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THE DIGITAL UNIVERSITY AND OTHER MYTHICAL CREATURES

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At the University of East Anglia, where I work, many of the offices had a peculiar socket on the wall. Puzzled by this strange item, I asked around and it transpired that in the 1970s in a fit of enthusiasm a video network was put into the building. The university, which had been in existence for a few years at that point, was panicked by the sudden appearances of, what Harold Wilson called “The University of the Air,” the Open University or OU. In the opening TV programme in 1971, “Open Forum”, the OU Vice-Chancellor was unavailable¹ and the Registrar announced that he doubted that “any university officer had ever had the privilege to address 25,000 students of his own university and many thousands of the general public at one and the same time”[1]. The OU was treated with some suspicion by the establishment but it grew, and it now has around 175,000 students². It was the precursor of the digital university and its introduction also forewarned of subsequent innovations. Needless to say, UEA’s “techno-panic” was unwarranted and forty years later we have just removed most of the video cable, most of which was never used.

We have talked about the cycle of *techno-panics*, or *hype-cycles*, in previous lectures ([2] for example): somebody invents something; alarmist reports are produced showing that universities will all be out of business unless we adopt that thing³; huge efforts are made to gear up for the new thing; then the new things turns out to be variously over-sold; over-priced or overly-complicated and then life returns to normal for a while. However, universities being rather venerable institutions, they appeared to be impervious to the hype-cycle. There are various theories as to why this might be but my favourite is enshrined in the book *Microcosmographia Academia* by F.M.Cornford [3]. Cornford pokes fun at the conservatism of academics and observes “There is only one argument for doing something; the rest are arguments for doing nothing⁴.” How true, however in this lecture I am going to take the contrary view, which is that universities are changing, they are changing rapidly and much of that change is highly innovative and interesting. Furthermore, while the hype-cycles make convenient reference points for our discourse, it is mistaken to view universities as veering from one fashion to another.

Considering the last decade, the initial excitement was over Massively Open Online Courses (or MOOCs). Who exactly thought of MOOCs is disputed, but one of the first large-scale courses was “Introduction to artificial intelligence” taught by Sebastien Thrun and Peter Norvig at Stanford University. Norvig already had a widely known textbook on Artificial Intelligence so maybe people knew the name or maybe it was the start of public excitement in machine learning or maybe it was the excitement of joining a course at Stanford. For whatever reason it was wildly successful and, as the course went online, it suddenly had 160,000 students in 190 countries. The excitement was palpable and Udacity (which was Thrun’s company) signed an early deal with San Jose State University (SJSU) to make their courses accessible online and the competitors, edX, Coursera, and others were soon reporting huge numbers of students. The Press went crazy and a group of consultants at Pearson Education,

¹ Thus, bringing to public knowledge the well-known fact that University Vice-Chancellors are almost always unavailable.

² This is an impressive figure, but it is a relative minnow in global terms ranking only 44th in global size.

³ The authors of these alarmist reports often have considerable interest in selling the new technology of course.

⁴ I should also note that this quote is followed by some rather less than “right on” remarks about women which I don’t want to give airtime to here. I’m not an expert on the values of 1908 but I suspect that Cornford’s view on women, which would be regarded as unspeakably naff nowadays was of its time.



among them Sir Michael Barber who is the current Chairman of the Office for Students, released a report called “An avalanche is coming” [4] which implied rather pointedly that academia, particularly British academia, was luddite and that the leaders of British universities⁵ were sitting on their expense chairs⁶ doing very little. In retrospect it was surprising that the report was given so much credence. Although it was published by the Institute for Public Policy Research, all three authors worked for Pearson, a vast education company, so they could hardly be called disinterested parties. The report did have an introduction by Larry Summers who had recently retired as a long-serving head of Harvard and it had some quotes from Lord Putnam who, for reasons that are not clear to me, is treated in some quarters as a guru of Higher Education. Putnam also worked for Pearson at the time. Anyway, notwithstanding concern about the authorship, the report was influential in the UK and it caused some alarm in the office for the Minister for Higher Education in the UK. So, at short notice, UK Vice-Chancellors were summoned to the office of the Minister, David Willets, and told that they would like to provide courses for the UK's first MOOC provider, Futurelearn. Futurelearn was the brainchild of the energetic Malcolm Bean who was the Vice-Chancellor of the Open University or OU. The OU pre-dated all MOOCs so knew a lot about distance learning, but was widely acknowledged to have become stodgy and chaotic, furthermore the Americans had stolen a march on the Brits and there was danger that Udacity, Coursera, EdX and others would grow rapidly and threaten the position of British Higher Education which, at that time, the government saw as an important export.

Malcolm Bean had been brought in to shake up the OU and Futurelearn was deliberately distanced from the OU. Not only was this separation between Futurelearn and the OU controversial, but Willets appeared to have not invited all UK Vice-Chancellors to the meeting – only the Vice-Chancellors of the “good” universities had been invited so there was much hurt when it was discovered that only some of us were considered to be in the “top drawer”. However, as Futurelearn, the French equivalent, France Universite Numerique (or FUN for short), launched, alarming stories started to leak out from the US MOOCs – some courses were reporting fewer than 10% of students were completing the course (and that was taking a particularly liberal definition of completion). For reference at a UK university one would expect near zero drop-out and an average mark of between 50% and 60%. Anything outside those bounds would almost certainly lead to action. It appeared that MOOCs were an educational disaster. Furthermore, it became apparent that the successful students were not third-world kids longing for education but middle-class retirees wanting to try their hand at Norse Mythology or Screen Writing. It seemed that to engage with a MOOC successfully, one already needed a degree education. Naturally there was quite a lot of backtracking at this point, especially as the MOOC providers had raised a lot of money from private investors and some MOOCs became specialist SPOOCs which are specialist open online courses. And the naysayers from the Open University, who had developed expertise in distance education over several decades, said “we told you so” and the anyone who invested heavily MOOCs explained loudly that they were in an experimental phase and anyone who was too sleepy to invest in MOOCs pretended that they were wise, and that was that.

Well not quite. MOOCs might have not delivered the spectacular gains they promised, but meanwhile another band of enterprises had been quietly chipping away at online education – the Get-Online-Providers otherwise known as OPM (Online Programme Management) providers. The philosophy behind MOOCs was that a university course was merely a set of materials – lectures, class notes, exercises and so. If these could be made available online, particularly with a “Rock Star”⁷ Professor giving the lectures, then intelligent students would be able to navigate themselves through the course and hence, impoverished but ambitious students could get a Harvard education. In my experience it is very common for highly motivated students from wealthy backgrounds to assume that all that is required for effective learning is motivation. For some reason they dismiss their own background which might have included nearly \$1M of private tuition as irrelevant. In fact, as Professors of Education will attest, this is far from the case: learning is relatively easy; but learning how to learn is a lifelong challenge. The early participants in MOOCs did not know how to learn so they failed. Of course, this was well-

⁵ Who for bizarre reasons are called *vice*-chancellors rather than the more logical chancellors.

⁶ This is a little academic joke – there was indeed a Vice-Chancellor who was heavily criticised for buying a chair by the furniture maker John Makepiece.

⁷ The term “rock star” Professor was developed at this time – originally it meant someone who was particularly effective at teaching but later it came to mean a Professor who was also famous.



known by the old hands at the OU and this was the proposition of the OPMs – we will take your course and help you deliver them online.

The OU is one of the most venerable OPMs⁸ but there have also been so notable commercial successes. Academic Partnerships has online Nursing education at the University of Texas Arlington and Laureate, for a while, constructed online Masters for the University of Liverpool and of course Pearson. In fact, the OPM commercial landscape is quite varied as there are partners who specialise in certain subjects, certain regions and certain segments. However, they mostly take the bare bones of a course, say a BA in Management and work out what is needed to deliver the course online. The high priests of this activity are Learning technologists who split your dull lectures into manageable chunks, redo your tired PowerPoints, build online quizzes and so on. This in itself is not enough – learning is a person-to-person business, so the OPM provider will usually hire tutors who may be provided locally or, more likely, by telephone or Video Conference. Sometimes the tutors work for the University but more frequently they will work for the OPM on rather different terms and conditions to the university⁹. Most OPMs will have Guidance Counsellors who will check if you are logging in frequently enough and use other measures to identify students who might fail. Importantly, at the end of the course, the students are awarded with a degree or credentials from a respectable university.

However, the OPMs came with two notable problems: poor revenues for the university partner and over-selling. The first one was entirely predictable – any deal in which one gives 80% of the revenue to the commercial partner is going to have to achieve substantial volume to be worthwhile to the university partner. The second problem over-selling was focussed on the USA¹⁰. Despite this queasiness, OPMs did not suffer the disastrous dropouts associated with MOOCs and the OPM providers were, like conventional universities, highly incentivised to prevent drop-out. The OPMs had emphasized a critical issue with online education – it is not the quality of the materials that is important but the quality of the education. Furthermore, the factors that students consider to be part of education are not at all what you might imagine¹¹: the rather humdrum organisational aspects of education should not be underestimated. Rock star Professors are all very dandy but if the seminar doesn't take place on time, how will I get a babysitter: much of education is about perspiration not inspiration.

The OPM experience introduces us to the world of “EdTech” which is technology used to enhance or enable education. Ed Tech has a long and noble history that pre-dates computers. The Victorians had quite a few ideas about how pre-university education could be enhanced with architecture and interior design – sunlight and fresh air being thought to be important in education. Many of these fads sweep through pre-university education quickly as, in most countries, pre-university education is directly controlled by Ministers and so, if the education Minister decides that pupils would learn so much quicker if they had electronic whiteboards, then suddenly all teachers have electronic whiteboards. Universities are more autonomous, so less faddish, nevertheless things have changed dramatically in universities and various pieces of Edtech have moved from experiment to mainstream in the last twenty years.

The most pervasive is the VLE or Virtual Learning Environment. Sometimes also known as an LMS or a Learner Management System, this is a website that allows tutors to upload materials so that students can access it 24/7 wherever they are in the world. I cannot think of a single university that does not have a VLE and many operate several VLEs from different manufacturers. Market share varies by region but there are four dominant providers who are Blackboard (generally on the wane); Moodle (on the rise); Canvas and D2L Brightspace. The latter being less popular in the university sector but popular in US Primary and High Schools. Moodle is shareware so follows

⁸ Indeed, it is so venerable that it is not considered an OPM at all.

⁹ Leading to inevitable accusations of “cheapening” Higher education.

¹⁰ The USA has complex student support arrangements which mean that certain groups of people, veterans for example, can access private education using state funds. There is therefore considerable energy devoted to identifying veterans and persuading them to enrol on courses even if those courses might not be optimal for them.

¹¹ In British Universities all graduating students are surveyed and asked a range of questions in an attempt to measure the elusive “student satisfaction”. Repeated studies have shown that the strongest factor in student satisfaction is “academic management” or “course organisation”.



a different commercial model in which universities contract with Moodle support company, which possibly explains its rising popularity.

Each course or module has its own configurable webpages on which the lecture notes, reading materials, video lectures and so on are freely available. Tutors can monitor who has logged in to course pages, what materials they have accessed, they can set quizzes and run discussion fora, chat rooms and assemble marksheets. Depending on the capabilities of the system I might also be able to run video seminars, integrate with my lecture capture system, send students counselling appointments and other less useful and arcane things – such as provide ready access to the reading list in electronic format. VLEs are also associated with the electronic submission of coursework and marking thereof. Electronic submission and marking represents a major reduction in cost and paper¹² so the VLE is seen as an important tool for both efficiency and cost saving as well as providing for improved course management. In that sense, the VLE should be differentiated from the other innovations I have been discussing up this point – they were controversial – the VLE is an accepted part of any modern university since it allows academics to efficiently transact with students.

Once all the transactions are digitised then it is then further potential becomes evident. Surely one could train an artificial intelligence to monitor student logins to the VLE? Maybe those who login infrequently are more likely to fail? They are. Learner Analytics systems monitor logins and a vast array of other data and provide warnings of failure and, if one wishes, rewards for good behaviour. Some analytics systems provide feedback directly to students, others to tutors, and others to both. The systems are relatively new and so the sector is still trying to work out the most effective way to feedback. The learner gains are not always that enormous¹³, but the systems are attractive to university managers as not only do they allow a university to guarantee a minimum level of service but also of course they can be used to identify bad Professors! They can also be used to identify gaps in student services or other non-academic provision¹⁴.

So far, I have focussed on teaching, but the digital world is starting to have an impact on universities' research mission too. Of course, research collaboration has always flourished over the internet (and even pre-internet) and one of the pleasures of a research life is meeting a co-author in person having only ever met them as a writing partner. However, the recent innovations are in the world of research promotion – sites such as academia.edu; researchgate.net allow researchers to upload what are supposedly pre-prints of papers that will ultimately be published in commercial journals. This allows the general public, and researchers at more impoverished institutions, to get access to work that previously would have been hidden behind an expensive paywall. To say that the publishers are unhappy with this arrangement is an understatement and there has been at least one high profile legal action by publishers against these websites for copyright infringement. However, just as making available the contents of lectures did not make education accessible, making research papers available is only part of the issue. Highly available research papers are indeed cited more, meaning that experts also do not like paying publishers to access their journals, but I cannot find any evidence that the general public has benefitted from open access research. I should imagine that one of the off-putting factors is that the huge volume of research is unmanageable by inexperienced research workers and, for that matter, quite experienced researchers. What is really needed is tools to help us navigate and manage the landscape of research publications.

Research management systems are now commonplace, especially in the UK where there is a ritual five-year exercise to measure the amount of research done universities known as the Research Excellence Framework or

¹² At UEA a typical student might easily submit 300 pages of work to be marked per year. We have 17,000 students. So that is around 5.1M sheets of paper that we used to have to move around UEA. My calculations show that to be 25 tonnes of paper per year which I can hardly believe so let's just say...it's a lot of paper saved.

¹³ As a rule of thumb, anything that produces an improvement that is less than the annual variation is pretty marginal in my opinion. So, if a course mark varies by $\pm 10\%$ then a learning analytics improvement of less than 10% is not very interesting. In the parlance of education, the gains due to learning analytics need to be compared to those achievable by High Impact Teaching (HIT) practices.

¹⁴ I attended an entertaining talk by Adrian Ellison and Mary Cameron from the University of West London. Their Learner Analytics system, provided by Civitas, measured which turnstile students uses to enter their main building. One group of students, those using one set of turnstiles, was more likely to drop-out than the set using another set of turnstiles. You will have to watch the lecture to find out why!



REF. REF is hugely expensive, and widely gamed, so most universities will use one of the market leading systems such as Pure (sold by Elsevier); Converis (Thomson-Reuters) or Symplectic Elements (Holtzbrink). It is no accident that academic publishing companies dominate the market in research management software: firstly academic publishing has been so lucrative that they are cash-rich enough to acquire promising start-ups; and secondly their main business, which is charging universities outrageous prices for journals full of articles written for free, is drying-up. A research management system will allow a university to know who publishes what, it will automatically generate a repository of knowledge, it will manage the different copyright permissions¹⁵ and will produce a feed of HTML that can be incorporated into university webpages so Professor Brilliant does not need to spend hours updating her web publication list. That said, research management software is moving from the rather humdrum task of keeping track of research outputs to the more nascent area of bibliometrics.

Bibliometric systems not only keep track of every paper ever published, but also mentions of that paper by other authors. This is particularly effective in medicine where every tiny little thought gets published and everyone cites each other, but the potential is growing across all fields and in ways that are quite creative. For example, instead of ranking universities by the quantity of papers published why not rank them by their Field Weighted Citation Impact¹⁶? This is indeed what happens on some of the university ranking tables. More usefully, when society announces a new framing of societal problems, such as the United Nations Sustainable Development Goals, (SDGs) can we quickly scan our own research to find out where we have strengths and weaknesses – the Aurora University network did just that and was able to produce an interactive tool to explore publication strength across its constituent universities. More experimentally can we combine bibliometrics with machine learning to spot young talent before they get snapped-up by distinguished mega-universities with huge salary budgets? That said, there is a long way to go on digital research management and it is possible to foresee the equivalent of learner analytics being applied to researchers. Whether this will be desirable is difficult to tell – in the UK the research environment has been described as “toxic” due to a combination of poor academic management and brutal government-imposed targets [5]. The combination of a toxic environment and all-seeing researcher bibliometrics sounds like a recipe for disaster, but maybe fuller transparency of researcher performance would lead to less unrealistic expectations.

Some might argue that the digital university will not really achieve maturity until all operations are accessible from a browser at home. Some of those concerns such as student health, security and payment are subject to separate lectures in this series. The remainder have had rather patchy implementation. As a positive example, the University of South Florida (USF) has, invested heavily in an International tracker. Internationalisation is usually a labour-intensive business with little automation and hence not much systematic evidence of what works. USF's tracker allows them to more easily compute their international impact¹⁷. Notwithstanding this success, it is fair to say that some administrative or support aspects of a university have been tricky to digitise. For example, a few Students Unions have a Digital Representative, but they are often little more than a feedback form surrounded with dire warnings to the effect that, if your complaint is serious, then you should speak to someone. UK Students Unions are an interesting opportunity as they often suffer from issues of scale, they are too small to afford an excellent digital presence and continuity, the elected officials are usually in post for only a year. So far, no-one has shown any interest in offering an outsourced students union although, looking at the popularity of some students' unions, there is certainly some opportunity to do so. That said, some aspects of shared responsibility, such as mental health have recently been the subject of digitisation.

Student mental health is one of the knottier problems of our generation. Starting from quite a young age, young people are reporting far more mental health issues than even five years ago. Universities are at the end of the chain, so by the time someone reaches university they may have had quite some experience of mental health counselling and attempts at resolution. And as universities are not allowed to ask too many personal questions of their applicants, it is not uncommon for students arriving at university to have serious mental health issues. In several cases, these issues have led to suicide with all the horror of the consequences. Leaving aside the blame,

¹⁵ Universities could also be sued by publishers – truly the hand that feeds.

¹⁶ Field Weighted Citation Impact or FWCI is a measure of how cited a paper is compared to the average for that field. Universities with a high FCI per Professor presumably are good at nurturing Professors who everyone cites.

¹⁷ When they completed the work, they were very surprised to discover how many Canadians they employed.



mental health difficulties can be quite extraordinarily serious and very tricky to spot early enough to help. One recent innovation is the idea of mood-tracking. Apps, such as OpenUp or Enlitened, allow students to track their mood and take appropriate action. In the case of Enlitened, a Head of Department might get a weekly dashboard to measure aggregate mood and hence adjust student satisfaction (recall that student satisfaction is measured annually at British universities so there is great interest in making sure students are happy particularly in the interval February to March which is when the survey is deployed). Although it is early days, these social analytics tools look very powerful particularly for universities that have a wide social mix of students.

Most modern universities would describe their mission using three categories: there is teaching (which often pays the bills); there is research (which provides the prestige and attracts students into the first mission) and “other”. The other is often called the “third leg” and is sometimes described as Enterprise and Engagement (E&E) and is something to do with a university’s role in society. It might be spinning-out companies and licencing technology, it might be about running public lectures, literature festivals, science fairs and so, it might be about charitable work and service. Digitisation efforts in the third leg are quite patchy and we can expect this to change. As an example, one might consider recent assertions from, for example, David Goodhart that British universities are too self-serving and disconnected from the societies that pay for them [6]. The obvious counter to this argument is detailed evidence that universities really give back to local communities. Such evidence exists, usually in glossy impact reports that are sent to Ministers and MPs, but to overcome the sense of disconnect that is sometimes called “Town and Gown”, what is needed is detail – and digital systems are super at providing detail.

This segues into my final point the real opportunity to universities is nothing to do with avalanches of technology at all; it is to with their core business of teaching, scholarship and research. Society is changing and that means that humanity is changing. In the last lecture on Social Media we saw how online, citizens are more disinhibited than in real-life. We saw how children’s reading and scholarship habits have changed and we saw how languages are evolving. I find it impossible to predict how profound those changes might be – surely more widescale than those of the industrial revolution – but it is certainly worthy of study. This area might be termed the digital humanities except that the term seems to have been coined for something rather uninteresting which is using computers to do stuff in the humanities. Maybe it is digital anthropology or the study of digital humans but there are also teaching gaps when we consider the digitisation of professions. It would certainly be highly worthwhile to understand how humanity is changing because teaching and research are ultimately human-to-human activities.

References

1. Open University Digital Archive, Clip: First OU Programme, https://www.open.ac.uk/library/digital-archive/clip/clip%3Aous_clip4/script/script%3Aous_clip4
2. “Deep Learning: miracle or snake oil?” <https://www.gresham.ac.uk/lectures-and-events/deep-learning>
3. Microcosmographia Academia: being a guide for the young academic politician, F.M.Cornford, 1908, Bowes & Bowes, Cambridge. Available online.
4. “An avalanche is coming: higher education and the revolution ahead,” Michael Barber, Katelyn Donnelly and Saad Rizvi, March 2013, IPPR
5. “What researchers think about the culture they work in” report for the Wellcome Trust by Shift Learning 2020. Available from the Wellcome Trust website <https://wellcome.ac.uk/reports/what-researchers-think-about-research-culture>
6. The road to somewhere, David Goodhart,

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