SENSE-MAKING INNOVATIVE SYSTEMS:

Prestigious MOOCs

Saras Sastrowardoyo and Mike Metcalfe

University of South Australia

Tel: 618 8302 0268

mike.metcalfe@unisa.edu.au

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Abstract

Making sense of the chaos that may be caused by the emergence of innovative systems is for many a necessary yet demanding task. Sense-making theory offers a pragmatic explanation of how to think about these dynamic and complex socio-technical systems. It is linguistic reflective analysis, intent on structuring alternative response actions. This paper uses sense-making theory to structure how to think about the threats and opportunities created by the example of the emergence of a new system in education, that of low cost prestigious MOOCs, like Coursera and FutureLearn. It demonstrates how to construct a sensemaking framework to think about these innovative systems from the perspective of formulating government policy. Stakeholders concerns were networked and clusters identified. This resulted in the four organising principles of Enlightenment Economy, Heritage Groups, Online Learning Functionality, and Agile Qualification Governance. This system of principles can be used to think about, structure or make sense of innovative systems like prestigious MOOCs.

Keywords: Sensemaking, presitious MOOCs, idea networking, stakeholders concerns

Problem Statement

Armstrong and Green (Green, Kesten C 2002; Green, Kesten C. & Armstrong 2011), have long presented evidence against the accuracy of experts when making predictions about the future. They find better outcomes whenever a group is encouraged to first talk about, decompose, role think, analogize, or generally discuss the problem situation. Others support

this, for example, Maio Mackay and Metcalfe (Maio Maky 2003) argue seeking multiple perspectives on a problem is useful and List and Metcalfe (List, D & Metcalfe 2004) found careful design of group interaction useful. Rescher (Rescher 1997) provides a philosopher's list of the issues (which includes exposing unintended bias, and underlying assumptions), that these prior interactions might be acting to expose when future-thinking. All of which suggest that when trying to think about the future impact of a new innovative systems like low cost, prestigious, automated, massive, open, online, courses (MOOCs), there is room for more research into the prior thinking processes of those involved.

Modern research into complex human thinking suggests thinking is somehow achieved using reflection on past experience and language (Rorty, Richard 1967; Vygotsky 1986; Humphrey 2006). This suggests that any thinking into what might happen in the future is a reflective, analogous act of seeking comparable past experiences or patterns (Dewey 1958/1929). Trend and regression analysis provide quantitative examples of this. An example would be using the case of the impact of the Internet on the music and newspaper industry when anticipating the impact of MOOCs on the education industry. This analogous reflection needs appropriate language to provide it with meaningful structure that can be articulated (Rorty, R. 1989). It would be impossible to reflect on the impact of technology on the music industry without linguistic concepts like CDs, retail, recording studios, contracts, artists, copyright and vinyl. How different that reflection is using the linguistic concepts of, iTunes, Napster, mp3, downloads, and iPods. Therefore, any method for helping with future thinking might need to explicitly involve the development of these linguistic concepts (or labels) (Toulmin 1972).

There are different reasons why we think about the emergent systems. The evolutionary explanation is that there was advantage in anticipating threats and the behaviour of food supplies (List, Dennis 2005). Economic forecasting tends to quantify these threat and behaviours into point estimates. Future thinking about messy (Ackoff 1987), swampy

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(Checkland 2000), unstructured (Rosenhead & Mingers 2001), and wicked (Rittel & Webber 1973) problematic situations, is more concerned with generating similar alternative responses to these threat and behaviours. Hopefully these responses come from creative, insightful or novel interpretations of the problem domain and from generating alternative responses. For example, when trying to reflect on what might be done given the growth in popularity of MOOCs, there is need to not only predict what might happen but also what aggrieved parties might do next. MOOCs may be interpreted as being a marketing device, charity, electronic proctoring market, machine learning research or recruitment consulting feedstock. Each suggests different possible reasonable responses. Part of the process of emergent thinking is to imagine more of these interpretations and so open up the alternative responses. This process is sensemaking (Weick, K, E. 2006; MacKay & Parks 2013)

This paper will therefore first elaborate on its explanation of how and why sensemaking might be used to think about the emergence of prestigious MOOCs. The MOOC industry will therefore also be discussed further. Next, the paper will explain how sensemaking was operationalised using idea networking to seek an appropriate set of linguistic labels or concepts. Idea networking clusters the concern statements of stakeholders using network diagramming utilising a clustering algorithm. The end result is a system of concepts that can be used to think about the emergent system of prestigious MOOCs.

Sensemaking

There is now a very large literature on sensemaking, space only allows for mention of the more central literature. Weick Sutcliffe, and Obstfeld (Weick, K, Sutcliffe & Obstfeld 2005) explain sensemaking as organizing flux, starting with chaos. Sensemaking then notices and brackets; inventing a new meaning (interpretation). These are labelled. Sensemaking is retrospective, and presumptive, connecting the abstract with the concrete. It is social and

systemic, about action; organizing through communication. Sensemaking is a social interaction process theory of how people interpret and respond to concerning situations. It seems to have overlap with problem structuring (Rosenhead & Mingers 2001), soft systems thinking (Checkland 2000) and project conceptualisation (Metcalfe 2007). It might be contrasted to psychological (Tversky & Kahneman 1981) and rational (Simon 1975) theories of how we do or should interpret situations that concern us. These underplay the role of social interaction and linguistic concepts.

The label sensemaking (making sense of) was popularised by Weick's book *Sensemaking in Organisations* (Weick, K. E. 1995) although the seminal paper is often attributed to Gioia and Chittipeddi (Gioia, Dennis A. & Chittipeddi 1991). Weick introduced sensemaking using the example of how the numerous non accidental injuries noticed in children were eventually collated under the label 'child abuse'. When this was done, social workers were able to be trained to look for this newly named behaviour, and respond appropriately. The concept of child abuse had to be socially constructed, before it could be discussed and responded to. In similar vein, although not explicitly using the term sensemaking, Resnik (Resnik 1999) explains the construction of the mathematical concepts of zero and one as having been derived from such process. Foulcault (Foucault 1975) explains the historical political, social, technical and economic forces that constructed our modern understanding of concepts such as mental illness and sexuality. In a recap 2005 paper (Weick, K, Sutcliffe & Obstfeld 2005), Weick and his co-authors applied the process of sense-making in the example of labelling a child's illness. It took time to articulate, but when it was labelled, the appropriate treatment became immediately obvious.

Weick (Weick, K E 1983) himself discusses the failure to or disintegration of sensemaking in the context of the tragic death of 13 fire fighters unable to quickly make sense of the shape of a mountainous forest fire. Berente et al (Berente et al. 2011) studied how argumentation

could be used to assist business professionals make sense of the virtual Second Worlds software. Brown (Brown 2003) showed how sensemaking was controlled to bolster authority roles after the explosion of an oil platform. Maitlis (Maitlis 2005) identifies four forms of sensemaking in orchestra management she calls guided, fragmented, restricted and minimal. Gioia and Thomas (Gioia, D.A. & B. 1996) theorise about creativity in organisations suggesting and that sensemaking results in a set of novel frames. Frames, labels and linguistic concepts seem to be similar things. This present paper is interested in this labelling process inherent in sensemaking.

A label is the name given to a classification of a cluster of things that make up the concerning situation (Weick, K, Sutcliffe & Obstfeld 2005). In chaos theory terms, labelling provides the attractor, the organiser, which changes randomness into something with structure (Gleick 2008). They are words, or perhaps more generically, linguistic concepts. Appreciation of the impact of these linguistic concepts on our thinking is to make the linguistic turn (Alvesson & Kärreman 2000). Complex thought seems to involve using one concept to reflect on another (Toulmin 1972). For example, the concept of marketing tool, machine-learning experiment or recruitment consultant feedstock can be used to make sense of the concerning situation of MOOCs. To sensemake, concerning situations need to be turned into an appropriate set of useful linguistic concepts, which then act as organising principles. The clever the concepts (labels) generated, the more insightful the reflection. (Brandom 2011)

Prestige MOOCs

The tipping point [Brandom 2011a] for online education, when a series of circumstances converged to into the public consciousness, might be set at April 2011 when Coursera offered a range of free, multiple choice, non IT, Stanford branded, self-contained undergraduate courses, advertised in Steve Jobs style by Daphne Koller on TedTalks (TedTalks 2012).

MOOCs were common place but these were badged by a highly ranked world class university. The technology pathway these 'prestigious MOOCs' (pMOOCs) emerged from seems clear. Many universities have offered online courses for some time. Massive was achieved by the Indian based automated high school maths courses offered by Khan Academy. There was already open access to MIT course materials. Other undergraduate course providers like edX and Udacity offered low cost courses. However, Coursera added the important ingredient of prestige and a wide range of courses. Free courses might be assumed to be of a low standard or some form of marketing but free Stanford courses was something different. Coursera quickly went on to badge their free online courses with the names of other highly reputable universities like Wharton forming an elite club with the world's top universities. A little over a year after launch, 102 top international universities were offering over 400 Coursera courses intending to expand this to 5000 courses and effectively block out non prestigious universities from offering courses under their 'designer label'. This was a significant game changer, even with 10% pass rates, no proctoring, no expert feedback and the simple course design of 'watch these many hours of video and answer quizzes about exactly was said'. Initially many of the students were those with a degree and fast broadband connection, in education or IT journalists, university lecturers and highly qualified professionals, not the poor from developing countries. Organisations like the Open University (UK) and Open University Australia seemed shocked that prestigious universities could offer a product similar to theirs, if un-proctored and without expert feedback, for free. Clearly, these free courses involved drawing on a very significant historic cost incurred by often publically funded universities. This shock may simply be a lack of imagination about alternative business models for online courses. However, this shock was soon replaced with the need to try and anticipate the impact of these MOOCs on university offerings.

Coursera's MOOCs have been described as a disruptive technology (Danneels 2004; Yuan & Powell 2013). This might only be in their potential, because all that is new in this service is the price and access to those not registered at a prestigious university. Correspondence courses, distance learning and School of the Air have been around for centuries (Moore & Kearsley 2011). Open University (UK) also, and non-campus attending courses have also been around for decades. These new prestigious MOOCs have generated talk of new business models and new markets but these are yet to demonstrate being sustainable. It is unclear if Coursera will actually alter existing education which still tends to be government protected. These MOOCs may have more impact on book publishers than universities. A lot depends on the reaction of employers. E-music disrupted the music industry by destroying many retail outlets and allowing the purchase of single songs, in a file format for mobile devices, for a low price. The Internet was disruptive to the newspaper industry as it removed trades like typesetting and had to compete with online globally disseminated news. The same is true of publishing generally (Øiestad & Bugge 2013). MOOCs would only be disruptive if students abandoned going to local universities in sufficient numbers to force closures or a redrafting of the purpose of the traditional universities.

MOOCs are an innovation, requiring innovative responses. An understanding of the alternative theories for the source of innovation assists in identifying relevant stakeholders, in better understanding their concerns, and in classifying responses to those conceptions.

The technology pathway theory of innovation, asks where the Coursera MOOCs technology came from to help explain what else could emerge from this pathway including improvements or competitors (von Hipple 1988; Keupp, Palmié & Gassmann 2011). Coursera, as a specific example of a free prestigious MOOC, was clearly the result of high levels of IT skill and generous resources. Over 100 wealthy universities have provided time, technology, reputation, money and expertise; as well as access to knowledge gained over

decades of investment by them, and governments, to provide the content. The full-time core IT systems staff are funded by generous start-up capital. It is hard to imagine this funding or skill level being possible from developing nations with limited resource and opportunities. The initial student statistics also show the courses are not being taken up by low-income students. They are extensively being used by those with access to expensive broadband, computers and a background English education. This all provides support for the resources theory of innovation, summarised as rich kids have the time, education and funds to do high tech innovation. Perhaps related to the resources theory of innovation, is that of dynamic capability (Ramírez, Österman & Grönquist 2013) and absorptive capacity (Zahra & George 2002) which focuses more on skills and motivation. It could be said that Coursera came from a capable, weak tie networked [43a], motivated and skilled clique of people; typical of the Silicon Valley culture. Interestingly the early motivations of this group were to provide data to conduct machine learning research, and for IT experts to replace educational theorists, whilst also offering free world class education for the disadvantaged. This motivation seems threatened by the commercial IT, education and social ideologies.

The systems or benevolent environment theory of innovation argues you need to be in the right place and the right time to innovate [reference]. The right place provides the knowledge, market, infrastructure and resources. The right time means there is an identified need, for which the innovation is next on a technology pathway. Unsuccessful inventions fail because they are invented before their time or in the wrong part of the world. A famous example is the ancient Greeks inventing the steam engine when labour was very cheap and coal very expensive. When these circumstances reversed, the industrial revolution's need for the steam engine became relevant. Free prestigious online courses need to occur when education is expensive, when prestigious degrees are in high demand, when global and enough people have the technology and time to take up the courses.

The environment in which Coursera was announced also included IT machine-learning academics working for a wealthy prestigious university in a world leading IT research and commercialisation region, California. The announcement mirrored that of the announcement of iPhones, iPads and other Silicon Valley products. It used a young casual intelligent 'face' enthusiastically presenting to TedTalks. A point of interest was the comment attributed to the President of Stanford of 'we need to be on the front of the curve on this'. Such statement provide prelude to setting up an environment for MOOCs. Other online platform products emerging from Stanford University such as NovoEd and Class2Go further exemplify the benevolent environment theory of innovation.

The networking and relative collaboration theory of innovation suggests that innovation requires small worlds of knowledgeable cliques weak tied to each other forming structural holes (Burt 2002). This is summarised as 'nothing was ever invented by one person'. Expert clusters of collaborators and testers need to be able to draw on the expertise of a range of alternative resources (money, distribution, marketing) when needed. These include the easy access to banks, Stanford, TedTalks, start-up funding tax relief, YouTube, and specialist IT and education media used by Coursera. These and later the 63 participating university contacts provided the structural hole contacts.

Von Hipple (von Hippel 2005) and Toyota's democratic theory of innovation (Liker 2004) might be contrasted with the guru theory of innovation (Kanter 1983). Koller and Ng were presented as the innovation gurus, champions, or heroes for Coursera. There are numerous other online platforms on offer, but Coursera seems to have the winning touch; not the least of which was the advantage of having the Stanford University badge. Was using this a stroke of genius attributed to the founding gurus? Perhaps that genius lies in putting the whole package together and presenting it to the world correctly. The democratic view is that anyone can be innovative, or rather that everyone is innovative; they just need to be part of a process

or work practices that allow their ideas to be used by others. There are other MOOCs, of which many would be better designed and have more informed content than those offered by Coursera. Many IT software developers would have designed alternative platforms for online, if indeed a dedicated platform is required. However, all these innovators would not have had the environment, connections or status for their ideas to become global. Moreover, the democratic view suggests that crowd source feedback on Coursera could be used to improve the platform design, perhaps more so if it was open source. Continuous improvement can lead to tipping points [47a] which are thought of as innovations.

Adaption or ex-adaption theory of innovation sees innovation as a process of adapting things or processes to a new environment (Majchrzak et al. 2000). Adaption is usually part of the discussion on the diffusion of innovations (Green, SE 2004; Moseley 2004); however, it can be generalised to the act of being innovative. Coursera can be seen to be a process of adapting the machine-learning online course at Stanford University to the needs of being a platform to offer other and free globally available MOOCs. Universities that wrap Coursera courses into their own degree awarding courses can be seen to be adapting. The dual touch screen available in modern mobile phones can be seen to be a process of adapting the existing dual screen technology to an iPhone or Android phone operating system. Nearly all technology adoption needs adaption to whatever environment it is being used within.

Last, the mimicking or analogy theory sees innovation as a process of mixing and mutating ideas (memes) into novel combinations (Barreto & Baden-Fuller 2006). So Coursera can be seen to be a re-mix of standard online degree courses ideas with perhaps the idea of Wikipedia, sitting in one prestigious university courses, cool mobile devices, online personality quizzes and book sale blogs. This raises the question of what else could be added in to improve the innovation idea. Examples for Coursera include the sorts of educational

graphic simulations offered by the Open University UK, or computer simulations generally, plus more use of social media.

Methodology

The usual method for studying sensemaking is to observe group interaction in a complex situation looking for the labels they use to describe their actions. The 'group' that will be observed in this study will be the community of interested stakeholders whose 'interactions' are expressed in the press media over a set period of time. The press, rather than academic journals, was chosen as it was could be argued that they reflect more spontaneous and current thinking of the issues being examined. If change is involved, then the observing is of what new labels emerged and what particular actions these labels encouraged (Weick, KE, & Roberts, K.H. 1993; Weick, Karl E 1998, 1999). In this paper an attempt will be made for the analyst to explicitly generate a set of sensemaking 'labels' from a complex problem situation. In line with the sense-making process, these labels will then be used to inform the process to structure advice on how to respond to the impact of these free prestigious MOOCs on the tertiary education industry. To be consistent with sensemaking generally, the method to explicitly create these labels needs to be an inductive, qualitative, process of turning chaos into order. All statements which express 'concern' of MOOCs will be gathered and grouped into like concerns. Such grouping will be guided and informed by the sense-making facilitator or in this case the researchers. This is clearly an act of interpretation requiring appreciation of the context. The explicit research method used classifies stakeholders' concerns into an interrelated set of labels (conceptual framework) by linking the statements into a network-mapping of ideas and then inducing clusters using a network clustering algorithm (Metcalfe 2007).

Over a period of 6 months (in 2013), a Google news alert was set to collect anything containing the word 'MOOC". Over 100 articles were returned including from newspapers like the Financial Times, New York Times, Wall Street Journal, Australian, Times Higher Education and university education related publications like Campus Review and Conversation as well as IT magazines. These were filed in a blog (Metcalfe 2013) and read closely looking particularly for concerns about the future. Statements thought likely to demonstrate stakeholders' concerns were extracted.

There are at least three different epistemologies guiding how to read narrative in research. A positive one would have required an impartial team to extract statements independently and correlate the results. This can make it hard to extract statements under a common theme and to ensure high levels of expertise and commitment in the process. A participatory approach would require the involved community to extract the statements for themselves, ones they thought most relevant. This can be very time consuming and assumes access to the involved community. The interpretive approach is for an embedded knowledgeable researcher to declare their interests and undertake the extraction based on their expertise. This was done here acknowledging it is only one person's interpretation, but someone with declared bias but unable to do more than classify statements under that explicit bias.

The classification of stakeholder groups can be undertaken using Porters 5 forces (suppliers, competitors etc) (Porter 1980), Boulding's Things, Organisations and People (Boulding 1956), Linston's Technical, Organisational, Personal and Religious interactions (Linstone 2003) (Allison & Zelikow 1999), or Hayden's technology, environment, social institutions, beliefs and values (Hayden 1982). Drawing from these exemplars, a hybrid was used of groups, skills, ideas, and things. This requires each to be anthologised to have concerns. The table below identifies the stakeholders. Examples of the statements allocated to stakeholder groups are shown in the results section under the cluster labels.

MOOC Stakeholders

	MOOC Provider	Students	Universities	Lecturer/ Researcher	Government/ Funders
Things	Internet	Certificates	Lecture facilities	Office	Universities
	IT Software	IT	Campus activities	Books	Regulations
	Proctoring Equipment	Costs	Laboratories	Lecture Notes	
	Mobile technologies			Equipment	
Groups	Directors	Undergrad	Lecturers	Teachers	Politicians
	Academics	Postgrad	Admin	Researchers	Bureaucrats
	Marketing	Part time	Unions	Tutors	Voters
	Finance	Alumni	Researchers	Professors	Suppliers
			Friends	Science vs arts	Regulators
			Funders		
Skills	Software	Study	Proctor	Classroom	Regulation
	Finance	Timetabling	Records	Marking	Performance management
	Teaching theory	Social	Performance Management	Researching	Finance
	Hardware	Motivation	Appeals		Marketing
		Referencing			organisation
Ideologies	IT solutions	Learn from teachers	Public good	Truth seeking	Voters
		Get qualified	Commercialisation	Honesty	Rights
		Social interaction	Financial Responsibility	Impartial	Taxes
			Economic development	Fair	Global markets
			Personal development	Helping	Justice
				Examination	Economic development
				Publish or perish	

Idea Network Diagramming

The statements attributed to stakeholder groups were paired (linked) by the researcher. For example the two statements below seemed to both be about costs.

> *Classes have become grossly excessive in recent years, students have to pay for excessive admin, irrelevant research, and lazy scholars. The many to one business model of teaching is highly lucrative. Users should pay, not taxpayers*

> *It will be expensive and cumbersome to put laboratories online*

A matrix of linked statements was entered into the network diagramming software to save having to draft it by hand, and to enable use of the spring embedded algorithm. In this case UCINET6/NETDRAW was used (Borgatti, Everett & Freeman 2002). This software was chosen for convenience and also had been used by other scholars in mapping idea-laden statements into a network diagram in qualitative research [insert references]. NodeXL is alternative software that could be used. The spring embedded algorithm in most network diagramming software packages acts to make the nodes repel and enables clusters to form. The resultant network diagram is below. Note the nodes are stakeholders' statements and the lines are the links (pairs) made between these statements by the author. This network has resulted in five clusters.

Results

Insert figure 1 here

Figure 1: Idea Network of Stakeholders' Statements

The top left No1 cluster was labelled:

Enlightenment Economy

The statements in this cluster were about the large education/learning/skills development industry which provides income for academics, administrators, technology suppliers and numerous other people. The education industry also provides feedstock to other industrial activities. Economists and Treasury will want to know the impact of MOOCs on this science enhancing industry which in the West now has a large export component.

The cluster contained statements like:

Classes have become grossly excessive in recent years, students have to pay for excessive admin, irrelevant research, and lazy scholars. The many to one business model of teaching is highly lucrative. Users should pay, not taxpayers

It will be expensive and cumbersome to put laboratories online

The nation's future competitive edge and quality of life depends on a good education system. Education is the capacity to feed yourself and those less fortunate than yourself

Who will pay for research, Govt are in debt, companies are choosey about what they pay for, student fees are drying up

Funding for educational equity and want 40% with a tertiary education is very expensive. Making monies from developing nations full fee paying students may dry up if they use free MOOCs but students often want an overseas experience

Voters expect there to be a good quality nationalistic education systems to be available at the right price, it's not just for the rich kids

Free MOOCs are a whole new and as yet unproven business model that depends on the free supply of materials funded under the old fee and federal support model. The sources of income for non MOOC providers may be customisation and student support

Researchers cannot rely on the private sector to do research, see how the world has advanced since taxpayers took on the cost of research. We need to get the balance between blue sky pure research and applied problem solving research

The business model for a free MOOC is different from fee paying, it is untested but includes selling analytics of students and charging for add ons like examination, wrapping and expert feedback

Is education an international tradable product, should it be treated as one?

To learn is a right, but therefore a responsibility, and someone has to pay for it. Blocking the poor or anyone from education is wrong. But the right to education is wasted on some people

Is education primarily for economic development or self development. Does economic develop bring self development? Does formal academic education bring economic development

Free markets for education are not always fair, size can dominate. Is online just another way for Americans to quash out the voices of others

Cluster two, in the centre of the diagram, was labelled:

Heritage Groups

These statements seemed concerned about getting the right balance between innovation and tradition, being a well organised second adopter is often better than poor investments in IT hype. Will MOOCs be sustainable? Teaching in hierarchical, streamed, classes has a long tradition of being effective, should this working model be abandoned? How will elites respond?

Statements in this cluster included:

Books offer a structured timeless recording media unlike magnet digital which changes constantly

Unions need to fight for traditional workplace rights and protections regardless of performance. This change to free MOOCs will undermine our member base, we need to polarise between classroom and online. This is like the music and publishing industry

Careers at Universities seem at risk. People want to work with real people not computer screens, lecturers and tutors will lose having any input to how a course is taught

We need to support our traditional institutions, they give some of us social status and a connection to the past

How fast should be change past ways, is evolution better than revolution. Is

incrementalism better than wholesale replacement?

The third or bottom right cluster was labelled:

Online Learning Functionality

There is clearly an opportunity to expand the new industry and range of IT products and services around learning online. New ways of using social media, mobbing, and of offering improved learning facilities, are needed. These will impact on MOOCs and alter the impact of MOOCs. Will online or MOOCs provide a functional including socially acceptable means of deep yet satisfactory means of learning.

Statements in this cluster included:

The internet destroys distance, identity and many sensations including touch

People need meeting rooms, don't right off the large venues too quickly, look at the size of sports and music meeting places. Even mobbing needs a location

Working from home can be good if you have kids but a bit lonely and distracting. Cabin fever is a problem

Good buildings are inspirational, long lasting and symbolic, see religious building. Education is more important than religion, music and sport. It needs symbolic building else it will wane

Whatever you do must go on your phone, and these need to be able to sync in mobs, voice may replace typed text

By drawing on the long standing massive public sector investment in education, we can offer a free service driven by the technology rather than education theorists

Automated marking has a place but its very limited, student marking is interesting but generally unsatisfactory, the use of graphics like argument maps may help. This is the real bottleneck of quality feedback. There is going to be strong demand for IT to help with marking/grading

How much structure needs to be provided for someone to learn? Should not students pick their own topics and determine when the know enough about the topic. Projects or classes? How can students test themselves. Professions like to dictate what needs to known. How do you examine application skills?

Online provides a power struggle between educational theorists and IT engineers, what teachers want done and what is technically possible

Due to the size and content of the fifth cluster it was merged with the fourth as it could be seen that there were closely-aligned ideas in the two clusters. These can be seen at the bottom of the diagram. The joint label given was:

Agile Qualification Governance

Explicit measures of peoples' knowledge, skills and usefulness need to be provided and managed. Will employers accept MOOCs as qualifications? Yet as thing change there is need for an agile process of recognising and ranking new forms of qualifications.

Some of the statements included:

Regulators save disputes, standardise, should be outcome focused, voted upon and have teeth

The demands of government accountability, occupational health, student rights, agency contracts and record keeping keep us very busy. Some form of red tape cutting is necessary

There is a skill in knowing what tricks students get up to whether cheating, copying, getting others to do their work etc. Also having the legal and moral skills of knowing how to respond

Someone needs to keep a reliable, secure long term record of what a student has done for stats but also for the student latter in life

Getting the balance between fairness and bureaucracy is not easy. Rule management is not easy. Legal rights can be abused and courts forces to enforce poor regulations

Is learning without recognised examination grades a waste of time, a self delusion? Who examines whom

Certificates is why most students study, to get a certificate, and from the best source possible

So in summary, stakeholders' concerns over the future impact of MOOCs can be thought about using the following labels or organising principles:

- Enlightenment Economy [Cluster 1]

- Heritage Groups [Cluster 2]

- Online Learning Functionality [Cluster 3]

- Agile Qualification Governance [Cluster 4/5]

What needs to be remembered about these "labels" (organising principles) is what they *do not* contain. In alerting us to what is not contained, we can thus avoid unnecessarily directing energy and efforts towards the less-relevant matters.

Sensemaking Responses

This paper has made sense of the emergence of free prestigious MOOCs by firstly identifying the relevant stakeholders who might be affected by MOOCs, then through the sensemaking process engage in clustering those stakeholders' concerns about the future of their industry into four issues, or organising principles. These provide some words (labels, structure) with which to think about prestigious MOOCs. It might be noted that using this set of organising principles means that the focus response is to not prioritise others. For example, it could have been possible to sense-make the impact of MOOCs using the principle of 'they are a threat'. This would have encouraged the logical response of trying to mitigate against that threat, including perhaps encouraging protective legislation, and trying to build professional norms to maintain the status quo. Similarly, the four organising principles above can be seen to also not overly about being entrepreneurial. If it was, it might then commit all thought to an education revolution, how we might sweep away past, getting ahead of the curve or turning tradition on its head. Furthermore, the organising principles also do not encourage a limited focus, such as only being about wrapping MOOCs into existing courses or worrying about what technology platform to use. These specific issues can be raised within one of the four capstone issues, but the four as a set should get the right balance between detail and abstraction. If too abstract, then they merely declare that we need to be alert but not alarmed.

In line with the definition of sensemaking, this paper has organized a state of flux. It started with chaos, noticed stakeholders concerns and brackets, and invented a new meaning

(interpretation) by creating a set of labels. The sensemaking was retrospective, and presumptive, connecting the abstract with the concrete. It follows the sensemaking process of engaging relevant stakeholders in the system-wide industry, in communicating and voicing concerns pertaining to MOOCs. It was more systematic than how most organising principles are generated, but generally did reflect the social interaction process of how implicitly people interpret and respond to the concerning situation. The paper has therefore provided a methodical means of sensemaking the future, especially of a technology likely to have a significant social impact.

The set of four principles emerged through the labelling of clusters, will very much reflect the past experiences of the analyst. They are nonetheless, in the English-speaking context, problem-solving, managerial language. In this case whilst the resultant principles have not been derived from the experiences of a political or economic power elite or from community meetings, as might be undertaken in traditional sense-making process ; they are however, not invalidated by this alternative method of gathering 'discussions' of the concerned discussants. The paper is more concerned with process than attempting to provide any providence over the labels reported above. Readers are invited to go through a similar process and derive their own organising principles.

The emerged principles can be used in conjunction with other tools and/or theories, to produce response decisions. Force Field Analysis (Thomas 1985), might usefully be applied, assuming the principles to be in tension with each other. Each can represent a social, political, technological and economic struggle for how the future will be designed. This aligns with the dialectic, evolutionary or contradiction theory of history (Foucault 1975). Evolution theory would suggest treating the principles as competing species asking what are the criteria that will select for survival (Baskreville & O'Grady 2001). The principles could also be used to structure a questionnaire survey or Delphi on participants' perceptions about

the future of MOOCs, or to identify independent variables in a multiple cause analysis (Bryson & Ackermann 2004). They could also be used to select roles in role thinking methods of forecasting the conflict of MOOCs vs classroom teaching (Green, Kesten C. & Armstrong 2011). They could be used to think of a wide set of appropriate analogies if using analogy to improve expert judgements (Green, Kesten C 2002).

The main point of sensemaking is to emerge the base ingredients (that is, the principles) to then make plans for appropriate responses. In this case, responses to an emergent system, the launch of free prestigious MOOCs. The responses might be classified into those made by regional governments, universities, career academics, software companies and publishers. For government policy, the issues identified by this paper, or those identified by a wider government review, suggest a means of structuring policy responses. In line with Adam Smith's (Smith 2006 reprint) advice, good government policy is often about removing constraints, legal, social, technical and psychological.

For example, the organising principle of *Growing an Enlightenment Economy* might be responded to by education industry policy makers by encouraging governments to remove constrains that stop the growth of an appropriate regional education economy. In the West, education employs large numbers of people and provides a powerful means of protecting local norms and priorities. By an appropriate economy it is meant, a scientific, individualistic, secular, progress orientated, multicultural, accessible, and environmentally sensitive, education, for the personal development of locals, and as a massive export earner. The impact of free prestigious MOOCs needs to be responded to by removing the constraints that stop this form of education industry forming. A response in line with this line of thinking would be to encourage a local MOOC industry, not be too concerned with the offerings having American worldview and to be aware of the risks of offerings by cultures with a different set of priorities. At present the education industry offers a considerable export

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market. This needs to be maintained and grown. Information technology has removed the retail end of the music industry and many trades from the newspaper industries. With State funded universities the shift of students to free MOOCs may require a restructuring of the research and teaching functions funded by governments.

The *Heritage Groupings* principle suggests a possible government policy of enabling traditions to be maintained but based on quality not privilege. Mention of elite, very expensive courses, which use small classes run by world leading personalities, is an obvious response to mass free education. However, it might be a governments' responsibility to ensure these niche markets are accessible to the most able rather than just the most privileged. Free MOOCs, tax breaks, public exposure and scholarships, might be a means of determining the most able. Those who wish for traditional classes to be maintained at State funded universities might be required to give students the choice. This may mean a structured fee arrangement with separate fees for course outlines, for online materials, for examination, for assessment feedback, and for access to a classroom learning experience.

The *Designing Online Learning Functionality* organising principle for regional governments involves ensuring appropriate workforce skills are generated. Recursively this includes developing skills to ensure a competitive IT industry supplying products and services to the education market. Should the Silicon Valley dominance of the provision of global mobile IT products and services be encouraged, ignored or countered? The main use for these products and services at present seems to be entertainment. Education and entertainment can reinforce each other. Education offers further rational for the purchase of these ever evolving products and services.

The last organising principle was that of *Agile Qualification Governance*. The regulation of qualifications often has heavy government involvement. Whilst personal development,

institution reputation, and employers' preferences will always be relevant, governments often use their funding power and qualification recognition legislation to insist registered education organisations have a particular structure. These may need reforming, including to be able to classify rapidly emerging global educational courses and for novel educational providers to emerge. For example, quality book publishers may offer individual books as courses.

Conclusion

Sensemaking emergent systems is about finding a set of labels to inform an appropriate response. These words or labels act as organising principles. This paper has applied the sensemaking theory to the prestigious MOOCs phenomenon. It has suggested four organising principles to structure thoughts about an industry level response. By extracting stakeholder concerns about online course design or online business models it could have generated organising principles for responding to these issues. None of the principles created here is thought definitive, yet they seem useful enough. Each context should create its own organising principles. What was being researched was how to apply the theory of sensemaking to a situation under apparent change by a technology. The intent is not to forecast the size of that change, not to define what future is sought, but rather, to find the language for structuring a response. The further contribution is in extending the use of the sensemaking process to a wide constituent of discussants who may or may not directly engage with each other; but whose thoughts and concerns about the issue (that is, prestige MOOCs) are nonetheless accessible to the sense-making facilitator/researcher; and have relevance to a wider industry. The research further demonstrates the utility of extending the sensemaking process beyond that traditionally undertaken in a synchronous, co-located manner by interacting participants; to one where industry-wide thinking could be collected and synthesised.

The statement clustering process, using network diagramming, acts to change a chaotic gaggle of words into a small set of definitive ideas. These are something that can be organised around. One would not be enough, too many would cause overload. The research shows a handful of these organising principles is optimum (Miller 1956). The process is collaborative, systematic, quick and repeatable. It does not exclude the application of context expertise or creativity. It uses algorithms to assist in classifying the qualitative without excluding the analyst. If the use of stakeholder concerns includes a range of discipline relevant experts, then the resultant principles can incorporate an interaction of that expertise with the concerns of non-expert stakeholders.

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