hybrid is improving. Kurzweil estimates that computers will achieve human brain “capability” in 2023 and cost ~$1,000. In 2037 the same machine will cost a cent. In 2049 he estimates a machine with the capability of the entire human race will cost $1,000 and by 2059 a machine with that capability will cost a cent. So the game we call teaching in Higher Education is being played on rapidly shifting sands.

Before moving to the matter of MOOCs I need to be clear about the way I think about technology. For many, technology is stuff, in the case of MOOCs hardware, software, coursework. The people associated with the operation of all the stuff belong in a separate category. Leaving aside the problems this widely used social/technical binary generates, I have found that thinking about technology more holistically offers a more robust and productive approach. In this vein, technology is seen as the way things are done. People and things without language are considered together in any analysis. In this respect, universities are technologies, they are ways of doing higher education. With this cryptic introduction I want to turn to make a few brief points about MOOCs.

**MOOCing around**

1. MOOCx’s arose as skunk works in major universities. That is, they were not planned, sanctioned or controlled by higher ups. This is a key point, particularly for management-intensive Australian universities. There is no way any university in Australia could produce anything as different as a MOOC was when they first emerged unless it was via a setup like a skunk works.

2. They were and remain experiments. No one, when they built these things, had much of a clue about who would take them up, why etc. etc. There are dribs and drabs of data available about this. This is a key idea. In the corporate managerial spin that clouds the modern Australian university, to say that you were

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1. I am deliberately glossing the complexities of various knowledge systems, ways of knowing and so on. See, for example, (Turnbull, 2000)
2. aka the human mind/body
4. Drawing on the argument made by (Franklin, 1999) and more substantively in the literature associated with a branch of science and technology studies known colloquially as actor-network theory (See, for example, (Latour, 2005)).
5. The term is copyright so perhaps a smelly Australian marsupial might be a useful label.
doing an experiment would signal that you don’t know what you are doing. To me, this is a hallmark of innovative thinking. Certainty is not a bed fellow of genuinely innovative developments.\(^6\)

3. The video material that is typically part of content delivery in a MOOC is not far removed from the lectures that prominent US universities had been making available for free via various means in the years leading up to the emergence of MOOCs. Hence the claims that MOOCs play, among other things, a PR role for prominent universities with star public intellectuals.

4. The interesting leveraging being done by, e.g. Andrew Ng at Stanford is to use big data/machine learning\(^7\) to tweak, in real time, the content and delivery of his course. This is something that is nigh impossible to do in small courses with the analytics provided by current LMS. This is a key idea in the development of programmed instruction. It is akin to the real-time tweaking Google does with its search engine algorithms and interfaces. Lots and lots of small experiments to improve things. It’s not clear if the analysis Ng is using is shaped to cluster types of students to cater better for difference in the student population or whether his system is one-size fits all. Whatever it is, the aim is to build the ultimate mousetrap to teach machine learning. The huge numbers of students makes applying his own expertise, through machines viable and elegant.

5. To my mind the motivation behind MOOCs is multiple. I recall that Stanford’s initial offering of an AI course attracted a very large number of students. I think, and I can’t recall the numbers but approximately the 1\(^{st}\) 700 students in rank order of assessment were non Stanford students! So there may be an element of recruiting talent. The 2\(^{nd}\) motivation is undoubtedly intellectual, i.e. what happens if we do this? The 3\(^{rd}\) motivation is likely as promoted, that is altruistic, giving people who otherwise would not have access to gun academics, access to them. This meshes with one of Christensen’s characteristics of a disruptive innovation (Clayton M. Christensen, 1997; Clayton M. Christensen & Eyring, 2011; Clayton M. Christensen, Horn, & Johnson, 2011). The 4\(^{th}\) motivation and here Google and other mega fauna\(^8\) of the digital education tundra are particularly interested in the notion of being at the top of the food chain, i.e. to do a Google on education. They understand the crucial advantage of being the first mover if and when a Google-like solution emerges.\(^9\) This won’t come from universities. Google and other large players have been exploring the control of the dissemination of content for some time. They gobble up anything that looks remotely useful. They have the resources to do a lot of experiments in and around education. These are players to keep a keen eye on.

6. Leaving aside the me-too logic of many Australian universities for getting into the MOOC game, there are undoubtedly things to learn from the experience. What is missed in this thinking is that you can’t generate MOOC-like beasts within the stifling bureaucracy that is the modern corporate Australian university. Sure you can copy and conform to templates others have set up. That’s easy. You can’t do anything that does not fit within the prevailing, A4 logic of Australian Higher Education. Without a facility for something like a skunk works\(^10\) operation, all a university can do is tweak their LMS, software that has been well past its use by date for at least a decade.\(^11\)

7. In all of this, what is always forgotten is that Moore’s law, that tricky empirical observation about the rate of improvement in computing grunt has not been rescinded, the point I made at the beginning. So what universities should be more concerned about are the offspring of MOOCs, their offspring, and their offspring as well as other species that will undoubtedly emerge in a digital education ecology.

8. Programmed instruction is invariably linear, sequential and predictable. It provides a kind of intellectual exoskeleton for students. All they need to do is move according to the constraints and logics of the skeleton: you can walk but you can’t jump. This mode of instruction works better for some disciplines than others. But at base, it is still old wine in new bottles, only on a huge scale.

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\(^6\) See, for example, (Johansson, 2012; Johnson, 2010)

\(^7\) His speciality.


\(^9\) For an excellent analysis of this phenomenon see (Lanier, 2010, 2011)


\(^11\) I tend to think about an LMS as the online teaching equivalent of the BASIC programming language.
The people we call students and the L-word

All Australian universities have a segmented student population, that is they draw students from particular places, locations and for a range of reasons usually peculiar to each segment. Most universities have some capability to answer the question: why did each segment choose us? I think that any threat posed by current or yet to emerge MOOC and MOOC-like experiments will be highly segment specific. Can you imagine a MOOC that provided all the training for doctors? But it is possible to imagine some courses that doctors take being offered in this mode.

I use the alphabetised term L-word instead of learning to get away from the silly, confounding and generally unhelpful mantras that are muttered in relation to what we imagine students do when they engage with a course. What do we actually know? We know what we offer them in terms of course materials and teaching events. We know what they produce when we ask them to show evidence that they have come to terms with the content we have provided and we judge them on the basis of what they produce. To use a cooking analogy, we judge the appearance and taste of the apple pie, not how they actually produced it, the work-arounds, the muck ups, the fixes, the glossed glitches and so on. Having a system that works on the scale of university class sizes dictates such a pragmatic approach to the L-word. I want to suggest that a lot of these logics derive from an A4 mindset, that is one that thinks in terms of the physical limits of paper, books, typewriters and pens that were the way things were done before the Net. We have a system that values right answers. Computers give answers. We have a system that largely values things that machines are good at. I leave that provocation hanging.

The second point to make about the L-word has to do with how courses, including MOOCs are produced. We identify people who have expert knowledge in a field and have them design the best sequence of experiences for an imagined learner. While all curricula represent the best intentions of those who build them, they rarely have any representation of what it was like for the expert when she was a novice, i.e. was new to the field. For all of us who have invested so much in coming to terms with a set of ideas in a field, we simply can’t remember what it was like not to know. A good colleague once described doing a university course as being akin to climbing a ladder that has the bottom rungs missing.

One approach to this problem is described by Dan Dennett (2013)

Scientists often ask me why philosophers devote so much of their effort to teaching and learning the history of their field. Chemists typically get by with only a rudimentary knowledge of the history of chemistry, picked up along the way, and many molecular biologists, it seems, are not even curious about what happened in biology before about 1950. My answer is that the history of philosophy is in large measure the history of very smart people making very tempting mistakes, and if you don’t know the history, you are doomed to making the same darn mistakes all over again. That’s why we teach the history of the field to our students, and scientists who blithely ignore philosophy do so at their own risk. There is no such thing as philosophy-free science, just science that has been conducted without any consideration of its underlying philosophical assumptions.

Making mistakes, productive stupidity (Schwartz, 2008) and the value of knowledgeable ignorance, perceptive ignorance, insightful ignorance (Firestein, 2012) tend to be rare in courses other than those directed towards systematic enquiry, aka research. Firestein actually teaches a course on ignorance!

Where there has been detailed research that looks at what students actually do when faced with particular tasks in a course, it clearly shows that the logics students bring to the task have little to do with the well-intentioned, carefully designed tasks of the course.

A final provocation. This from Doug Thomas and John Seely Brown (2011, p. 92)

In 2006, a survey conducted by Roper Public Affairs for the National Geographic Society found that 63% of Americans aged 18 to 24 could not find Iraq on a map of the Middle East. Robert Pastor, a professor of international relations at American University, described the problem as “geographic illiteracy”. Two years later, one of us replicated the survey with a smaller sample and a slight variation.

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12 Related to this notion, I have been exploring the notion of what I have called public click pedagogy, PCP. Some of this work can be found here: http://pubclickped.wikidot.com/
Doug recruited 18 undergraduate students, also between the ages of 18 and 24. But instead of providing a map, he sat them down in front of a computer and said, "Find Iraq." One hundred per cent of the students were able to do so—and more. They asked, "Street view or aerial?" Do you want to focus on any particular region or the whole country?" Should I turn the satellite imaging on or do you want it in map form?"

This brings us back to the machine-human hybrid. While it is a cheap and for some, annoying shot to ask why are you teaching students to do things that machines are good at or soon will be, it nevertheless underlines the nature of the rapidly shifting circumstances in which we now operate. Here, I want to make one simple point. The approach I very briefly outlined earlier, the holistic take on the human-machine poses the interesting issue of delegating work to a machine. This is a non-trivial problem. Simply getting a machine to do work without thinking about the complementary skills a human needs is folly.

The other notion associated with an A4 mindset is one of scarcity (Mullainathan & Shafir, 2013). Pre the Net, paper, books, and distribution mechanisms were key elements in making ideas, knowledge and information scarce. Other people decided what you would read in a newspaper or watch on television. Other people decided what you would read in scholarly journals. This Gutenberg logic of scarcity no longer exists. The net is a giant copying and publishing machine. Everyone now has a blanket to send smoke signals (Weston, 1997). Access to ideas, experts, knowledge is no longer the issue. Yet, so many of our practices in Higher Education operate as if this is still the case. We try and generate modes of scarcity so we can maintain the illusion of scarcity. In a world of scarcity, people who operated as radio transmitters of other people's ideas were important. Relaying material and perhaps tweaking it a little was important work. They did a fair job in curating a small set of resources. This is what teachers at all levels did. It does not make a lot of sense to be a radio transmitter these days. We have the Net. It makes a heck of a lot of sense to be a darned good curator though.

These provocations reflect my own long-standing interests. I find the endless ground hog day debates and associated scholarship around the L-word to be uninteresting and reflect more of the logic of an A4 world than the world in which we currently work. They represent what I like to think of as the educational unimaginative.13

The value of small affordable experiments

It is important to recognise that any new development will come from the edges, more likely from a field that has, at first blush, little to do with formal education.14 This is a warrant to look outside our comfortable and familiar intellectual sand pits. Of course you do need to keep an eye on the ground hog day stuff, the stuff that the current system encourages and rewards.15 One of the richer sources of ideas and genuinely different thinking comes from the GLAMs, the folk who work in galleries, libraries, archives and museums.16 These are the folk who eat, drink and sleep curation17. The GLAMs have much to offer. As Paul Saffo (1994) so presciently wrote:

It is not content but context that will matter most a decade or so from now. The scarce resource will not be stuff, but point of view.

So expertise, the stuff universities value and reward in, matters. This notion is more bluntly reflected in the title and substance of David Weinberger’s (2011) book: Too big to know: rethinking knowledge now that the facts aren't the facts, experts are everywhere, and the smartest person in the room is the room.

If we take the notion of curation seriously, then students become apprentice curators. Their work in a course is to assist the boss curator (aka lecturer) to improve, add to an initial set of curated resources. To curate well you need to know your field, be highly familiar with all of the ideas and resources you have to hand. Taking this idea a little further, a key outcome for a student would be being recognised for their

14 I could make a case that the entire planet is doing education. It's just not called that.
15 So much for the view that a university ought to be at the cutting edge of ideas and ways of doing things.
16 I am grateful to Catherine Beavis for drawing my attention to this acronym.
17 Not the glib practices that you find online. I prefer to use the term C-word to point to the growing in-utility of the word.
ability to curate, to know and add to a field. This is where the exploration of various ways of credentialing are important. We are seeing the beginnings of these experiments. The other point to make about curated resources should be now be bleedingly obvious: if resources are locked up, for example, an LMS, they have no value, zero, zip, nada! Scarcity does not generate value online, familiarity does.

Some aspects of curation are generic, i.e. work across disciplines, but good curation requires a mindset that has developed in the intellectual traditions of a field. Thinking like a botanist is different to thinking like an economist. A student of botany need access to practising botanists, to mature insider forms of practice. Radio transmitter teachers of botany or economics are removed from mature insider practices, i.e. they don’t actually do any botany or economics, they just repackage the work of other botanists or economists. Their problem now is that there are excellent repackers of botany and economics whose products are easily located.

I am not making a case for a whole system overhaul which would likely replace one way of doing things with another one way of doing things. It is a case for doing lots of little experiments. Some of these can take place within the current bureaucratic structures with which we are all familiar. Others will operate at or perhaps beyond the edges. Such experiments will need the protection of a skunk works-like facility.

Our McLuhanesque habits of making sense of things via a rear-view mirror is something we need to keep in mind. Of course we make sense of the new by mapping back to the familiar (Marvin, 1988) but it also nurtures the ground hog day stuff we see around thinking about teaching, and the L-word in higher education. The notion of doing small, affordable experiments is a crucial one. First, it challenges the orthodoxy that we know what we are doing when by any measure we don’t. Second it offers a way to think around some of the mindless legacy infrastructures and thinking that burden universities.

References


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