



Online Education: A Revolution in the Making

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Abstract

Internet and Communication Technologies are transforming education, taking it out of the traditional classroom and making it open, affordable and dynamic. Universities, publishers, corporates and individual lecturers are creating online courses. A course consists of video lectures, electronic study notes, online tests and assignments. Anyone who wishes to learn may enroll in these courses, take the lessons, complete the tests and assignments, and receive a certificate upon successful completion of the course. These Massive Open Online Courses (MOOCs) are making world class higher education available to all those who wish to learn, regardless of age, location or educational background. Education faces a number of challenges worldwide. Over 366 million youth are unenrolled in colleges. College education is growing more expensive. Many institutions face shortage of qualified faculty members, funding and infrastructure. Education over the internet can address many of these issues. Online classes are scaleable – a class of 50 can be expanded to teach 50,000. Teaching and learning over the internet can be done at a fraction of the cost of traditional classroom teaching. Flexibility, mobility, use of multimedia technologies, constant syllabus revision, collaboration and interactive discussions give online education an advantage. This is still an evolving field. New partnerships, innovations and technological advances are revolutionizing teaching and learning, and clearly, online education is an integral part of the future of education.

1. Introduction

A much quoted and requoted quip about education is that it has not changed much since the middle ages. If a physician from the 12th century were to enter an operation theatre in a hospital today, he would faint. Whereas a teacher from the same period could enter a classroom and feel quite at home. But this joke is becoming more and more obsolete every day. The past two years have seen such a phenomenal transformation in the nature of education that even a teacher from an earlier decade would feel the change.

Technology that has penetrated every aspect of our life has altered teaching and learning. Internet and Communication Technology (ICT) has rewritten the rules. The university is no longer the sole repository of scholarship. The class is not enclosed within the walls of the classroom anymore. Knowledge is not contained in a textbook. Imparting it is not the domain of the teacher. The degree is not the sole proof of learning. Education, as we have known it,

is on the cusp of a profound change. Gutenberg's printing press made books easier to print, and what had been handwritten, rare, precious and so tied to library shelves was freed of the chains. The computer and internet gave us the 'soft copy' that freed information from all physical media. ICT is virtually opening up education to the whole world.

"Education is an insurance against poverty."

2. Value of Education

Education is directly or indirectly connected to every global challenge we face. Statistics from every continent show that the higher the level of education, the lower the rate of unemployment. Even in countries where unemployment levels are high, the unemployment rate of those with a degree is less than unemployment rate of those without a college education. Higher educational attainment also correlates with higher earnings. Perhaps with the exception of Bill Gates, Steve Jobs, Mark Zuckerberg and a few others, college education is essential for a rewarding career.

That makes education an insurance against poverty. Illiteracy, unemployment and poverty form the hotbed of extremism, and education that tackles each of these issues is a safeguard against violence at all levels, domestic to international. Better educated people are better equipped to overcome the frictions of globalization and cultural differences. Historically, education and democracy have been inextricably linked. No country with very low levels of education has been democratic over the long term, and almost every country with a high level of education has remained a stable democracy.

Life expectancy is found to be strongly associated with education. Data shows that among 15 OECD countries, a man with tertiary education lives 8 years longer than one without a degree or diploma. According to a 2012 UNESCO report, each extra year of a girl's schooling reduces her fertility rate by 10%. At the same time, the probability of infant mortality reduces by 5% to 10%. The children of more educated people are better immunized and twice as likely to survive beyond age 5. Education also turns out to be the first vaccine against disease.

Those with higher levels of education are more likely to report stronger civic engagement. They take action to address ecological and social issues. Education plays a key role in our attempt to evolve a new global paradigm to meet today's challenges.

3. Gaps in Education Today

People arrive packed with food, sleeping bags and torches, ready to spend the night outside. They are not campers holidaying in the woods. Nor are they eager customers impatient to buy the latest model of the iPad or iPhone at an Apple store in New York or Beijing. They are parents of three year olds queuing up in front of the school gates in many Indian cities, to secure an application form for kindergarten. Application forms are limited in number, and obtaining a form is the first of many steps in obtaining school admission for their wards. So, the night before the forms are distributed, parents queue up on the road outside the school, to ensure that they get the form in the morning. If this is strange, college admission

can be worse. The acceptance rate in some Indian colleges is less than 2%, and the admission process is a pressure cooker like situation.

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The Indian national college enrollment rate is under 20%. If all those of college going age in the country need to be enrolled in tertiary education, then India will need to send 95 million new students to college. That means 132,000 more colleges will need to be built, and 4.1 million lecturers will have to be recruited to teach these new students. If in 65 years of independence, the nation has reached a position where it has 35,000 colleges and .8 million lecturers, what will be the time, cost, resources and effort required to multiply the educative capacity of the country 4 times in the next few years!

The Indian college education scenario is indicative of the same level of functioning in many other countries as well. The world over, more than 366 million youngsters are left out of tertiary education. If all of them are to be admitted to college, how can they be accommodated, or can they ever be accommodated? Such a large gap between demand and supply as it exists in India does not exist everywhere, but every country has its own set of issues.

According to *American Dream 2.0*, the Gates Foundation report, just over half the students who enroll in an institution of higher learning in the US graduate within 6 years. One of the primary reasons students drop out is finance. In the past three decades, average family income has risen by 16%, while fees at public universities have gone up by 250%. Some of the enrolled students are forced to drop out of college and take up a job because debts are piling up. The student loan debt of over \$1.1 trillion in the US is composed of 38 million borrowers. The higher the fees, the greater the borrowing, and higher the default rate, dropout rate and the unemployment rate.

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Where finance is not a problem, quality of education can be. Much as it may defy the imagination, there are schools and colleges that teach the technology of magnetic tapes and punched card readers to their students of computer science. Syllabus updation takes place once in a few years, while advancement in technology is announced every few weeks, if not days. There are classrooms without roofs, without walls, without even teachers. More than half the college faculty positions in India are currently vacant. Low college enrollment rates result in fewer eligible teachers and lack of good teachers affects college education in return.

Many other factors trouble education today. It is one of the first victims of conflict and violence. In societies where women are repressed, half the population is consequently left out of education. Those with special needs and challenges often face insurmountable obstacles

on their path to school and college. In the US, 57% of youth with visual impairments attend post secondary schools compared to 68% of the general population. In many developing countries, not even 10% of such youngsters receive any kind of education. With low levels of education, poverty follows.

4. The Online Revolution

The challenges facing education are numerous and varied. There have been attempts, some successful, made to address them in the past. But what makes this period momentous is that technology makes it possible to break into another space and time, taking education to a whole new plane.

When we order a book online from Amazon or one of the many similar online stores, we hardly wonder at the act. But when Jeff Bezos started Amazon.com 18 years ago, Barnes and Noble, the Borders Group and other large bookstore chains dominated the market, and the idea of a website competing with the giants was a new, even irrational one. But the startup not only overtook everyone else in the domestic market, but soon began selling to the whole world. The user friendliness of the site, the wide range of products, discounts, user reviews, wish lists, targeted advertising and the convenience of shopping from home made the whole idea a perfect success, and setting up an online store seems the most obvious thing to have done then.

The idea of online education is similar. Just as Amazon took the experience of shopping out of the brick and mortar store and made it available on the internet, enhanced the process and continues to do so in a hundred ways, it is possible to do the same with education. Both traditional universities and a range of startups are experimenting with new models that challenge centuries of convention. In another 18 years from now, online education will seem to be the most obvious thing to have done at this time. Today when one mentions major book-sellers, the name of Amazon comes first to mind. In education, it is Harvard, Cambridge, MIT and the like. What will it be 18 years from now?

What is online education? The terms virtual education, e-learning, web-based training, computer-aided instruction and digital education are all references to the use of electronic media and ICT in education. In other words, it is what we have been doing since the 1960s. In 1960, the University of Illinois linked computer terminals in a classroom to allow students to access informational resources on a particular course while listening to recorded lectures. Today, when we read an online book or newspaper, a newsletter or even a mail message, we are engaged in online education. Participating in a discussion, reading a blog, visiting a website, watching a video, referring to an online dictionary or encyclopedia, even social networking are learning experiences, and come under the same definition.

If online education has been around for over half a century, why is everyone suddenly talking about it so much now? Since 2004, enrollment in online learning has recorded a growth of 2% per year. Almost 25% of all students in post-secondary education in the US were taking online courses in 2008. In 2009, it had risen to 44%. This figure is projected to rise to 81% by 2014. From being a marginal, experimental idea, online education is gaining

mainstream acceptance. From renowned universities to educational startups, from publishing houses to software companies, everyone has realized the potential of online education to democratize and revolutionize global education.

5. MOOCs

MOOCs, or Massive Open Online Courses, have become phenomenally popular. A MOOC refers to a web-based class that can support a large number of students. Anyone from anywhere in the world who wishes to learn can enroll in a course. Each course typically consists of short video lessons, with a lecturer or subject expert teaching the subject with the help of models, images, animation and video. Each lesson is followed by multiple choice tests that the students take online and assignments that they complete and submit. Multiple choice tests are automatically corrected, essays are peer reviewed or graded by teaching assistants. Students can email or chat with lecturers, participate in forum discussions, raise questions, form study circles and in some cases, even meet co-students offline. After all the video lectures have been watched and tests successfully taken, the student is awarded an electronic certificate of completion by the MOOC provider. These providers can be colleges, private educational companies, even individuals.

With advances in multimedia and technology, new and innovative methods of teaching and learning have evolved. Video conferencing software makes it possible to recreate a classroom in virtual reality. Social networking sites can be used for real time research. Cloud computing technology assists in online collaboration. Learning Management Systems allow anyone with little technical knowledge to create a course and present their expertise online. 3D gaming teaches as much as it entertains, and can improve the impact of education tremendously. Crowd sourcing harnesses the knowledge already discovered. E-book readers, notebook computers, tablets, phablets and the like that will be developed between the time of writing this article and its publication make dissemination of knowledge easier, more effective and affordable.

In a trendsetting move, MIT put all of its educational materials online in 2002, allowing free access to all. In ten years, many colleges have followed suit. According to the Babson Survey Research Group report, in 2012, 2.6% of the colleges in the US provided MOOCs, and an additional 9.4% were in the planning stages of creating MOOCs. Some colleges collaborate to provide their courses under a single platform. One example of a collaboration of many institutions is edX. It began as a combined initiative of Harvard University and MIT, and as of August 2013, University of California at Berkeley and 25 other international institutions were involved. Coursera and Udacity are two of the largest private MOOC providers. They are funded and managed by educational entrepreneurs and provide a platform for a college or lecturer to teach a free course online. Most MOOCs are not for credit, and do not award degrees that are officially recognized by universities. But some are experimenting with charging a fee, arranging a proctored examination at the end of the course, and providing a degree. Some colleges collaborate with private MOOC providers and allow their students to take some courses online. Online education is an evolving industry, and every day sees the birth of innovative ideas.

6. Advantages of Online Education

Best quality education can be made available to the whole world. Remember that one brilliant lecturer you had, whose classes were inspiring, who awakened in you an interest for the subject, whose lessons you still remember. Imagine if every student could learn from that lecturer. And if every subject could be taught by lecturers like that. The best lecturers in every field could be identified, and their courses made available on the internet. Faculty shortage will become a thing of the past. Every student regardless of country, background and academic proficiency could learn from the best talent in the world.

An online course need not be restricted to watching a recorded lecture. Animation, virtual reality, audio, video, virtual lab, video conferencing, chat, discussion forums and social networking sites make learning a richer experience. Imagine learning Shakespeare by watching his play enacted, geography through virtual visits to the places studied, history through documentaries and dramatic presentations of historical events, or science through films of actual experiments and conversation with famous scientists. It is no surprise that the Babson Survey Research Group report shows that 77% of academic leaders rate the learning outcomes in online education as the same or superior to those in face-to-face classes. Neil Armstrong called the first step he took on the moon as a giant leap for mankind. We are currently making that giant leap in education.

Expansion is possible on a scale larger than ever conceived of before. Imagine doubling the size of a traditional college class. If a class of 50 were to be expanded to accommodate 100 students, it might be managed with some ingenuity. If another 100 were to be enrolled in the same class, it might be difficult. But if a 1000 students need to be taught, it would require setting up new classrooms or a college itself, hiring lecturers, providing the infrastructure and investing a lot of time and money. Whereas in the case of an online class, a class of 50 can accommodate 50,000, 5 million, or even 50 million. The digital classroom does not have the constraints that its physical version has. Scalability is critical in education systems of the future. Tertiary education participation rate in 2010 was 80% in OECD countries. It is 26% for China, 18% for India, 41% for Latin America and 7% for Sub-Saharan Africa. Like the proverbial Bata salesman who saw people barefoot in Africa and found in it a huge opportunity, the poor enrollment rates in countries in Asia and Africa can be seen as an indication of an exponential rise in the demand for education there. The enrollment rate has tripled in China between 2000 and 2010. In the same period, India and Latin America have seen doubling of rates. An education system that aims to provide education to all needs the potential to incorporate students in large numbers, read millions.

Flexible hours and self-paced learning suit those who are trying to juggle work, family and studies. After finance, the next greatest challenge to retaining students is class timing. All those who drop out of college because they need a job or cannot leave the house for family reasons can be retained if they are allowed to take classes when and where they can. Online education can be paced to adapt to the speed and capacity of each individual student, so above average learners can proceed quickly and others can take more time. Space and time become irrelevant. Students can take a class at home, at work, during travel, or just about

anywhere. The class is not limited by time either. Once a lecture is recorded, it is available forever. Students can watch it any number of times till they master the subject. We can have talented and inspiring lecturers teach us even after they are gone. Imagine having Einstein tutor you at home on a one-to-one basis. It is just one of the possibilities of online education.

Text and audio content can be made available in multiple languages. With the help of translation software, educational resources in one language can be made available to everyone in every language spoken on earth. This automatically expands the student base from North America and parts of Europe to include the whole world. Some countries and colleges have resources for those with physical challenges. If these could be made available to all such people in countries where such facilities are not even conceived of yet, or have never been attempted for want of resources, hope for a better life will replace despair.

Online education lends itself most naturally to collaboration between colleges, government organizations, companies and communities. This opens up infinite opportunities for students. It also lends itself to be customized and specialized to meet the varied interests and needs of students, far more than is possible in the bulk educational delivery system now prevalent for higher education. Syllabus revision can be done on an ongoing basis, without a lengthy procedure, administrative bureaucracy and the cost of reprinting thousands of books. This way, students stay updated with rapid social and technological advances. A wider range of subjects is available for students to choose from. This especially benefits students in rural areas and small towns where colleges offer limited program options. Students benefit from exposure to many cultures and viewpoints. Learning from a lecturer from another country, and discussing with peers spread all over the globe, students gain a global perspective that would otherwise have been beyond their reach, and which will qualify them to become global citizens.

In a world where the cost of education is rising rapidly beyond the reach of many students even in Western countries, online learning represents a way to deliver education at a fraction of the cost of traditional classroom education. Apart from tuition, costs of transportation and accommodation can also be saved.

7. Questions about Online Education

We may talk about online education saving everyone time, money and a lot of trouble, but there are also many who vehemently call for saving education from this online frenzy. When The New York Times declared 2012 the year of the MOOC, there were others who termed it the year of hyperbole. Selling books, headphones or used cars may very well be done online, but education is not a commodity to be sold. It is a process to be experienced. Nothing ever can replace the physical presence of a teacher. Teachers do not just teach their subject. In a hundred ways, they pass on their passion for learning, their values and principles to us. Their presence inside and outside the classroom, their handwritten notes on the answer sheets, their jokes and reprimands, their scholarship have all influenced us deeply. How can an image on a computer screen fill that place? Attending class with a group of friends, scribbling messages to one another, discussing, arguing, studying together – aren't all these as integral a part of college as acquiring a degree? The time spent at the college canteen, dorm, lab,

campus grounds, baseball matches, class outings are all learning experiences that teach us lessons that last a lifetime. Can all this be stimulated in virtual reality? Lifelong relationships often begin in school and college. How can the internet give all these? In a world where people are already getting addicted to gadgets and becoming more isolated, what will the youngsters of the next generation be like if they are left in front of the computer all day or night? What will the physiological, social, psychological consequences be? Doesn't the virtual world come with its share of problems – problems of security, hacking, identity theft? How can one make sure that the youngster sitting at the computer is watching a video lecture and not indulging in some recreational activity that does not serve any purpose? What if a forum discussion strays from the subject to personal affairs? Evaluating a multiple choice question can be automated, but how can a software program evaluate an essay on the subtle humor in the works of William Makepeace Thackeray? It is not easy to stay focused and self-motivated when one is given freedom. Why is the dropout rate in MOOCs so high? How can an employer be certain that the applicant actually took the online course and tests, and not a proxy? These are some of the questions being raised.

“When Gutenberg started printing Bibles, the capacity to read and write was taken as a sign of genius and many protested that the Word was meant to be read only by priests.”

New developments are always received with some degree of skepticism or opposition. When Gutenberg started printing Bibles, the capacity to read and write was taken as a sign of genius and many protested that the Word was meant to be read only by priests. When electric street lights were introduced in Germany, some declared it as evil. God had meant the day to be bright and the night dark, man should not interfere with the divine will. When Apollo 11 was launched, there were some who criticized spending millions of dollars on a fool's errand. Until the dawn of the PC, working with computers was regarded as the sole province of engineers and scientists. The ATM, cell phone, satellite TV, social networking, e-commerce, internet banking, wearable computers – which one of these was welcomed without cynicism, only to be accepted as a matter of fact in due course?

8. Interactivity

An internet-based education need not exclude the traditional classroom. A blended or hybrid version can combine the best of both formats and elevate education to as yet unknown standards. When a lecturer uses a recorded lecture, there is more time for direct interaction with students. Any student can directly email the lecturer, have a live chat discussion, or participate in a video conference. Skype, Webex, Google Hangouts are some of the video conferencing platforms that enable the creation of global classrooms. More versatile and user-friendly group discussion software and feature-rich social networking sites allow students to relate to their classmates.

Online education need not isolate the student; it can enable him/her to connect in ways never done before to students across continents, cultures and age groups. Some forums allow

voice messages in addition to text. Live chat makes discussion as close to a classroom discussion as possible. Questions posted in forums in Coursera courses are answered, on an average, in 22 minutes. Students who are active in the forums, who answer questions, or even raise them are noted, and their participation is positively reflected in their grades. Posts can be voted for, and students whose posts receive the most votes are similarly appreciated on the completion of the course. Forums keep track of the most popular topics and questions raised, and the MOOC instructor personally responds to them, or takes them up during subsequent live conferences.

Following instructors or peers on Facebook, Twitter and other social networking sites makes learning fun, and more effective. A lecturer teaching science fiction asked his students to watch a film as a course requirement. Students could watch the movie anywhere they found convenient, but were required to 'live tweet' their viewings. This created a collective experience out of the disparate viewings. Then he used Storify, a tool to collect updates from social networks and created an interactive, dynamic and social story, and put his students' posts together. The tweets and the story form as much an education as his course that follows. Moreover, they make students connect with each other in dynamic ways. Using video conferencing facility, another lecturer taught a global classroom, followed by a live discussion between students in the US, Brazil, India and China. Inkling, a company that creates interactive digital textbooks, allows the reader to not only take notes, but also create study groups online, and lets one see others' notes and highlights in real time, creating running discussions on the go. Kno Inc., an education software company, lets you get even your professor's notes right in your e-reader.

Many educators are using Pinterest, the pinboard-style photo-sharing website, to aggregate images, create visual scrapbooks, publish students' work, and engage a group. The networking power of Facebook is already legendary. A study of Facebook usage among educators and students concluded that the participation of a mentor and mentee on a Facebook group page is seen to positively affect their relationship both online and offline. Students and mentors that interacted regularly, posting questions and receiving feedback through the page, were observed as having a stronger relationship than other mentor-mentee pairs.

Peer review which is part of some online courses can be an education in itself. Online forums make it possible for students to raise questions and to teach one another as well. Some MOOCs allow students to identify classmates from the same vicinity, and enable physical meetings, much as home schooling students have their study groups and joint activities on a regular basis. Coursera meet ups allow Courserans living in the same locality to meet, discuss the course or any other subject. At a meet up in Menlo Park in 2012, the organizers expected a turnout of 100 students, but more than 600 attendees arrived, raising the question whether meet ups are the new classrooms. Interaction, meetings and socializing are possible even in online education.

9. Education 3.0

Education as we used to know it, and which is now termed Education 1.0, was imparted by teachers in the classroom using textbooks and notes. Education 2.0 saw the cautious

acceptance of technology. Computers and the internet were used to supplement teaching and learning. Today what we are witnessing is Education 3.0. Education takes place everywhere, in the classroom, at home, on the road, in the workplace, anywhere. It comes from teachers, classmates, friends, strangers. Technology has permeated everything, and education has become lifelong.

New learning methods have always evolved. An advertisement for shorthand courses through weekly mailed lessons was seen in the Boston Gazette in 1728. The University of London first offered distance learning degrees in 1858. In the 1930s, schools and colleges in the US were using radio to teach students. UK's Open University established in 1969 initially relied on radio and television broadcasts for delivering its courses. In 1976, Coastline Community College in the US combined computer assisted instruction with telecourses to successfully establish online distance learning. The limitations of the classroom were overcome long before the advent of internet. Distance and Open learning have provided education to students who either could not, or did not attend regular classes. According to the 2011 report of the US Department of Education, 20% of all students enrolled in college took at least one distance education class, and 4% enrolled in an entire program through distance education. In India, 24% of all students study through the correspondence method. IGNOU, an Indian open university, teaches 3.5 million students each year. Turkey's Anadolu University and Allama Iqbal Open University in Pakistan educate nearly 2 million students each. Since its launch, UK's Open University has taught almost 1.8 million people worldwide. Online education is one step in a long continuum.

Online education is to distance education what the E-book reader is to the book. It is not a glorified version of the older one. It brings much greater capabilities than ever imagined to improve the quality and effectiveness of this huge field. True, there is only so much that can be transmitted through wires, or wirelessly. Online education is the solution to a number of problems, and at the same time poses a different set of challenges.

10. Innovations Unlimited

Startups and established companies alike come up with products, services and ideas that seek to improve online education and meet the challenges it presents. The range of subjects offered by MOOCs and providers of online education leaves the students spoilt for choice. There are search engines such as Moocse that search the MOOCs for the required course. Class Central, MOOC List and moocs.co are online course aggregators or directories that list all available courses. Some even allow students to rate the courses they have taken and lecturers they have had, to guide others. Learning Management Systems (LMS) such as Blackboard, Moodle and Desire2Learn allow the creation and management of online courses. Presentation, audio, video and graphics software allow a subject expert to create all the components that make up the course. One need not be a college lecturer or a PhD holder to create a course, companies like Udemy and Educreations allow anyone to host courses online and share knowledge with the world. Khan Academy, Codementor, Colingo, Magoosh and many others focus on one or a few subjects exclusively. TED Talks educate in an unconventional, inspiring way. Major players such as Apple, Samsung, Nokia and Sony

create devices that cater to the educational needs of students. Others like Datawind come up with low cost devices that aim to make digital education affordable to all. Publishing houses like Pearson and tech companies like Inkling and Kno create interactive, digital textbooks that allow the reader to organize notes and take tests on the internet, so that the plethora of information does not overwhelm the student. Organizing software such as Zotero allow one to categorize data, ebooks, websites, videos, notes, and synchronize all these online with other users. Kno Inc. provides a personal study dashboard that helps students track their learning engagement for each ebook they use. Wordle, a tool for generating customized “word clouds” from text, can be used to make text more visually appealing, and put to uses that are limited only by one’s imagination. Biometric devices for identity verification aim to minimize fraud. Hardware, software and strategies that seek to prevent malpractice during the course and evaluation, and different revenue models that will make open courses sustainable are mooted. Google and edX are collaborating on a new online learning platform, MOOC.org, which they aim to make the YouTube for MOOCs. Udacity, along with other online education providers and tech companies in Silicon Valley, has launched The Open Education Alliance, which is an experiment in open education. Collaborations are the rule of the day, with tech giants and startups, government and voluntary organizations, universities and publishing houses coming together to educate. Tools are available for every conceivable aspect of learning – for event scheduling, translation, flashcard creation, mind mapping, document sharing, digital storytelling, screen casting, note taking, blogging etc.

11. Assessment & Certification

There are course providers that adopt the freemium model, where the basic course is provided for free, and students are charged to take a proctored exam, and receive credit for the course. Coursera launched Signature Track, which gives students the opportunity to earn Verified Certificates in recognition of their work and completion of a course, and within 9 months of the launch, 25,000 had signed up. These certificates are building a reputation as an accessible credential for adults to demonstrate their proficiency in a range of skills and disciplines. Signature Track links one’s online coursework to one’s real identity. It provides financial aid for students who are unable to pay for the certificate. Its participants are substantially more likely than the average Coursera student to complete a course. These Verified Certificates are beginning to be included in resumes, cover letters and LinkedIn profiles. Certification ties in with employment opportunities.

12. Employment

Many online educators provide training for students through tie-ups with companies. Some allow companies to recruit from among their students. The Cisco Learning Network is a social networking site that lets users seek knowledge, training, and support to enhance their careers through various certifications offered online. The portal also has a mentorship programme where peers anywhere in the world can mentor others that are preparing for certification exams via discussion forums, blogs, video interviews and wikis. Udacity allows students to share their resume with recruiters and provides employment assistance by matching students with prospective employers. Knight Center for Journalism in the Americas’ program

on journalism offers students the chance to interact and learn directly from data journalism experts working for leading U.S. publications. The advantage of education providers partnering with companies is that students can be trained in a way that ensures they will be hired, almost guaranteeing employment. There are now enterprises like Accredible that translate all online learning into a five star rating to assist recruiters take a decision about the applicant. Online accreditation and certification are going to assume a lot of significance given the projected shortage of graduates worldwide. Manpower Group's 2013 Talent Shortage Survey finds that currently, 35% of employers worldwide report having difficulty filling jobs due to a lack of available talent. A 2013 study by the Lumina Foundation finds that by 2020, 65% of the workforce will require some form of post-secondary education. At the current trajectory, the US will be at 48.1%. A study by the McKinsey Global Institute says that by 2020, there will be about 38-40 million too few college and university graduates to satisfy the demands of the global labor market.

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13. World University Consortium

“The future of education is online.”

Education is breaking out of monastic retreat and coming into much closer contact with the real world. Online education blurs the line between the university and society-at-large enabling other players to become major knowledge providers and enabling academia to experiment with new types of courses that do not fit within the confines of conventional academic disciplines. The completion rates of MOOCs may be low, but given that the strength of many MOOCs runs into tens of thousands of students, even a completion rate of 10 or 20% means a class larger than most college classrooms. The course “Functional Programming Principles in Scala,” from Switzerland’s École Polytechnique Fédérale de Lausanne attracted 50,000 students. 83,000 enrolled in “A History of the World since 1300” at Princeton University. University of Edinburgh’s course “Introduction to Philosophy” drew almost 100,000 participants. With such numbers, even a miniscule completion rate translates into a very large class.

The founders of the World Academy of Art and Science were inspired in 1960 by the idea of establishing a “world university”. The Academy has envisioned an idea half a century ahead of its time, and is perfectly poised to assume leadership in this initiative by creating a World University Consortium.

14. The Future is Online

The future of education is online. The claim is backed by all available data. The Babson Survey Research Group, supported by The Sloan Consortium, Pearson and the College Board, has been studying online education since 2002. Its January 2013 report, *Changing Course: Ten Years of Tracking Online Education in the United States*, is the tenth annual report in

this series. According to it, 71.7% of higher education institutions were offering some form of online learning in 2002. In 2012, it had risen to 86.5%. 34.5% of these institutions offered complete online programs rather than individual courses in 2002. Now the number is 62.4%.

In 2003, 57% of academic leaders rated the learning outcomes in online education as the same or superior to those in traditional classroom learning. In 2012, the number had risen to 77%. However, faculty resistance to online teaching is considerable. 27.6% had accepted the value and legitimacy of online education in 2002, and that rate has inched up to 30.2% in a decade. Academic leaders and faculty members at institutions with online offerings have a more favorable opinion of the outcome of online courses than those at institutions with no online offerings.

69% of chief academic leaders say that online learning is critical to an institution's long term strategy. The number of American students taking at least one online course is 6.7 million. The proportion of all students taking at least one online course is 32%, up from 9.6% ten years earlier. Mark Twain is supposed to have humorously said that he never let his schooling interfere with his education. His words are literally coming true for many.

The cold numbers above all represent heartwarming human stories. A self-learner left a note in one of the popular MOOCs. He had been working as a shelf stacker for 6 years, applying for 4 jobs every week but with no avail. Programming had long fascinated him, but there had been no opportunity to learn. The advent of online courses had provided the opening, and the shelf stacker took a programming course, applied for a software job, and found one that paid more than twice his earlier salary. When he went to a dentist and filled out a form, under occupation, he put 'software engineer' instead of 'shelf stacker'. There can be no number affixed to the sense of satisfaction, pride and joy in that.

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