The Future of E-Ducation: The Impact of Technology and Analytics on the Education Industry

The Future of Education: the Impact of Technology and Analytics on the Education Industry
This report is dedicated to:
**Malala Yousafzai – Education Activist**
fighting for the right to education and for women

*Because the right to education is universal*
ABSTRACT

Technology is having an unprecedented impact on education; its future is being shaped by current and emerging technologies that are drastically changing the way in which learning and teaching are experienced. Education is increasingly becoming individualised, customised and more accessible as a result of combining open source technology, the Internet, mobile and multi-faceted technology, virtual learning environments and learning analytic technology. This report reflects on the innovation and the complexities that are currently emerging in education as a result of these technological advancements. Building on this, the report will examine why these technologies are changing the landscape of education and how they will be pivotal in achieving the United Nations’ goal for universal education by 2015.

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FOREWORD
Technology has started radically changing the lives of those in and dedicated to education, but the transformation has only just begun. This white paper explores, and explains what the future is likely to look like for teachers and students, and examines what the implications might be for institutions currently involved in the industry. The good news is that there will be massive improvement in the lives of students, teachers and parents. The bad news is that people in the institutions that have shaped this industry historically will be left behind if they do not help their organisations adapt; as there are new entrants waiting in the wings with products that are fundamentally better at serving the interests of the customers. A revolution awaits.

We examine this revolution by firstly building a detailed theoretical foundation, and then supplementing this knowledge with an engaging set of case studies which look into services offered by new entrants that have delivered amazing outcomes for their students and for which there appears to be insatiable demand.

In the modern landscape, ensuring excellent quality of education is just as important as the typically more emphasised focus on increasing the quantity of those in education, at any level. This is where educational technology has such a substantial impact – not only does it greatly improve the interactivity, and engagement of the educational experience (quality), but it also brings with it improved accessibility and universality (quantity).

Educational technology is so vitally important to these targets because it can improve them both simultaneously. These are two targets which, policy wise, have historically been targeted independently by governments and institutions, as they have previously involved very different approaches. Educational technology has combined these approaches, and has accelerated education’s future trajectory greatly. It is an exciting time to be involved in the educational sector, regardless of your role.

The revolution in E-ducation does not just affect the way in which students learn – this particular paradigm shift reverberates significantly deeper than that. It affects the way teachers teach, the way schools are structured, the barriers between school and home life, and – perhaps on its most profound level – affects the trajectory of the entire future of humanity. The global future of mankind in these modern, changing times, is uncertain, unstable, and dynamic. In order for future generations to adapt to such uncertainty, and create sustainability, it is vital that the way in which we teach them to do so can also adapt with equal dynamism. This is not the case with the “old” educational paradigms. Through better understanding and utilization of these incredibly powerful new revelations in educational technology, we can prepare future generations for whatever may lie ahead. By ensuring that the avenues through which learning is delivered are optimised for greatness, we ensure that future generations can launch themselves along the road to greatness.

As such, this paper provides useful policy suggestions and insights, in addition to examining various powerful examples of Edtech developments, as case studies. Please join us in the goal of trying to advance educational development; an extraordinarily good cause which will change the future of mankind in wholly positive ways. This report, is one of many important steps which must be taken.

Nicolas De Santis, President of Gold Mercury International

Sherry Coutu, Chairwoman of SVC2UK (Silicon Valley Comes 2 the UK)
EXECUTIVE SUMMARY
In the last century, society has dramatically changed, however the way in which we prepare ourselves has not. The world is rapidly moving online and, until now, education has largely been restricted to the physical world. A revolution in education is underway, as technological advancements allow education to be customised, individualised and universally accessible. Independent learning is at the forefront of the paradigm changes that are shaping the future of education. This report will highlight and critically assess the current technological advancements that are bringing innovation into what has historically been a rather stagnant sector.

This report looks at the future of education with regards to the impact which technology has had on the sector as a whole. This impact should no longer be revolutionary; it has become a necessity for society. The United Nations’ Millennium Development Goals have emphasised the urgency to deliver universal primary education by 2015. The most pivotal technologies to achieving this will be the Internet, Open Sources and Mobile Learning Devices. These technologies are portals through which students across the world can access education cheaply, from any location and at any time, shattering the rigidity and barriers associated with traditional educational institutions.

Education will not only be more accessible, it will be highly adaptive and customised. Technologies such as cloud computing, 3-D printing and learning analytics will transform the norms of education. Students will be more independent from their educational institutions; education will be more interactive and engaging, and educators will be capable of monitoring and providing individualised feedback on an unprecedented level. ‘Digital natives’, those born during or after the introduction of digital technology (Prensky, 2001), are already using this sort of technology daily and see it as a non-remarkable feature of society today. The ubiquity of these technologies will facilitate their integration into educational institutions.

The paradigms of education have not changed for nearly a century. Emerging technologies and technological advancements are bringing innovation, offering new ways to provide education, and challenging the education-industry’s landscape. The technologies at the forefront of this revolution are divided into three sections: Open Sources and the Internet; Mobile and Multi-Faceted Technology; and Virtual Learning Environments and Learning Analytics.

The common feature of these technologies is how they merge our virtual and physical worlds. This merging has its benefits, downfalls and complexities, which will be discussed with reference to each technology. Most importantly, however, this report will highlight that these technologies will not only make it possible for the United Nations’ Millennium Development Goal of universal primary education to be achieved by 2015, but they will also help the world deliver a globally innovative, engaging, customisable and accessible education that students across the globe deserve.
Introduction

The way in which learning is experienced has begun to change. Technology is impacting education to such an extent that educators and industry-professionals are claiming a revolution is underway. Students are no longer restricted to hierarchical, top-down, traditional learning environments. Increasingly, students are offered an individualised and adaptive form of education that can be accessed anywhere and at any time. This change in the learning experience could not have come at a better time. The new generation of students are increasingly ‘digital natives’ (Prensky, 2001), who view technology as a non-remarkable feature of daily-life. The impact of technology in education is no longer new and exciting; it has become merely a necessity.

Yet the idea of a revolution in education is not new, and is seen by some as akin to the story of the boy who cried wolf. In the 1920s, Thomas Edison claimed that television would largely replace textbooks; in the 1930s, Benjamin Darrow predicted that radio would challenge the role of teachers and textbooks; and in 1984, Seymour Papert suggested that computers would become the key tool for education. Papert’s prediction is only just a reality. However, nearly a century later, schools deliver education in much the same manner as they always have.

This educational ‘revolution’ is different to all previous paradigm changes in education because of how technology is used in daily-life. Technology, in particular the Internet, Web 2.0 platforms, mobile devices, computers and virtual realities have become a standard part of how society functions. What makes the technology discussed in this report innovative, unlike previous technological advances, is that together, they remove the need for schools to constantly invest in maintaining, updating or upgrading hardware. Previously it took educational institutions “all the running you can do, to keep in the same place” (Carroll, 1865) but now, thanks largely to Bring Your Own Device (BYOD) initiatives, cloud computing and the Internet, that will no longer be the case. Moreover, as ‘digital natives’ are more than comfortable with this technology, the development programs necessary to implement them will only be required by those unfamiliar with digital technology. This report will discuss how the digital age is leading to a fundamental shift in how we manage education.

Open Sources and the Internet are the first innovative technologies this report will discuss. The importance of Massive Open Online Courses (MOOCs) and Web 2.0 platforms shall be highlighted as technologies that are
promising to revolutionise the infrastructure of education. MOOCs and the Web 20
defy the traditional barriers of education and offer it on a decentralised, universally
accessible level. This section, consequently, emphasises the importance of digital
information literacy in an increasingly online world. Both MOOCs and Web 2.0 are
Open Source technologies that have resulted from the Internet, and from the drastic
changes the Internet has caused in how people communicate and process information.
The second section of this report covers the revolutionary qualities of mobile and
multi-faceted technology. Mobile and multi-faceted technology is revolutionising the
way society provides education to students. Cloud computing is one such noteworthy
technology. Cloud computing changes how educational institutions store information
and, ultimately, where students can access this information from, whilst mobile learning
devices are the portals through which education is accessed. Mobile learning devices
also allow students to be more independent with their learning; providing a customised
educational ‘experience’. Furthermore, 3-D learning technology like 3-D printing is
being increasingly incorporated into curriculums to make education more interactive
and engaging for students. Education is increasingly becoming a fully-customisable
experience, shattering its traditional rigidity.

The third and final section of this report discusses the potential of virtual learning
environments and learning analytics for education. Today’s fully inter-connected
and digitalised society has allowed people’s physical lives to merge with their virtual
ones. Soon, this will also be true for students. As students increasingly have access to
mobile learning devices, learning will occur more frequently via educational games and
virtual learning platforms. Students will be able to complete assignments, be corrected,
and receive feedback entirely via virtual learning environments. These environments create learning
data that will allow teachers to continually assess and accurately guide their students. This new technology
is referred to as learning analytics. Together, virtual learning environments and learning analytics will solidify
the progression of education towards being a more individualised, customised and adaptive system.

Despite promising to transform the paradigms of learning
and education in a manner that, for the first time, is likely
to be achieved, the technologies discussed in this report
are not without their complexities. By explaining how
and why education is undergoing rapid changes due
to technological advancements and societal needs, this
report will also highlight the benefits and downfalls of
customising the learning experience for each individual.
The future of education will be more individualised,
adaptive, customised and accessible than ever before; this
report will show you why.
Open Sources and the Internet

According to Joi Ito, Director of the MIT Media Lab, these platforms are founded by “a belief system, a philosophy about the effectiveness of decentralised, bottom-up innovation” (Loyd, 2012). This viewpoint is particularly evident with regards to MOOCs and Web 2.0, both of which can be accessed by anyone, anywhere and at any time. These Open Sources are changing the way students experience learning: they are offering more accessibility and new opportunities in how we deliver and structure education. Indeed, new educational ideas and methods focused on innovation are already being implemented, as seen by the Irauaritz-Lezama Foundation’s EBI project in Madrid. Open Sources are already disrupting the infrastructure of current education systems, globally.

Web 2.0

The Internet has drastically changed how people interact, communicate and present information. New platforms such as Wikis, blogs, podcasts, bookmarks and social media sites including Facebook and Twitter have adapted the original website platform in such a way as to coin the term Web 2.0. Web 2.0 is, therefore, not a new technology: it was coined in 1999 by Darcy DiNucci and merely describes the new ways web pages are being made and used. It is now not uncommon to see Web 2.0 being used by students and teachers alike as tools to support learning. However, this technology is also being used to extend student’s learning environments beyond the classroom (New Media Consortium, 2013).

The world is moving online, but until recently this has not been reflected in classrooms or in curriculums across the world. The world’s students, particularly those in primary and secondary education, are ‘digital natives’ (Prensky, 2001) who understand how to navigate and use the online world. Geoff Maslen of the Sydney Morning Herald explains how the education system owes its students “to use technology as well as they do to help them succeed in their own education” (Grossman and Loyd, 2012). More willing educators believe this will be achieved through the use of Web 2.0 platforms. >
OPEN SOURCES AND THE INTERNET

Bringing the classroom-learning environment online through Wikis, blogs, podcasts, bookmarks and social networks allows students access to the classroom anywhere and at any time. Blogs are formally defined as “frequently updated websites consisting of dated entries arranged in reverse chronological order” (Walker, 2005). They are online, Open Source platforms that allow sequential entries like diaries or journals to be posted and published for a global online audience. Blogs are used as learning journals, gallery spaces, for peer reviews and as display platforms for problem-solving exercises. They encourage students to reflect, think critically, respond to feedback and to develop authenticity (Tomel, 2007). Blogs, however, are hard to monitor as the authors primarily control the blogs; the teachers, therefore, are often unable to modify or edit a student’s blog.

On the other hand, Wikis are designed so that numerous people can send, receive and express ideas, edit someone else’s work, or post links to other relevant sources. In the education sector, Wikis are being set up to promote teamwork,

CASE STUDY:
Edmodo
Using Social Media in E-Ducation

Edmodo is a social networking platform which takes advantage of students’ everyday, normalised usage of social media sites such as Facebook. Edmodo’s goal is to bridge the students’ social, “personal,” life with that of their school life, and bring their methods for interaction closer together. Edmodo is advertised as a “free and safe way for students and teachers to collaborate”. It can be most casually likened to a Facebook, or a social network, for schooling. Edmodo emerged in 2008 when co-founders Nic Borg and Jeff O’Hara recognized the need for the educational environment to evolve, in order to reflect the increasingly connected and online world. Since its inception it now has over 29 million users utilizing the solution worldwide – a figure which is nothing short of astounding, and undoubtedly indicative of the full extent of the modern revolution in E-Ducation.

Edmodo is built on the principle of embracing the modern shift in the ubiquity of social networks, rather than avoiding it; as has typically been the case in most educational institutions. Use of social networking platforms in school has often been actively prevented while on school IT systems, and has always been considered a problem and a distraction. Edmodo flips this stigma on its head, and embraces it; by integrating the schooling experience with the social media experience. Edmodo allows social networking to supplement and enhance the school experience, rather than hinder and distract the process. It allows teachers, students and parents to safely and actively share files, assignments, concerns and thoughts online, among one another, in an encouraging environment. It also connects teachers around the world to each other, by providing a platform where they can share and use other materials recommended by teachers worldwide, for any topic. It also keeps the teacher in constant contact with the students, akin to the way in which modern students are constantly connected to one another via their social networks. Teachers can remind students of their duties, or assist them with their assignments at any time, allowing students to receive a more personalized, flexible system of education which exists outside of school hours as well. Bridging the gap between the students’ personal, and schooling life, creates a more adaptable, flexible experience for all involved.
Bookmark sites allow users to create and categorise a library of websites, images and other media.

Continuous review and to develop sharing in a conversational manner (Wagner, 2006). They are used in brainstorming activities, knowledge creation, collaborative writing exercises and group work. Wikis are growing and adapting. For example, Wikibooks is building an increasingly large platform offering free, user-edited online and Open Source textbooks. However, it is difficult to track these contributions or modifications, which makes Wikis prone to poor quality control, which is often the downfall of the Wiki encyclopaedia called Wikipedia.

Social networking sites are similar to blogs and Wikis. They are websites people sign up to in order to chat, post comments and share media. Participants must build a network in order to participate. This offers students and teachers a private, interactive network where they can communicate outside the classroom. Social networking sites like Twitter and Facebook are increasingly used by teachers to keep parents informed. >
In 2011, 57 million primary school aged children did not attend school (United Nations, 2012); goal 2 of the UNMDG aims to achieve universal primary education by 2015.

of class activities, to post homework or other reminders for students, and to share the activities of different classes with the rest of the school. In this way, social networking sites are an online, Open Source extension of a class diary, acting as another portal for teachers to guide students socially and intellectually.

Podcasts allow audio-based files to be created and distributed on a regular basis. Podcasts are the foundation of the ‘flipped classroom’ scenario as they allow students to listen or watch education lectures anywhere and at any time. They are also being used for case-based lessons, guest lectures, as supplementary course materials and as support for distance learners. For secondary and tertiary education, Apple’s iTunes University (iTunes U) enables educators to build courses based on podcasts, with access to over 500,000 free public resources, using the iTunes U Course Manager. The downside of podcasts is that they do not encourage collaboration or interaction.

Bookmark sites allow users to create and categorise a library of websites, images and other media. These sites are used in a similar way to how an individual bookmarks a website on his or her personal computer. Bookmark platforms are particularly useful as they allow users to share their bookmarked websites with one another. For example, if students are requested to visit certain websites for a school project, their teacher can guide the students by creating a bookmark page, with all of the webpages, on a platform like Delicious.com.

Web 2.0 platforms are encouraging students to work within a class community outside the classroom, allowing students to share their contributions and inputs. The Internet and these Open Source platforms have achieved global recognition as “an effective means of distributing high-quality, accessible educational materials to schools in both developed and developing countries” (New Media Consortium, 2013). Similarly, these platforms are also being used to expand school curriculums by incorporating informal in-class learning (New Media Consortium, 2013). Australian schools, particularly in Victoria, are discovering how these Web 2.0 platforms can be used as a part of schools’ literacy programs. James Farmer, a former technology lecturer from Deakin University, Australia and Founder of Edublogs, explains how using activities such as blogging “changes how you learn, [it] motivates children to improve their reading and writing literacy skills, gives them the chance to express their own thoughts and opinions, often to a global audience, and enables them to collaborate with classes in other countries, and with experts” (Maslen 2013).

This sort of learning process also simultaneously encourages learner independence and student collaboration. An online learning environment encourages students to take a more active role in their own learning process “by using technology to search for and collate information, and publish and share their findings” (Lim, Zhao, Tondeur, Chai and Tsai, 2013). This promotes the ability to find, evaluate and put
information to use. The same cannot be said for many traditional course materials “which can be cumbersome, unchanging and particularly costly for K-12 schools” (New Media Consortium, 2013). Moreover, Web 2.0 platforms encourage greater collaboration between students. These platforms are designed so that participants can have input into, comment on and share the work of others. This creates a much more engaging educational context because it gives students more opportunities to participate, provides greater access to additional information and provides more opportunities for students to learn (Lim, Zhao, Tondeur, Chai and Tsai, 2013).

However, as briefly mentioned above, the Internet and Open Source platforms are also allowing for innovative adoptions to the current infrastructure of education. Open Source platforms are being used by Wikibooks and the CK-12 Foundation to provide students with free, online textbooks and digital books. Indeed, the movement to online class materials is becoming increasingly popular, particularly for traditionally cumbersome and expensive materials like textbooks. In Poland, the Prime Minister’s Office has mandated Open Source textbooks for students in grades four to six (Blommestien, 2012). Elsewhere, schools such as Los Angeles USC Hybrid High School are adapting the Internet and Open Sources in other ways. Schools like USC Hybrid are now offering students “flexible schedules, highly integrated online components and personalised learning plans to keep students engaged and focused on success” (USC Hybrid High School, 2013). The mission of this particular school is to graduate 100% of its students “to be socially and academically prepared for success in college and the workplace” (New Media Consortium, 2013). This mission statement highlights that schools are now realising that a well-rounded education includes providing students with real-world experience, engagement and, most importantly, digital literacy.

Although the Internet has drastically changed how people communicate and process information, this change is only starting to be implemented in schools. Web 2.0 platforms may not be considered a disruptive technology as they have become a part of everyone’s daily life. However, if these platforms are further used to extend student’s learning environments beyond the classroom we can only imagine the possibilities. The education industry and society in general have yet to decide whether a dependence on Web 2.0 technologies is a good thing or not. These platforms are criticised for feeding ‘digital natives’ (Prensky, 2001) factoids of information via headlines or in 150 characters and as a result are preventing them from learning to critically analyse or evaluate. Web 2.0 platforms and their affinity with distance education will be particularly important in achieving the United Nations’ Millennium Development Goals in Education (UNMDG). In 2011, 57 million primary school aged children did not attend school (United Nations, 2012); goal 2 of the UNMDG aims to achieve universal primary education by 2015. This goal is unquestionably relevant to education and is important to keep in mind throughout this report as many of the technologies mentioned will be pivotal to achieving it. >
MOOCs (Massive Open Online Courses)

Emma Boyde from the Financial Times says that the *agent provocateur* of this revolution in education is the MOOC. MOOCs are free, online courses with open, unlimited enrolment. They provide access to courses being taught by leading scholars and industry experts, and are being offered by the world’s leading universities. The original three universities to offer MOOCs were Harvard, Stanford and the Massachusetts Institute of Technology (MIT). The term MOOC was coined in 2008 as a result of a learning theory course from the University of Manitoba, Canada, which had enrolled 25 tuition paying students and some 2,300 online students who paid no tuition. The first MOOC platform was launched in 2011 by Stanford University. Stanford launched three MOOCs, each of which enrolled about 100,000 students (Pérez-Peña, 2012). MOOCs then exploded across America as, by July 2012, MITx.org, edX.org, Udacity.com and Coursera.org have been launched. As of July 2013, universities from Germany, Australia, Brazil, Turkey, Lithuania, Israel, Italy, India, and France offered MOOCs. Moreover, universities in the UK, Denmark, China, Korea, Japan and Mexico, are planning to launch their own MOOCs by the end of the year. This global explosion has made MOOCs a disruptive technology in education.

MOOC providers are offering MOOCs as an alternative to traditional education. MOOCs offer students traditional course materials such as readings, quizzes and problem sets. Students are taught via video lectures, can participate in online discussions and study groups,
MOOCs are revolutionary in offering students free, world-renowned education that can be completed anywhere and at any time. Stanford Professor Ng explains how MOOCs are revolutionary for the way in which they change the economics of education. In particular, they allow “one professor to teach not just one student but 100,000” (Grossman, 2013).

MOOCs also vary in whether they impose time restrictions that mimic the university experience, or allow students to work at their own pace. MOOCs predominantly offer tertiary level education and target students over the age of 18. However, with parental approval, students from the age of 13 are encouraged to participate in different courses. Some of the open source platforms that offer tertiary-standard MOOCs are Coursera.org, Edx.org, futurelearn.org, Udacity.com, OpenupEd.eu, openlearning.com, and Ulearniversity.com.

Although each MOOC platform performs a similar function, they each offer something different. Coursera.org and EdX.org are virtually similar. They both offer courses from globally leading universities in a wide range of topics from humanities and social sciences to medicine and business. They encourage students to learn at their own pace, but to complete courses within a time frame that mimics a traditional university course. Coursera.org and EdX.org offer their students feedback though interactive assessments and discussion platforms. OpenupEd.eu is very similar, aside for the fact that it focuses on offering courses from European universities. Openlearning.com is the Australian equivalent; it offers courses in a variety of topics that are both time-restricted and self-paced. Futurelearn.org is based at the Open University, and provides MOOCs from over 25 different UK Universities, in collaboration with huge cultural and educational institutions such as the British Council, the British Library, and the British Museum. Particularly important to this platform is that it encourages online learners to interact with one another, a principle known as “community supported learning”. Conversely, Udacity.com doesn’t promote itself as a university course provider. It offers courses largely based on computer science, mathematics and business for all ages. Udacity does not restrict students to a time frame and tries to offer courses for all types of students, including high-school aged students. It is also unique in offering its students virtual field trips all around the world via its short video lectures. Ulearniversity.com offers a MOOC platform where tertiary and secondary-level teachers can create online, Open Source platforms themselves. It subsequently allows any student or learner to access the content. Each of these MOOC platforms present and deliver the same products to learners although they are offered in a manner of different ways.

MOOCs are revolutionary in offering students free, world-renowned education that can be completed anywhere and at any time. Stanford Professor Ng explains how MOOCs are revolutionary for the way in which they change the economics of education. In particular, they allow “one professor to teach not just one student but 100,000” (Grossman, 2013). Moreover, as traditional universities’ fees continue to grow, MOOCs provide a cost-effective alternative for students seeking quality education.
rise: to £9,000 in the UK and to $60,000 in the US; tertiary education is increasingly becoming an unaffordable expense. McKinsey & Co. highlights how most people do not realise “that this new way of teaching and learning, together with employers’ growing frustration with the skills of graduates, is poised to usher in a new credentialing system that may compete with college degrees within a decade.” Conversely, Google’s Chief Technology Advocate Michael Jones sees MOOCs as the birthplace of ‘movie star’ global educators who could stream-line and combine the world’s best courses into a few premium offerings. Mr Jones goes so far as to say “you would end up with a dozen [course versions] of each possible topic done brilliantly and a lifetime legacy for all future

CASE STUDY:

Minerva University
Redefining the Ivy League for the future

Minerva University is an educational start-up based in San Francisco, USA, whose aim is to completely redefine the American landscape of Ivy League “elite education,” a sector whose business model has been stagnant for nearly a century. One particularly groundbreaking aspect of Minerva University is its use of the online learning environment, and learning analytics. This use of the online environment facilitates the decoupling of place from the learning experience. Minerva’s online courses aim to be not only “Harvard quality,” but also half the price of a typical university course - $10,000 a year, to be precise. Minerva’s founder, Ben Nelson, says that “by creating an educational experience that is built from online resources [Minerva] won’t be subject to the same scarcity of resources that besets institutions today,” allowing the university’s resources to be focused on more important areas.

At Minerva, students are required and encouraged to change location every semester (by moving to a new country or city), in order to maximise immersion in different cultures and languages, and develop life-changing networks of connections and relations. These types of skills and this form of immersive learning cannot typically occur in traditional university structures; due to their place embedded (campus) nature. While the university will offer no foreign language courses or support
As traditional universities’ fees continue to rise...tertiary education is increasingly becoming an unaffordable expense. McKinsey & Co. highlights how... “this new way of teaching and learning, together with employers’ growing frustration with the skills of graduates, is poised to usher in a new credentialing system that may compete with college degrees within a decade”.

In that regards, Nelson states that: “if you’re not trilingual by the end of your four years, you won’t graduate”.

While the first year of Minerva University will involve living on the Keck Graduate Institute (KGI) campus in San Francisco (a city widely considered to be one of the most thriving, diverse metropolises in the world) the remaining three years of their university career are spent adapting, living, and learning new environments and locations. To this end, Minerva has pledged to open two new residence halls each year from fall 2016 onwards, in locations around the world. Though the university itself will not open until the end of 2014, Minerva University looks to be one of the more promising developments in educational paradigms thus far.

Humans” (Armitage, 2012). But for now, MOOCs are merely online versions of courses offered by some of the world’s leading universities. They are also, supposedly, as rigorous as any standard course offered by the university in question. MOOCs, most importantly, can be taken by anyone, no matter what their background is or pre-existing qualifications are. Moreover, MOOCs are currently free, although they regularly offer the student a certificate of completion. MOOCs therefore promise to burst the current ‘education bubble’ and democratise education (Loyd, 2012), but only if they can promote themselves as true alternatives to education’s traditional learning environments.
However, not everyone sees the stagnation of the MOOC revolution as a bad thing. Teachers, like the professors in San Jose State University’s Philosophy Department, see MOOCs as the final force to “replace professors, dismantle departments, and provide a diminished education for students in public universities” (Grossman, 2013).

The Open Source platforms that provide MOOCs may, however, find it difficult to offer themselves as sustainable replacements to traditional education. This is because of how difficult it is for MOOC providers to replicate the invigilated, rigorous assessment used by traditional tertiary institutions. MOOCs currently ask students to agree to a traditional honour code, provide quizzes and assessments, most of which are peer-graded. A growing number of MOOCs also offer students a certificate signed by the lecturer (for a fee) once the course is satisfactorily completed. However, despite this, most MOOCs remain unaccredited by universities and employers. For example, even though Colorado State University’s Global Campus accredits a computer-science course offered by Udacity.com if the students can pass a proctored exam, Stanford University (where the company’s founders teach) refuses to offer credit for the same course. Moreover, even though the American Council of Education has recommended five Coursera.org courses for accreditation by American Universities, the universities that offer these courses do not themselves accredit the courses. This is a result of MOOC providers being unable to offer invigilated, rigorous assessment. Without finding an online parallel for traditional assessment and accreditation, the revolution of MOOCs may be short-lived.

However, not everyone sees the stagnation of the MOOC revolution as a bad thing. Teachers, like the professors in San Jose State University’s Philosophy Department, see MOOCs as the final force to “replace professors, dismantle departments, and provide a diminished education for students in public universities” (Grossman, 2013). It seems unlikely that it will be possible to convert MOOCs into revenue sources for universities which are already struggling financially (Cuban, 2013).

The issues that surround tertiary-level MOOCs are less of a concern in MOOCs offering kindergarten to grade 12 (K-12) courses that promote themselves as teaching aids rather than as replacements. The Khan Academy offers over 4300 videos covering K-12 Mathematics, Science and Humanities subjects in 10-minute segments (The Khan Academy, 2013). The Khan Academy also offers an adaptive assessment environment that enables students to practice topics at their own pace. It is pioneering MOOCs in primary and secondary level education and it will be the K-12 MOOCs that make ‘flipped classrooms’ a real possibility. A flipped classroom refers to a scenario where students would be assigned an informative video lecture as homework. Katie Ash in Education Week explains how the term ‘flipped classroom’ comes from “the idea of swapping homework for classwork” (Ash, 2013). This allows class time to be used for hands-on activities that apply the knowledge learnt at home. The flipped classroom scenario gives teachers more time to support a student’s learning journey, rather than merely correcting the errors on the students’ homework. K-12 MOOCs, therefore, may
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CASE STUDY: Veduca

Content from the world's top universities, accessible in one place

Veduca is a Brazilian Ed-Tech company which is aiming to democratize access to top quality higher education around the world, and improve peoples’ lives in a sustainable way through education, by providing high quality educational video content. Veduca offers a highly accessible platform through which content from the world’s top universities is aggregated, translated, subtitled, and made available to the general public via Veduca’s online portal. So far it is one of the most promising and fast growing Ed-Tech start-ups in Latin America, with over 200 million video views, 150,000 registered users, and more than 5,600 classes from 20 top universities around the world.

Statistically speaking, Brazilians are among the most engaged students in the leading MOOCs that have sprung up in the US, but the English language remains a particularly strong barrier to wider participation, and it is this barrier which Veduca aims to tear down. The Veduca platform translates and makes this top quality educational content freely available to their users; collecting, localising and contextualising it for Brazilians. It very quickly became established as a platform which anyone could use, anywhere, to gain access to the best possible education.

Veduca, in alliance with O Estado De Sao Paulo (the second biggest newspaper in Sao Paulo), created an interesting algorithm known as “Content Sense.” The algorithm is able to interpret the newspaper’s articles, and shows the reader related and translated video lectures from top universities around the world. This supplemented an area which has always been considered of primacy to a well-rounded and high quality education; the necessity for wider reading and outside learning. “Content Sense,” allows users to really understand and grasp the concepts and applicability behind their wider reading for daily topics.

In partnership with the University of Sao Paulo (widely considered the largest and best university in Latin America), the Veduca platform serves as a major step towards realising the future of online education, in the form of certification; by creating the first online MBA (Master’s Degree in Business Administration) in the world, in Engineering and Innovation. Veduca’s online MBA is unique and revolutionary in so many ways. In Veduca’s online MBA, the student simply pays if they wish to be considered for certification; accessing the course content is free. Another contrast with typical MOOC
certification is that Veduca’s MBA is actually issued by the Brazilian Ministry of Education, so it has significant real value compared to other online certifications, which are typically not backed by official organisations. Veduca’s course is especially powerful because its approach to teaching has a great focus on real world applicability; the content is delivered and engages in a way which attempts to ensure that the student actually learns and really understands the MBA content. Veduca founder Carlos Souza aims to account for industries and sectors in Brazil where there is a shortage of talent and knowledge; a prime example being the engineering sector. The Veduca MBA was designed to address this gap in the market and output experienced, talented leaders in this lacking sector. Carlos has a bright vision for the future of Veduca in this aspect, and is planning future courses designed to create and foster further talent in other areas in which Brazil is lacking, making Veduca a highly relevant and transformative educational institution.

Veduca provides a personalised learning plan, which infers from the students’ activities and set objectives (specified by said student) what the student does or does not know, and therefore needs to learn to fulfil the requirements for the course. This is built around the philosophy that every individual requires their own unique education based on their strengths, weaknesses and experience. Veduca co-founder and Chief Financial Officer Marcelo Mejiahowicz explained this system using himself as an example. Veduca’s MBA is divided into 8 disciplines, one of which is finance. Marcelo’s background prior to Veduca was 15 years of experience in the financial sector, and thus if he were to participate in the MBA course, it would be unnecessary for him to learn a great deal about that particular discipline. The Veduca platform would adapt to his knowledge of this field and instead emphasise subjects his experience might cause him to be weaker in; such as marketing. Such individualised and personalised educational experiences are undoubtedly one of the most powerful and unparalleled strengths of online courses, and in many aspects, Veduca is leading the way in this field. Veduca is creating an unprecedented and accessible experience which is very much at the forefront of the revolution in Education, not just in Latin America, but around the world.

Beyond expanding to include K-12 courses, the MOOC model is being adapted in other ways. TED, a non-profit organisation “dedicated to ideas worth spreading,” (TED, 2013) has started offering videos for students under the catch phrase ‘TED-ED: Lessons Worth Sharing’. TED-ED builds upon the ‘flipped classroom’ scenario as they encourage lessons to be customised around their educational videos. Users can then distribute the lessons publicly or privately on TED-ED’s platform and “track their impact on the world, a class, or an individual student” (TED, 2013). Similarly, the University of the People adapted and incorporated the Open University model truly disrupt the current education system. If the ‘flipped classroom’ model becomes the norm, the classroom will become more flexible and student-centred as “students move from being the product of teaching to the centre of learning” (Nagel, 2013). Despite this, these instructional videos will not and cannot replace professionally-trained teachers. Indeed, the increasing prevalence of Open Sources and the Internet in K-12 classrooms will shift the teacher’s role from being the information source to “a more complex role of negotiating lesson objectives with students, providing a varying degree of support for different students, monitoring students’ progress, and encouraging reflection on classroom activities” (Lim et al., 2013).
and MOOCs’ platforms. Launched in 2009, University of the People is the world’s first purposefully tuition-free, online university. It is a non-profit organisation that aims to provide universal access to quality, online university education for qualified students. Students are merely asked to cover the cost of exams at the end of each course. For students who are unable to pay this amount, the university has set up a ‘Micro-Scholarship Portal’ that enables donor contribution for students in need of financial assistance.

Although the MOOC may continue to be adapted and improved, the online learning environment it introduced to society will continue to drastically change students’ future learning experiences. The MOOC model, especially for K-12 classrooms and distance learning platforms, promises to become a part of the standard education process.
Digital Literacy

Digital literacy is becoming education’s largest challenge in adapting to new, disruptive technology. Teachers do not receive enough training in order to use technologies to their full potential and our ‘digital natives’ (Prensky, 2001) are unable to critically examine and evaluate the information they find online. A deficiency in teacher training is the main barrier to successfully implementing technologies throughout schools and to teaching students how to navigate technology critically and efficiently. Being comfortable, proficient and able to critically use technology is a definitive part of digital literacy. Digital literacy is now as important and functional as numerical literacy. Literacy, generally, refers to how well someone can use printed, written and digital information “to function in society, to achieve their goals, and to develop their knowledge and potential” (Educational Testing Service, 2013). However, digital literacy is defined somewhat differently; it refers to a “multi-faceted skill that covers the ability to find, use, interpret, modify and create a variety of digital media” (New Media Consortium, 2013). This definition however, implicitly refers to two separate aspects of digital literacy. The first is general technology or computer literacy; in order to successfully function in society, it is increasingly necessary to understand how technology works and how to use it. The second is information literacy; the ability to critically sort through digital information that has not been taught with the Internet in mind. This latter aspect of digital literacy is what will make teachers more important as schools further adapt to the Internet and Open Source technology. As mentioned before, the more MOOCs and Web 2.0 platforms progress and are adapted to educational use, the more the role of teachers will shift from being providers of information to being guides. These new guides will be steering students towards learning digital literacy. This is typically referred to as the “flipped classroom” model, where students drive their own education and teachers guide and assist them.
The Interactive Basic Education (EBI) Project: Santa Maria la Blanca school in Madrid

A new business model for the future of personalised schooling

The EBI (Interactive Basic Education) Project is a Spanish educational innovation project created by the Foundation Iruaritz Lezama’s Centre for Educational Innovation, in partnership with Microsoft. The EBI Project offers a methodological alternative to transform schools through the use of technology.

The EBI project achieves these goals by making changes at 3 fundamental levels – to the nature of the teacher, the presence of technology, and the role of the student. The role of the teacher and student are altered through an “operational plan,” and the implementation and use of technology is influenced through the “technological plan.” The methodology is as follows:

The Foundation Iruaritz Lezama makes an initial presentation to the prospective school, showing them their best example EBI Centre; the Santa Maria la Blanca school in Madrid, which is one of the Foundation Iruaritz Lezama’s member schools. Showcasing the school and its success using EBI is usually enough to convince prospective schools to adopt the EBI methodology. After the initial demonstration, the Foundation Iruaritz Lezama then visits the prospective school and makes a “diagnosis” of the existing technological equipment, teaching structure, and space that the centre has, in order to determine the course for implementation in a tailor made proposal. A team of professionals makes this “diagnosis”, and a proposal of the minimum requirements is stated; and if necessary the Foundation Iruaritz Lezama offers their advisory services. The “diagnosis” of the school depends on many factors like the number of students and teachers, the distribution of spaces, the types of construction; a good diagnosis is important, as it facilitates the proper implementation of the system.
The first plan which is put into place is their operational plan, where a curriculum is designed for each student and adapted according to their level and capacity. This is individually determined. The best way to allow each student’s level to be accurately assessed is to change the role of the teacher.

To do this, the EBI Project splits the traditional role of “teacher,” up into two distinct sub-roles. The “analyst,” or “specialised teacher,” is in charge of the direction, support, and personal advising of each student; being careful to note the interests, expectations, weaknesses, strengths and necessities of each individual. Teachers create the individual plans and curriculums for each student, and coordinate on a personal basis with each student and their parents. The “tutor,” fulfils much the same role as the traditional teacher; guiding the students through their individual curriculum and facilitating their learning.

The next important step is to put the IT framework into place, to allow students to make the most of the many advantages of technology. Once the teachers are properly trained and established into their new roles, the Foundation Iruaritz Lezama then ensures that all teachers in the institution possess the basic technological literacy necessary to use the new IT systems, regardless of their subject speciality. The EBI Project has several training programmes for this purpose, and coordinates this all through Microsoft support. EBI Centres typically have 1 laptop or tablet per student with 100% Wi-Fi coverage, to allow students to learn in an individualized, flexible and creative manner. All classrooms also have projectors and digital boards, as well as speaker systems and workshops. The Foundation Iruaritz Lezama ensures that adequate advice is given in order to optimize the costs for each school. Each student having their own individual laptop gives unparalleled and unprecedented flexibility and creativity to every student; provided their usage is mediated correctly by the teacher – another important aspect to the teacher training which the Foundation and EBI offer.

Once the teachers have acquired sufficient training, the Foundation Iruaritz Lezama defines the performance plan to inform students and families about how to use this equipment. The plans are customized on a case-by-case basis, though they could involve strategies such as: web information, meetings with student representatives, meetings with parents, audio-visual resources, tutorial meetings, etc. Reducing the hurdles which students face with regards to technological literacy, allows them to focus their attention on maximising their creativity and utilizing the beneficial aspects of the technology to their maximum.

Once the entire process of implementation has been carried out, the Foundation certifies the school as an EBI Centre, and their work is complete. EBI Centres have been applauded all over Spain for boosting participation in extra-curricular activities, greater concentration, creativity and satisfaction from students, and significantly enhanced interaction between teachers and students. Rather than modifying the now ageing and traditional teaching structure to accommodate new technologies, the Foundation Iruaritz Lezama have rebuilt teaching and schools from the ground up, to provide the best possible educative experience. It is a truly progressive and robust reinvention of the educational process, incorporating many of the aspects which this report has outlined as being key for building the educational paradigms of the future.
The Future of E-Ducation: the Impact of Technology and Analytics on the Education Industry

Eduardo De Santis, Chairman of Gold Mercury International with Father Luis Lezama, founder of Lezama Foundation and the EBI Project at the Santa Maria la Blanca School (which is an EBI Centre).

Isabel Solana and Pedro Lezama of EBI Project and Nicolas De Santis, President of Gold Mercury International, with EBI Project students at the Santa Maria la Blanca School in Madrid.
Mobile and Multi-Faceted Technology

As technology advances and becomes more readily available, mobile and multi-faceted technologies are becoming standard tools in education. Indeed, this is why digital literacy is becoming an issue of great importance that educators and policymakers need to explore further. A modern educational environment now includes learning platforms such as cloud computing, one-to-one device systems, interactive white boards and 3-D printing. Mobile and multi-faceted technologies are revolutionising the way we teach, particularly in the way we structure and deliver education. Students are encouraged to become more engaged with their learning as mobile technology allows them to work on the school network from anywhere, and at any time. Remote or distance learners will benefit the most from this technology, as schools which already offer distance learning will be able to offer their entire network as a resource to students alongside structured lessons. The interactive platforms of multi-faceted technology are also engaging students more as learning becomes a more active experience.

Unlike the barrier defying qualities of the Internet and online sources, however, mobile and multi-faceted technologies threaten to impose a ‘technology divide’ (Spector, 2013). Students from lower socio-economic backgrounds are likely to be disadvantaged by the age and quality of their technology, especially in Bring Your Own Device (BYOD) schemes. Moreover, the use of mobile devices and Open Source education is shifting, and, according to some in the education industry, threatening the role of teachers. Like the concerned professors in San Jose State University’s Philosophy Department, some teachers are concerned that mobile, Open Source education will make them unnecessary parts of educational infrastructure.

This section will discuss cloud computing, mobile learning and multi-touch devices, explore why they are disruptive education technologies and, consequently, what effects they will have on our educational environments. Industry-professionals and certain educators are trying to make mobile and multi-faceted technology a necessity in education. Some educators, however, remain unconvinced by the technologies’ benefits. In discussing the complexities surrounding mobile and multi-faceted technology, this section will demonstrate why cloud computing, mobile learning and multi-touch devices are technologies at the forefront of change in education.

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Cloud Computing

Cloud computing is the practice of using a network of remote servers hosted on the Internet to store, manage and process data, rather than using a local server. Since the launch of the first, Open Source Cloud platform, cloud computing has become the storage platform of choice. The CDW-G 2013 State of the Cloud Report highlights that in 2012, cloud computing was increasingly adopted for the cost savings and efficiency it could deliver, improved user mobility it offered and the increased opportunity for innovation it provided (Wong, 2013). For example, Lakeside School in Costa Rica is using cloud computing so that an entire lab of workstations can be maintained using just three computers. This new system will allow the school to save money on energy, software support and hardware costs. Cloud-based sharing services such as Dropbox and Google Drive have also incorporated cloud computing into our personal lives. Cloud computing offers educators the possibility to revolutionise the structure and delivery of education.

Cloud computing may not be a disruptive technology in the same way MOOCs and Web 2.0 platforms are. The disruptive nature of the Cloud, says Wayne Hawkins (an IT Supervisor from IPS Online) is that “it’s not just a portal system – it’s a single-sign-on solution” (Wong, 2013). Once users are authenticated, they can use the programs anywhere and at any time. Schools are using cloud computing to provide students with easy, simple access to teachers’ lesson plans, and the ability to submit their homework or access educational programs and websites that the school subscribes to. Students can now also access and work on their files anywhere, increasing the efficiency and flexibility of homework. This platform of cloud-based sharing is expanding the opportunities available for collaboration in education. Cloud-based platforms such as “email, video or other hosting services; subscription-based software tools; and a wide choice of collaborative applications” (New Media Consortium, 2013), remove the pressure placed on schools to continuously update
Cloud-based platforms such as “email, video or other hosting services; subscription-based software tools; and a wide choice of collaborative applications” (New Media Consortium, 2013), remove the pressure placed on schools to continuously update their hardware. This collaboration is not limited to the students. Parents are also being encouraged to use the Cloud, so they can “view their children’s work, check attendance and grades, and communicate with teachers via email.” (Wong, 2013)

By changing how schools store information and, therefore, how we structure education, cloud computing is changing how education is delivered.

For educational purposes, one of the most important aspects of Cloud computing is the flexibility it provides to support a myriad of mobile devices. The importance of mobile devices will be explained in the next section. But whether institutions would like to implement a BYOD, one-to-one initiative, or whether they would merely like to equip classrooms with mobile computing carts of laptops or tablets; cloud computing strengthens their IT infrastructure in order to be able to accommodate these various possibilities. For example, the launch of mobile devices such as Google’s Chromebook, a low-cost laptop that relies on ever-present Internet connectivity, cloud-based software and storage, is forming an era where equal access to technology is a real possibility. This year Malaysia joined the Philippines among the nations that have announced educational system reform through the use of Chromebooks’ cloud-based software. Cloud computing used in this manner is nothing short of revolutionary and will have a significant impact on education globally. Felix Lin, Director of Product Management for Chrome OS at Google, says “to date, more than 3,000 schools worldwide, from Edina, Minnesota to Point England, [and] New Zealand, have deployed Chromebooks” (Wood, 2013). Therefore, by providing schools with the flexibility and simplicity of a single network, cloud computing is changing the face of education by creating the foundations required for mobile learning. In fact, cloud computing is changing the way in which we deliver educational content.

The Cloud is also being used creatively for education outside schools, especially with regards to the delivery of education. Nokia’s cloud-based program called Mobile Mathematics is transforming education for distance learning and especially education in the developing world. This project, already implemented by 200 South African schools, offers students free mathematics lessons for grades 10 to 12 (Nokia Developer, 2013). This cloud service can be accessed via any web browser on any computer or mobile device. Moreover, it allows students to continuously test themselves and “receive instant feedback on their answers – even outside of the classroom,” (Nokia Developer, 2013) from computerised-auto-correction. Similarly, the aforementioned Khan Academy was among the first to take advantage of YouTube’s cloud-based sharing platform for educational purposes. Cloud computing makes it easier for teachers to shift their curriculum online and to initiate the ‘flipped classroom’ model. The Cloud is therefore an important part of the revolution in education that is promoting personalised learning outside the classroom.
Adopting cloud computing in educational institutions is, however, stagnated by issues surrounding data security. As the Cloud (public clouds) is based on the Internet, it is not always a secure educational network. To combat this, cloud computing providers are creating private and hybrid Clouds. Private Clouds are maintained on a private network and offer users the most security. However, users are still required to maintain and support all the technology infrastructure and software, which often eradicates the cost-saving benefits of cloud computing. Hybrid Clouds utilise the benefits of both public and private options through multiple cloud providers. They allow data to be appropriately placed in Clouds that meet security requirements. This model, however, eliminates the aforementioned ‘single-sign-in’ advantage of cloud computing, as users must manage multiple security platforms and ensure that there is communication between the individual platforms. Despite these issues, CDW-G’s 2013 State of the Cloud Report finds that 42% of K-12 schools and organisations surveyed “are currently implementing some form of cloud computing” (New Media Consortium, 2013). Since cloud computing is still new to the education industry, this figure is promising.

**CASE STUDY:**

**Knewton**

A new platform to personalize educational content and adaptive learning

Knewton are pioneers in the exciting new field of “adaptive learning” having created a platform which allows educational providers to create the most personalised educational experience available. The Knewton API is a platform which allows educational providers (such as Pearson) to personalise their content on an unprecedented, vast scale. Knewton’s API performs “sophisticated, real-time analysis of reams of student performance data”, to identify a student’s particular strengths and weaknesses, and adapt the course content accordingly. Knewton’s platform consolidates data science, statistics, psychometrics, content graphing, and tagging to generate dynamic course content based on the student’s particular understanding and degree of proficiency. For example, if a student were to make a mistake on a real-world problem based math question, but in their answer were able to demonstrate a key understanding of the core mathematical content, the next aspect of their course would adapt to instead focus around facilitating better understanding of applying theoretical knowledge to practical problems – rather than the traditional method of reiterating that same core concept.

Knewton’s powerful, adaptive platform makes this possible, and the infrastructure unlocks the vast quantities of data which can be gleaned from a student’s performance, in real time. When assessing a student’s performance in one area, Knewton can therefore predict where the student will fail in the future, and thanks to the interconnectivity of educational concepts, and Knewton’s ability to interpret these connections, why the student will fail. The platform can then restructure the content appropriately, to build on the student’s weaknesses. Knewton’s educational technology platform is leading the revolution in creating an adaptable, personalized educative experience, by allowing courses and educational providers to create a dynamic, highly detailed course which accounts for more than just simplistic performance metrics.
Cloud computing is changing the way we store digital information and, therefore, how IT networks provide information to its users. This change is important for education. Students will become more mobile, flexible learners as they are increasingly able to access information and software anywhere.

Cloud computing is changing the way we store digital information and, therefore, how IT networks provide information to its users. This change is important for education. Students will become more mobile, flexible learners as they are increasingly able to access information and software anywhere. Schools are gradually able to encourage students to use educational software at home and in their spare time. Students, especially university students, are increasingly able to hand in assignments or view lesson plans at any time, from anywhere in the world.

The ability of cloud computing to provide this type of efficiency and flexibility will particularly benefit learners who are unable to access traditional forms or places of learning as demonstrated by Nokia’s Mobile Mathematics Cloud-based program. Globally, cloud computing promises to become part of the standard education infrastructure and, as a result, will play a pivotal role in achieving the United Nations' Millennium Development Goals in Education.
Mobile Learning Devices

Mobile learning devices, if implemented in educational institutions correctly, promise to make education individualised, customised and accessible for every student.

Mobile learning was redefined with the introduction of smartphones in 2001, mobile applications in 2008 and tablet computers in 2010. By 2013, these mobile learning devices, alongside laptops, have become incredibly capable, useful, and ubiquitous in the developed world. More importantly, mobile learning devices are naturally encouraging exploration and learning in adults and children alike (New Media Consortium, 2013). The New Media Consortium 2013 Horizon Report says the distribution of these mobile learning devices “defy traditional patterns of adoption; schools and consumers alike have decided these devices are necessities, even economically disadvantaged families find ways to make use of mobile technology.” (New Media Consortium, 2013). As the world is moving online, Web 2.0 platforms and ‘flipped classroom’ models become the norm, it is becoming imperative that students have constant access to mobile computing devices. Mobile learning devices, if implemented in educational institutions correctly, promise to make education individualised, customised and accessible for every student. Mobile learning devices are also increasingly necessary for students and educators alike, if they are to partake in the aforementioned revolution of education.

Most young people today have access to some sort of mobile learning device: be it a smartphone, tablet computer, e-book reader, or a laptop. Smartphones are devices holding both the qualities of a mobile phone and a computer. Tablets are typically differentiated from smartphones by their size and technical capabilities. A tablet, or tablet computer, is a computer contained in a flat, touch screen and, generally, do not have analog telephonic capacities. Both serve as conveniently sized video players, conferencing tools, high-resolution still and video cameras, browsers of email, the Internet and Web 2.0 platforms, and are rich gaming platforms. There is also an embedded hands-on approach within these devices as a result of their ‘touch-screens’. E-Book readers such as Kindle, Kobo and Nook are designed specifically for reading digital e-books, articles and periodicals. Although smartphones and tablets can function like e-book readers, the readers are differentiated by their designs that mimic
The last mobile learning device, the laptop, has become so popular in every-day society that most households own at least one. Laptops alongside the aforementioned mobile devices have redefined mobile learning.

A part of mobile learning devices’ significance for education is the rising popularity of Apps. The word ‘app’ is short for application and refers to, typically, a small, specialised program that can be downloaded onto most mobile learning devices. Tablets and smartphones are specifically designed to be optimised app platforms. Apps are very useful for educators and students alike as learning tools. They range from annotation and mind-mapping apps, diary and journal apps, to apps that allow users to explore the stars in the night sky or examine the minute particles that make up a chemical. Apps and mobile learning devices together enable users “to learn and experience new concepts wherever they are, often across multiple devices” (New Media Consortium, 2013). In the year 2013, ABI Research estimated that mobile device users would download 70 billion apps (New Media Consortium, 2013). Schools that teach younger students have pioneered the use of apps in education. Apps on interactive platforms like tablets allow young students to explore, interact and learn fundamental concepts through games and interactive materials (discussed later). Although apps are a new and exciting tool for educators, they are unavailable to students unless they are provided with mobile learning devices.

Schools are implementing the use of mobile devices in one of three ways. The first method is known as the one-to-one initiative. Schools from Australia to Finland are looking to acquire mobile learning devices that can be provided to each student. The initiative aims to provide every student with a laptop or tablet so that they may have independent access to a computer at school and at home. Justin-Siena High School in California will be implementing a one-to-one pilot for the 2013 academic year. Students will receive an iPad and are excited about having to carry fewer traditional learning tools such as notebooks and textbooks (Dills, 2013). Students will also be able to work on the same task, software and hardware anywhere and at any time. The teachers are also excited; they will no longer be confined to reserving computer labs in order to access the Internet for class activities (Dills, 2013). However, despite programs like the Finnish Molla project which aims to introduce kindergarteners to new media on platforms like the iPad, Esa Kohtamäki of the Pori Education Board in Finland highlights, “it’s impossible for us to guarantee a working computer for everyone” (YLE, 2013). Similar impossibilities are arising in other countries where one-to-one initiatives were pioneered. For example, in 2008, Australia implemented a one-to-one initiative, where 967,000 computers were installed in secondary schools for a total of $2.4 billion (Karena,
The BYOD program encourages students to take responsibility for their own learning through a medium they are incredibly familiar with. Finnish authorities consequently estimate that within the next few years, 60 to 70% of students will bring their own mobile learning devices to school (YLE, 2013).

2013). Unfortunately for students and teachers, the funding for the initiative ended on the 30th of June 2013 and the Australian Prime Minister Kevin Rudd seems unwilling to re-finance the initiative. Because of the expectation involved in providing the one-to-one initiative to every new student, as well as the support costs involved in continuing and updating the initiative, the one-to-one initiative is unappealingly expensive and difficult to implement.

As a solution to the increasing costs of the one-to-one initiative, schools across Europe, North America and the Asia-Pacific are talking about and implementing a Bring Your Own Device (BYOD) initiative. The new interest in BYOD programs is also a result of educators’ attitude shifts in regards to mobile learning devices like smartphones. Schools are now encouraging their students to make use of devices in their homes and, increasingly, at school. The BYOD initiative is also being considered as a solution to the financial problems of Australia’s one-to-one initiative, as most students already bring their own mobile learning devices to school (Karena, 2013). Yet the BYOD initiative may also be beneficial to educators for other reasons. In the Texan Katy Independent School District, one of the pioneers of the BYOD program, the Director of Technology Lonnie Owens found surprising results: “Discipline issues went down and test scores went up” (Barseghian, 2013). The BYOD program encourages students to take responsibility for their own learning through a medium they are incredibly familiar with. Finnish authorities consequently estimate that within the next few years, 60 to 70% of students will bring their own mobile learning devices to school (YLE, 2013). The BYOD program, however, poses some issues for educational institutions. Tina Barseghian, editor of MindShift at KQED, explains how the BYOD initiative threatens to introduce a technology gap and reduce the equity of education between students of the same age, but of different incomes. She explains how, even without the BYOD, there are already technology disparities between students of different income schools. Barseghian references the findings of the Pew Research Report which states 52% of teachers in higher income schools already allow students to use their mobile learning devices in class, compared with 35% of teachers in lower income schools. But BYOD programs will help to remove this already present disparity rather than imposing technology like a uniform, as in the one-to-one initiative, the BYOD program will allow schools to provide technology to those who really need it. As a result of not being required to provide all students with laptops, educators and governments will be able to compete within the technological gap and provide poorer students with more advanced, expensive technology. Although the BYOD initiative is in its early stages, it promises to be the initiative that changes the way educators’ provide students with technology.
Mobile learning devices will continue to develop and progress, but as they do, they will increasingly change the experience of learning in and outside of the classroom.

The third manner of introducing mobile learning into classrooms is via mobile carts. Mobile carts are trollies with a number of laptops and/or tablets so that teachers may reserve a cart and, for a lesson, provide each student with a mobile learning device in the classroom. This is a more traditional method of providing students with mobile learning and is simply a portable variant of the computer lab model. As a part of this model, which is especially prevalent in English schools (Turel and Johnson, 2012), Interactive White Boards (IWBs) are provided for teachers and students in classrooms. IWBs enhance the function of mobile learning devices; as teachers are interactively able to guide students, present material and encourage active participation from students in front of the class. Despite the fact that the combination of mobile carts and IWBs are seen as more traditional forms of mobile learning, only 2% of Asian classrooms contain IWBs. Mobile carts may then offer the opportunity for governments and educators alike to introduce the use of mobile learning in to the classroom.

With the increasing use of mobile learning technology and the new focus on interactivity, individualisation and customisation, educators are concerned that these devices will replace traditional teaching techniques or will merely be a fashionable gadget rather than a useful tool. The main solutions to these concerns will be found in comprehensively training teachers. For educators who are comfortable and confident with these new learning platforms, the mobile devices will increase their time efficiency during instruction; allow teachers more time to focus on particular students while others work independently; and will engage students with a more hands-on learning environment. For educators uncomfortable with these new platforms and devices, they will either have to slowly incorporate these new technologies by adapting them into old methods: such as using online textbooks (rather than physical textbooks), or they will have to move on; as they may become a hindrance to potential future national policies. Mobile learning devices will continue to develop and progress, but as they do, they will increasingly change the experience of learning in and outside of the classroom.

Mobile learning devices have already changed how technology is used in education; however, implementing them sustainably in our educational institutions is proving challenging. The redefinition of mobile learning since the popularisation of smartphones, apps and tablets has made learning more accessible, individualised and customised for students everywhere. Any further progress in this education revolution, which promises to be the case as shown by the later sections, will make mobile learning devices even more pivotal in our daily lives than they already are. It will therefore be incredibly important as to how educators and policy makers alike choose to implement mobile learning devices in classrooms.
CASE STUDY:

Sistema UNO - SANTILLANA

Santillana/Moderna is the leading educational publisher in the Spanish and Portuguese speaking markets. Santillana’s “Sistema UNO” is an innovative education programme in Spanish, Portuguese and English that is working towards modernising teaching, designing and articulating digital and printed academic content for all grades of preschool and primary education. Sistema UNO has a particular focus on digital supplementary materials designed specifically for classroom work in all subject areas, teacher training resources, school management optimization, assessment, and family participation.

The Sistema UNO programme originated in Brazil, created by education publisher Moderna (Santillana), where traditional education systems (Sistemas de Encino) have been operating for years. Sistema UNO aims to change education by providing schools with new education methodologies, centered around technology. UNO provides students with critical thinking skills that enhance their problem solving abilities as well as educating on key subjects that create responsible and ethical universal citizens. Sistema UNO’s process involves inserting new teaching practices into schools and classrooms which generate new teaching strategies for students immersed in a digital culture. Sistema UNO’s digital platform provides a Virtual Learning Environment, known as “Moodle,” for each school, which provides reinforcement activities, expansions, research and evaluation tests/quizzes. In addition, they provide programmes for teaching English (Sistema UNO’s programmes have a particularly large focus on bilinguality), with access to video, audio, graphics, and supplemental online materials. Finally, their platform also provides digital resources for teachers, and facilitates communication between members of the educational community.
3-D Learning Tools

Engaging with a virtual world via mobile, multi-faceted technology can still be regarded as a passive activity, but 3-D learning tools promise to change this. Education is increasingly focused on integrating soft skills, such as creativity, into students’ repertoires and 3-D learning tools are becoming a popular solution. Exploring the progress from designing 3-D images to producing 3-D objects has and will continue to open up new learning possibilities. Interactive demonstrations and increased participation are encouraged generally by mobile, multi-faceted technology, but are a focus of 3-D learning tools. 3-D learning tools emphasise active, formal and informal learning in an unparalleled manner for all levels of education.

Advanced 3-D technology has existed since the 1990s, however, in the past 12 months, 3-D learning tools have taken off. 3-D learning is unique in that it reflects how humans view the world, with children finding it especially difficult to understand what is not visible (Bamford, 2013). Visual, tactile learning improves students’ understanding, as they are are able to comprehend how the parts make the whole of something. This more physical type of learning makes complex concepts more easily understood. This physical, visual type of learning is provided by 3-D technology.

In the K-12 learning environment, 3-D learning tools are being used in a variety of ways. In science and history classes, students with access to 3-D printing can make and interact with replicas of fossils and artefacts that they would otherwise only see behind glass in museums (New Media Consortium, 2013). Often, by creating these objects themselves, and then being able to interact with them, the students are much more eager to participate in a lesson that would otherwise be regarded as dull. For example, at Concordia International School in Shanghai, students were given the opportunity to explore miniature models of asteroid Vesta from the Dawn mission, from a 3-D scanned image which NASA made publically available. Similarly,
chemistry students, especially older students who are learning molecular chemistry, particularly benefit from using 3-D printing in this manner as they can print out models of complex proteins and molecules as seen in 3-D Molecular Design’s Model Gallery (3-D Molecular Designs, 2013).

Similarly, but with a stronger focus on soft skills, a new curriculum in New Zealand utilises 3-D printing so that students can create their own chess pieces (New Media Consortium, 2013). This style of learning emphasises the skills necessary to complete all aspects of the process from design to creation. Science students at Buford Middle School in the US are using 3-D computerisation and printing to craft their own sound speakers from plastic and paper. It is interesting to see how much international attention the US education system has received from introducing 3-D printing in the curriculum (McKenzie, 2013). A correspondent of Japan’s Nippon Television, Takashi Yanagisawa, explains how this international interest is largely a result of what effect the introduction of 3-D printing at this level will have for “the future of job training in the US” (McKenzie, 2013). Therefore 3-D learning tools, particularly 3-D printing, are unique in their ability to engage students, teach them soft skills and also train them in more vocationally focused skills.

CASE STUDY:

Raspberry Pi and MOOC
Promoting the teaching of basic computer science in schools

The Raspberry Pi is a prime example of a 3-D Learning Tool which is giving students in schools an unprecedented hands on and kinaesthetic approach to understanding both the hardware and software aspects of computer science. The Raspberry Pi is a piece of technology which combines several of the different types of technology described in this paper; not only is it a fantastic 3-D learning tool, but it also provides access to open source software and programming tools. It is a credit-card sized single board computer developed by the Raspberry Pi foundation, which promotes the teaching of basic computer science in schools by providing a simpler, more digestible platform for learning the workings of technology. The primary operating systems provided with the Raspberry Pi revolve around various distributions of Linux – such as Debian, Fedora, or the most commonly supported (for Pi) Raspberian. Python is utilized as the Pi’s main programming language – and one common feature of all of these platforms is that they are open source – which facilitates easier learning and creativity among students.

Raspberry Pi, in collaboration with OCR and Cambridge University Press, are creating a Massively Online Open Course for GCSE Computing; the first of its kind. It provides the first ever online course linked to a formal, recognised qualification, a GCSE; teaching students on the course the material they need
Science students at Buford Middle School in the US are using 3-D computerisation and printing to craft their own sound speakers from plastic and paper.

3-D learning tools extend beyond 3-D printing; however they are much less common. Web platforms such as 123D Catch allow users to create 3-D images from their own photographs. In Michigan at Grand Rapids High School, 123D Catch is being used as the technological foundations for a summer school program on digital holography (Jackson, 2012). The introduction of 3-D learning tools will also allow older students to learn more complex concepts like computer-aided 3-D design and 3-D mathematical modelling. These applications of 3-D learning beyond 3-D printing are particularly new for educators and institutions alike, yet, this does not present an issue as most of the technologies being implemented are used and understood by ‘digital natives’ (Prensky, 2001), but also are adaptations of traditional teaching tools. 3-D learning tools beyond 3-D printing will therefore be more adaptable to our pre-existing curriculums than 3-D printing which requires a new syllabus altogether.

3-D learning tools, particularly 3-D printing, are shattering the passivity of traditional education. These technologies encourage an interactive, engaging and dynamic learning environment where students’ experiences can go beyond the pages of a textbook. As 3-D technology becomes cheaper and more readily available, students’ learning experiences will change dramatically. Learning will no longer be restricted to understanding the theory of something, it will become about experiencing the object itself.

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Raspberry Pi’s MOOC is also unique in that it is universally accessible. Many educational online courses are only accessible at the schools they are signed up for, or require registration, but Raspberry Pi’s MOOC is accessible for free, and can be learned anywhere in the world. The aim of the MOOC is to provide engaging work for both teachers and students – so alongside the 120 “spine” videos which form the core learnings, there are supplementary “ribcage” resources which expand on concepts the students may be interested in. The Raspberry Pi plays a leading part in the video series as a key 3-D learning tool for the engagement of users.
Virtual Learning Environments and Learning Analytics

The increasingly online, mobile world we live in leaves an unparalleled data trail, but this is a good thing for education. Students’ information collected from their interaction with Web 2.0 platforms, MOOCs and cloud computing will be increasingly important as Virtual Learning Environments (VLEs) and learning analytics become more prolific. As more students are educated via the merging of their physical and virtual worlds through mobile technology and dynamic websites, it will be important for teachers to assess and monitor students’ progress.

Students’ progress will be monitored and assessed via VLEs and learning analytics. VLEs are educational electronic learning systems based on online models that mimic conventional in-person education. VLEs provide access to classes, tests, homework, assessments, lessons and reading material in an equivalent manner to traditional educational institutions. Typically VLEs provide students with real-time interaction with their teachers through threaded discussions or instant messaging. The aforementioned Open Source platforms are often classified as, or used within, VLEs. The technologies at the forefront of VLEs, which are the focus of this report, are game-based education, virtual and remote learning laboratories. These VLEs generate massive amounts of data on the progress and style of learning of the students who utilise them. Learning analytics are the measurement, collection, analysis and reporting of this data. Learning analytics are increasingly used in education to understand and optimise the subjects and learning environments that students engage with. They are also increasingly used to monitor and assess students; an area which has previously been a barrier to the proliferation of electronic learning within educational institutions. Together, VLEs and learning analytics will transform how educational institutions provide education and assess students.

This section will explain how game-based learning, VLEs, learning analytics and digital assessment change the landscape of education. These embryonic technologies will be developed further before they become a standard part of education across the world. Teachers, parents, students and industry-professionals alike remain sceptical of the amount of data these technologies produce, and what effect this will have on students’ futures. In discussing the functionality and complexities of VLEs and learning analytics, this section will demonstrate why and how they are the future of education. >
Game-Based Learning

Young people have played computer and online games with enthusiasm and persistence since the 1960s and 1990s, respectively. Now computer and online games are more prolific and popular than ever before. Educational institutions, as a result of having mobile learning device initiatives and cloud computing, are harnessing the same determination, enthusiasm and persistence that are brought out of students when they play games. Cardiff teacher Gareth Ritter explains how “a lot of the kids in [this] school play Call of Duty. If they fail a level they won't give up, they'll keep doing it. We've got to bring that into the classroom” (Vasagar, 2012). Game-based learning seems likely to become the most effective way to teach students fundamental concepts which would have previously been learnt via repetition and written exercises.

Game-based learning is much more engaging than traditional methods of teaching. Students generally commit to games because they are both fun and challenging. Du Sautoy, holder of the Charles Simonyi Chair in the Public Understanding of Science at Oxford, explains how educational game-developers are trying “to tap into that quite
committed effort that kids put into gaming” (Vasagar, 2012), but to progress through the levels of knowledge that students must get through to understand a particular subject. Game-based learning is being used in everything from mathematics and science to history and languages. These games are not designed to replace the teacher; they are designed to highlight the areas that students are struggling with in the game, and therefore particular concepts of a subject. Teachers will be able to focus their attention on the students who need it, during class hours and without holding back the overall progress of the class. Games are positioned in such a way that students will enthusiastically engage in learning without direct instruction from the teacher and without boring, repetitive questions from a textbook. Game-based learning will allow teachers to deliver a more attractive, customised and adaptive education to their students.

Game-based learning not only delivers education in a very different manner to traditional learning mechanisms, it also delivers a distinctive type of education. It is the inherent learning process of games that make them enjoyable for students. Game-based learning often engages the players through a narrative or storyline that both rewards students’ progress, and allows them to develop an understanding of consequentiality. These narratives also allow students to engage in social, civic and political contexts that mimic real-life complexities and experiences in a risk-free environment. The journey of progress within a game, as a result of learning new concepts, rewards the students for their achievement; whilst also encouraging them to experiment and make mistakes. This problem-solving environment offered by most games also encourages students to be creative with what are often real-world challenges. Game-based learning therefore provides students with the opportunity to acquire knowledge, experiment with implementing this knowledge, and then receive feedback in a safe virtual world (Pivec, 2009). This safe virtual world provides students with an incredibly interactive experience, whilst also providing teachers with necessary information about students’ progress. Game-based learning, therefore, provides educators with the possibility of offering students a very diverse and exciting educational experience.

Game-based learning remains uncommon in most educational institutions, however it is most commonly used in the US and in the UK. Based on a successful US program, the Cornerstone Maths Project explores mathematical concepts such as ratio and proportion using animations. For example, “cars racing across a screen are used to explain the relationship between distance and time” (New Media Consortium, 2013). Similarly, the UK based game-developer Blue Duck Education offers ‘Wrecks Factor’ amongst other mathematical games. In ‘Wrecks Factor’ students have to correctly factorise quadratic expressions to answer ships’ distress calls and save their crews (New Media Consortium, 2013). The game called ‘Minecraft’ is increasingly common in both countries and is also used in 1,000 schools across six continents. Game-based learning seems likely to become the most effective way to teach students fundamental concepts which would have previously been learnt via repetition and written exercises.
As educational games become more popular and advanced, the possibilities for their use in education will be endless. Game-based learning is just one other way for the virtual world to merge with our physical world. Using games as a part of standard educational infrastructures and landscapes is revolutionary because of the fluid, engaging and customisable educational content they promise to offer students. The most controversial aspect of game-based learning is how much data it produces about students’ progress, productivity and learning speed; this barrier to implementation will be discussed further in the learning analytics section. This issue of data, however, is an issue beyond education – it is very much a part of our daily 21st century life – and should not be a barrier to implementing game-based learning initiatives. Data is good for education as it allows for better guidance. If educators can make every student engaged and enthusiastic in learning, they should be encouraged. Game-based learning is likely to be a pivotal part of making education accessible to all types of learners and that is why it is at the forefront of innovative technologies in education.>
CASE STUDY:

KAHOOT!

Game-based digital pedagogy for the classroom

Kahoot! provides a prime example of game-based learning, employing the “flipped classroom” model to create an experience which is engaging and exciting for students. Kahoot! allows teachers to create quizzes using an easy drag and drop interface on any internet-capable device, using embedded videos, imagery, graphs, etc, based on educational content. It also gives the teachers the power to look at public quizzes based on course material, giving them access to a huge library of educational games and quizzes for students. Each student can access and participate in the quiz through their own mobile device, and fosters a competitive, friendly atmosphere. For example, while students will be able to see whether they got each individual question wrong or not, at the front of the class, typically displayed on a projector or interactive whiteboard, they can see the class’s overall results on a chart, without individuals being “named and shamed”. Making learning fun by introducing the ability to “win” significantly engages students and encourages positive behaviour and thinking.

One other extremely unique aspect to Kahoot’s pedagogy is that students are later encouraged to create their own quizzes, from which the teacher can pick the best to ask the class. This is unique and revolutionary because it fosters greater engagement on a conceptual level with the topic at hand. Due to the quizzes’ multiple choice nature, creating their own quiz encourages students to consider what potential wrong answers may be too, which requires greater intellectual involvement and understanding, as they would have to understand potential stumbling blocks or incorrect logics in order to do so. The analytics provided by Kahoot, for parents, students and teachers alike, allows a more accurate assessment of performance and better tracking of progress, as well as allowing a short term “snapshot” of the student’s understanding of a topic, far more so than an examination.

Kahoot! flips the classroom in the sense that it allows the students to become the creators of the educational content, once they themselves have consumed and understood it. It moves the students’ role from learners to leaders; a transitional path which education is meant to facilitate.
Virtual and remote learning platforms are poised to provide any student within or outside of traditional educational infrastructure with an engaging and interactive learning environment.

New, previously unimaginable possibilities for learning environments are also resulting from the merging of our physical and virtual world. The classroom is no longer restricted to existing inside a physical educational institution; it can be anywhere the student chooses. This is the idea encapsulated by VLEs. At the forefront of this idea are virtual and remote learning platforms. As mentioned above, VLEs are educational electronic learning systems based on online models that mimic conventional in-person education. VLEs can include most learning environments from virtual learning platforms like those of MOOCs to virtual worlds like those used for game-based learning. Virtual and remote learning platforms are poised to provide any student within or outside of traditional educational infrastructure with an engaging and interactive learning environment.

Virtual and remote learning platforms are not new technologies for education, but they have become an important part of the revolution in education. MOOCs are the most recent adaption of virtual and remote learning technology. MOOCs use Web 2.0 platforms to provide students with a virtual, remote learning environment that mimics traditional educational infrastructure. Game-based virtual learning environments are a new addition to educational infrastructures and are only now becoming a possible teaching aid. The virtual platforms made possible by game-based learning are much more immersive than Web 2.0-based learning platforms. Students follow an avatar through a comprehensive virtual world where the avatar/student must explore, discover and complete activities, related to educational subjects, in order to progress in the game. VLEs, specifically MOOCs and game-based virtual worlds, are not new technologies, but their educational application is new.
Other types of VLEs, specifically virtual and remote laboratories, are new technologies, not just for education. Virtual and remote laboratories are at the forefront of this new technology and are easily adapted into our current educational infrastructure. Virtual laboratories are “web applications that emulate the operation of real laboratories and enable students to practice in a ‘safe’ environment before using real, physical components” (New Media Consortium, 2013). These virtual laboratories allow students to access them at any time and from anywhere, but they also allow students to practice various experiments until they can execute them precisely and confidently. For example, the Drosophila Virtual Lab is a biology-based virtual lab that allows students to engage in experiments with digital fruit flies (Drosophila, 2013). In addition to the laboratory activities, the site allows students to take quizzes, write reports and participate in surveys (Drosophila, 2013). In comparison, remote laboratories provide students with a virtual interface between them and a real, physical laboratory. Students are able to operate the laboratories’ equipment and watch the experiments or activities unfold via a webcam on a computer or mobile learning device (New Media Consortium, 2013). The University of Technology in Sydney has the world largest remote laboratory facility. The university highlights how “the experiments vibrate, move around and make noise, exposing students to a real-world learning experience in their own time and as often as they want” (UTS, 2013), from behind a computer screen. As a result, both virtual and remote laboratories offer new teaching and learning possibilities for poorer and distance educational institutions alike.

VLEs, especially virtual and remote laboratory technologies, are particularly beneficial for educators and students in much the same manner as game-based learning. The inherent learning process in an interactive ‘safe’ virtual world, like VLEs, provides students with a motivating, but supportive experience while also providing teachers with the ability to monitor the learning journey of students. They provide teachers with a dashboard to track students’ progress and students can also monitor their own learning journey. For example, in the virtual and remote laboratory scenario students remain accountable for their learning and results because of data collection and analysis (New Media Consortium, 2013). It is this interactive, independent and customisable learning environment which is becoming the focus of most innovative technologies in education. Pip Cummings from the Sydney Morning Herald explains how “the ability to track students’ progress, in real time and for an entire classroom or more at a time, combined with self-paced learning, remain at the heart of [VLEs’ so-called reinvention of education]” (Cummings, 2012). Professor Shirley Alexander from the University of Technology, Sydney, stresses that the benefit of this technology lies largely in its ability for educators, and potentially software, to provide each student with tailored advice about how they can improve. However a recent report by the >
Grattan Institute shows that some students may be nervous about data records “being kept for other purposes” (Cummings, 2012), such as employers wanting to see applicants’ learning profiles. However, addressing this concern will involve simple data and privacy protection which is easily solved by policy. What should be concerning is the potential for the data collected by VLEs and other such platforms to be used as assessment, but the next section will elaborate on this further. VLEs offer both students and teachers an unparalleled, interactive and informative educational experience – in this way VLEs are particularly beneficial for our educational infrastructures.

VLEs are the ultimate learning environment beyond the classroom because they often mimic the traditional landscape of education. They are a part of the technologies changing how we deliver education because they are reinventing how, when and where learning can take place. The difference between VLEs is highlighted by the difference between MOOCs and game-based virtual worlds; the differences between virtual and remote learning platforms were exemplified by comparing virtual and remote laboratories. These differences are important as they highlight the variety of possibilities for individualising, customising and making VLEs accessible for every student. The adaptability of VLEs will make them the easiest innovative technology to implement within our current education systems. VLEs are, therefore, not revolutionising education, they are reinventing it in such a way that education will defy traditional barriers such as income, gender and distance.

Learning Analytics

Analytics were first used in business for targeting potential customers via personalised advertising, using customer data. Learning analytics gain crucial insight for educators, industry-professionals and researchers on students’ affinities
Students can monitor their own learning process in relation to other students or reflect on their own learning milestones; learning analytics can predict when students will require more support or extra attention from teachers; the technology can be used to improve courses or develop new courses based on data feedback; learning analytics also allow institution administrators and industry professionals to make informed decisions on efficiency, recruitment or advertisement.

Data collecting technologies and learning analytics have the potential to monitor and assess students in an unparalleled manner. Learning analytics can be used within education in a variety of ways. Students can monitor their own learning process in relation to other students or reflect on their own learning milestones; learning analytics can predict when students will require more support or extra attention from teachers; the technology can be used to improve courses or develop new courses based on data feedback; learning analytics also allow institution administrators and industry professionals to make informed decisions on efficiency, recruitment or advertisement. Although similar, learning analytics is a different technology from educational data mining. Educational data mining is the use of data to provide formative assessment and personalise learning, which will be discussed further in the next section (New Media Consortium, 2013). However, both educational data mining and learning analytics highlight issues of data privacy and dependence on learning analytic software rather than on human insight. These two issues, which have been highlighted by organisations like the Grattan Institute, are the main complexities surrounding the collection and analysis of data. Students are worried about data being shared with potential employers; parents and educators alike are worried about learning analytics being used to assess students in a single-faceted manner. For example, in the International Baccalaureate, mathematics students gain points for having a reasoned process of working out the problem, but this sort of assessment would be difficult to implement within software that observes whether students have the correct or incorrect answer. Yet, these barriers to adopting technologies like learning analytics and educational data mining are being dealt with in a variety of ways. For example, the development of private and hybrid cloud computing, contractual privacy clauses limiting how long institutions can hold onto >
student data, or to process how students have reached a particular conclusion. Thus, although data collecting technologies and learning analytics have the potential to revolutionise how we assess and monitor students, they are not currently at a stage where they can be standardised into our education system.

More and more educational software is learning to provide students with an adaptive, customisable education, and learning analytics is an instrumental way to capitalise upon this development. Software like AlwaysPrepped is beginning to harness aforementioned technologies like Khan Academy, other Web 2.0 and cloud computing platforms to provide teachers with a single point of reference to view students’ progress individual and as a class (Always Prepped Inc., 2013). Similarly the NSW Syllabus of the Australian National Curriculum monitors how students reason through mathematic problems and provides personalised feedback with Mathspace, developed by a group of educators, programmers and data scientists. It also provides teachers with analytics reports on their students. Moreover, companies like Kno are using learning analytics. Kno is an e-textbook company that has launched a Kno Me tool that allows students to reflect on their study behaviour while using e-textbooks (Kno Inc., 2013). However a group of Harvard University professors have developed a Cloud-based learning analytics and assessment system called Learning Catalytics. Recently acquired by Pearson, and offered as “complete solution for managing the interactive classroom” (Learning Catalytics LLC, 2013), this software allows teachers to ask their students open-ended questions and receive feedback in real-time. Learning analytics is a new and exciting technology for educational institutions of which seems poised to change how educational institutions monitor and assess their students.

Data collection is at the forefront of the transformation of education, as it will allow Open Source and mobile technology to individualise and customise education. Learning analytics harness data to provide educational institutions and students alike with information that can be used for self-reflection, monitoring or assessment. Learning analytics will be the technology that allows game-based learning and ‘flipped classroom’ scenarios to become a reality for educators and students globally. Learning analytics is therefore, and despite its complexities, the key to the ‘Pandora’s Box’ in this ‘revolution’ in education.>
**CASE STUDY:**

**ClassDojo**

Making the classroom more fun with avatars, games & points

ClassDojo is a behavioural management program for younger students; an analytics platform for behaviour monitoring designed for parents, teachers and students. In simpler terms, it is a fun way for teachers to keep younger students’ behaviour in check via a system of “feedback points,” displayed in real time. With a single click on a smartphone, laptop, or computer, the teacher can give real-time behavioural feedback to students and parents, through use of encouraging notifications (“Well done Josh! +1 for teamwork!”). ClassDojo’s recommended setup for classrooms is to have the points on display at the front of the class through an interactive medium, in the form of a projector or interactive whiteboard. According to ClassDojo, more than 50% of teachers’ time in the classroom is spent managing behaviour rather than actually teaching – ClassDojo is designed to develop positive behaviour over time, rather than the traditional, less effective and more time consuming model of enacting punitive measures after the fact. By dramatically reducing the amount of time between an action and feedback for said action, the reinforcement effect on the student’s behaviour is significantly increased. It allows parents to monitor their child’s progress via the platform to get a daily breakdown of their child’s behaviour. This is positive in a number of ways, as knowing their parents can assess their daily behaviour motivates students to behave better, as well as eliminating some of the traditional separation between teachers and parents. Currently, ClassDojo has 15 million users and saves time for approximately 17 million teachers around the world, by reducing their time spent managing student behaviour, and allowing them to focus on the real task at hand.
Digital Assessment

Traditional educational assessment and accreditation is rigorously invigilated, yet online assessment remains relatively anonymous and difficult to invigilate. Online educational institutions like MOOC platforms currently try to bypass these barriers by asking students to agree to a traditional honour code, by providing regular quizzes and assessments, most of which are peer graded. Digital assessment, however, is beginning to be used by traditional education institutions in Britain and the US. This may help to overcome the assessment and accreditation barriers faced by online educational institutions.

The digital assessment currently being used by traditional educational institutions is based on analysed data provided by learning analytics. Britain’s largest exam board, the Assessments and Qualifications Alliance (AQA) is trying to introduce computer-based exams that are interactive, meaning that harder or easier questions will be generated on an individual basis, pending how a candidate performs. Dr Chris Wheadon explains how the computer-based test “would be a bank of questions, each graded in terms of difficulty, and the program would pull up questions of appropriate difficulty as the student progressed through the paper” (Vasagar, 2012). Wheadon emphasises that this test format would challenge students at a level appropriate to each individual while also preventing students from feeling labelled and unmotivated by test tiring in traditional test-formations (Vasagar, 2012). Nearly 11,000 students sat the GCSE French pilot of this exam format across the UK in 2011.

In the US, however, Valerie Shute and Matthew Venture of Florida State University are investigating a new assessment format that can be used within traditional educational
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infrastructures. Called Stealth Assessment, the new format uses well-designed games as a medium to assess and support learning. They argue that the assessments used today “are woefully inadequate for assessing the kinds of complex skill that are really important” (Shute, 2013). In contrast, the Stealth Assessments can provide feedback on how students progress towards desired competencies, how they approach challenges, how long they spend on problems and, fundamentally, how they are learning (Shute and Venture, 2013). Innovative technologies like Stealth Assessments, combined with the re-formatting of traditional exam-formats, may indeed overcome the current barriers that are preventing online Open Source educational infrastructures from being accredited.

The two aforementioned examples demonstrate the possibilities for innovation in a very traditional, rigorous and valued process. Many of the technologies involved in revolutionising or reinventing education are dependent on the ability of educators to monitor, access and accredit the efforts of students; yet, industry-professionals have been unable to find an assessment process that ticks all the boxes. Only when the education industry discovers a way of assessing students online, on computers without anonymity and with rigorous invigilation, will many of the technologies mentioned in this report be used to their full potential.
How technology is disrupting education forever and helping the poor: the story of Maria

By Dr David McNally - Director of Digital Systems for Macmillan Science

Technology is being used to disrupt all the disadvantages of the traditional language learning model that limits Maria’s ability to engage.

Summer 2011, two executives from an education publishing house visit the home of a 29 year old single woman near the Favelas of Sao Paulo. The purpose of their visit is to understand the impact that learning a few words of English would have on the woman’s life. The woman’s name is Maria.

Maria worked in a hotel as a cleaner and earned a wage of $600 per month. This money barely pays for her food and travel and even though she desperately would like to get away from the Favela into a flat in the city, it’s something she can only dream of. She cannot even think about marriage or starting a family. She is visibly upset as she recounts her lot.

English is spoken by a tiny minority in Brazil – less than 5% speak any English at all (Brazilian Education Census), and even fewer are fluent. However, the impact of only a few words of English is dramatic. Maria told us that if she could speak enough English to greet guests she could get a front of house job in the hotel paying 2 to 3 times her current wage. With that additional income she could rent a small apartment in the city and look forward to getting married and having children. At this point Maria is in tears - as are the executives from the publishing company.

Yet they are there with some hope for Maria. One of the executives is the founder of EnglishUp, a new type of Education Company that relies on technology to deliver language skills and vocabulary training to its customers. Suddenly Maria brightens up. She works...
extremely long hours and has neither the time (it would take her up to 2 hours just to travel from home to the nearest language school) nor the money (averaging $300 a month) to attend a traditional language school with its fixed timetable, where attendance is required at the physical classroom; where the curriculum and pace is the same for all students. Technology is being used to disrupt all the disadvantages of the traditional language learning model that limits Maria’s ability to engage. In this article, we will explore some of the driving forces behind these changes and the opportunities they present for entrepreneurs globally as well as democratising access to essential and life-changing education for people like Maria.

Needless to say, the Internet is an enabling technology for most of the change we will discuss, but change is not something that comes lightly to the Education establishment. For over 1,000 years it has remained largely unchanged. Students turn up at a classroom, a teacher gives his or her lecture and students get the same course and pace regardless of ability or personal circumstances.

Little wonder so many drop out – something that technology is also addressing for higher education in the US where a student that drops out of University dramatically reduces their life chances and earning potential. Technology such as EBI-Mapworks allows the University administration to spot students at risk (e.g. through a decline in attendance, grades, engagement in sport and other activities or increasing visits to the health advisor) By identifying at risk students, the University can intervene and offer assistance to help the student overcome any personal difficulties.

However, this really addresses only the symptom and not the root cause – the impedance mismatch between traditional education and the enormous unmet needs of the global student body.

The three Supporting Pillars of Traditional Education that are being eroded
Since the 11th Century at the University of Bologna and in Pisa (where teaching was taking place but not formally a University until 14th century) education has been based on the same core model:

1. A classroom – a physical location with finite capacity
2. The lecture – a broadcast (one way) communication model
3. The course – a one size fits all pedagogical structure

The Classroom
The classroom was a great concept. It magnified the bandwidth of education by bringing students together to the source of knowledge. In the absence of the printing press, hand copied books could not easily be distributed or protected (they were extremely valuable). However, in the 21st century, classrooms are bulging at the seams or unfit for purpose. At the larger international universities some first year courses accommodate 2,000+ students in a single space.>
There is far more demand than capacity, however the cost of that constrained capacity limits the market in a classical economic sense.

The classroom of the future is virtual. Enabled by the internet, of course, but as Reed Hastings, CEO of Netflix often says, it is broadband and specifically fibre optic networks that facilitate the global distribution of video on demand – video having the highest bandwidth consumption of all media forms today. What this means is that a traditional lecture can be viewed by anyone anywhere provided they have access to a reasonable broadband connection (even if that is in an internet café in the poorer regions of the world). In Brazil, there is a high penetration rate of DSL connection at home: 55% (F-NAZCA Radar, April 2010). Even Maria had a DSL connection in her home.

These global fibre networks are unleashing educational content to the audience that has to date been unable to afford to attend the physical institutions and classrooms that constrain access to education globally to those that have the financial resources to attend. This is a powerful disruptive force in the Education space enabling low cost or even free courses to be offered by companies like Veduca, the leading massively open online course (MOOC) in Brazil. This force alone is democratising access to education globally and eroding the traditional classroom concept. As we saw with Maria, travel to a physical classroom can be too expensive or just take too long to be practicable.

**The Lecture**

It was once said that Archimedes was the last man alive who knew the entirety of human knowledge. In order to learn you had no choice but to seek out scholars such as Archimedes and listen to their teachings. 1,500 years later, this has been re-enforced by the university system as “the lecture” (e.g. at the University of Bologna and other places of formal learning). The practice in a medieval university was for the instructor to read from an original source to a class of students who took notes on the lecture. This practice has persisted for a thousand years. In terms of bandwidth amplification it is an effective model – especially when the source material is in scarce supply, however, even in modern classrooms where almost every student has a text book the broadcast model is still dominant. Technology such as i>clicker, a device that allows teachers to increase engagement, poll the students in attendance and pivot their lecture based on the results, is beginning to disrupt the lecture model.

The divide between rich and poor is being further antagonised even today with the widespread use of private tutors for children of school age. In London, according to the BBC, some 40% of school pupils now receive private tuition. Tutoring
is an effective method of increasing motivation, improving knowledge, understanding and retention and ultimately allowing the student to achieve higher grades.

Technology is also being used to deliver online tutoring with companies like MathsDoctor based in Brighton, UK, offering live online tutoring sessions for high school maths students. There is no need to physically meet the tutor; MathsDoctor matches the student with the best tutor and connects the two via a combination of a virtual whiteboard shared by both the student and the tutor, and a video conferencing solution to engage the student in the online tutoring session. Simon Walsh, CEO of MathsDoctor comments that “Online Tutoring is proven to increase student motivation with over 90% of our students achieving higher grades”.

This opportunity is likely to have a huge impact on the erosion of the lecture model to deliver knowledge.

The Course
The course is a pedagogical structure used to serialise and compartmentalise the delivery of knowledge to students. It is an extremely effective way to teach subjects where knowledge is built up on foundations and core concepts. However in our traditional model of education a course has a timetable. The lectures happen on certain days at certain times and cover certain parts of the course. If you miss a lecture you miss that part of the course and need to catch up. If you are struggling with the core concepts you will increasingly struggle with more advanced concepts that rely on the underlying core. Time, as they say, stands still for no man (or woman) and is indeed the enemy of the struggling student. At the end of a course there is often an examination. A summative assessment meant to determine how good the student’s knowledge is in the given subject being tested. You can’t choose when to sit your exam!

Once again technology is disrupting this model. Online quizzing companies like SaplingLearning and Prep-U offer continuous assessment capabilities where the proficiency of a student in each concept is computed based on their answers to every question attempted. Learning by quizzing is an effective method for knowledge retention and algorithms such as the Leitner model (for flash cards) or Item Response Theory can be leveraged by software systems to improve student outcome.>

Self-paced study becomes entirely feasible when combined with access to online education resources, online tutoring and peer to peer learning. More importantly, technology similar to collaborative filtering (like Amazon’s recommendation technology) is being used to recommend the pedagogical journey for each and every student based on their individual performance and ability.
Self-paced study becomes entirely feasible when combined with access to online education resources, online tutoring and peer to peer learning. More importantly, technology similar to collaborative filtering (like Amazon’s recommendation technology) is being used to recommend the pedagogical journey for each and every student based on their individual performance and ability. This personalised model for learning is only possible through the use of technology, advanced algorithms and data science. Companies like Knewton are leading the way in development of adaptive learning solutions based on recommendation engine technology. The key to personalisation is a deep understanding of the student – their proficiency at each and every learning objective and their own preferred or most effective learning methods.

**Affordable Flexible Blended Learning Changing Lives**

EnglishUp combines many of the above disruptive opportunities to deliver a flexible blended learning environment for English language students in Brazil. Online tutors provide individual lessons, address problem areas and keep students motivated. Online video lessons and quizzing allow the student to progress at their own pace and learning analytics are used to improve the efficacy of the teaching. Flexible because it is personalised to each student and they can proceed at their own pace, blended by combining self study and tutoring with on demand classroom style knowledge delivery (online).

For people like Maria, the opportunity to study at her own pace suits her lifestyle and financial resources. As she becomes proficient in English she can look forward to a brighter future and a lifestyle in which she will be proud to bring up her family. Prashant Raizada, CEO of EnglishUp, told us “the issues Maria faced are not just common in Brazil; the poor across the world are poised to benefit from access to low cost high quality education delivered digitally that can be transformational for the life prospects of these people and their families”.

The disruptive forces above also afford opportunities for Professors whose role will change dramatically. They will have the opportunity to create and contribute educational content to the learning platforms of the future. The exclusive position of the celebrity author will be replaced by the recognition of effective learning material curated by a variety of professors. The ability to achieve the best learning outcomes is the competitive landscape for education in the future. Technology allows this to be measured and proven for the first time.

Education technology is a very active space in the venture capital world as money moves from revolutionising travel, financial services and retail into education.

Education technology is a very active space in the venture capital world as money moves from revolutionising travel, financial services and retail into education. Matthias Ick, CEO of Macmillan Digital Education and winner of the 2013 Education Investor of the Year awards believes that “to drive innovation, a combination of digital e-commerce and education publishing perspectives which enable a deep understanding of all stakeholders needs and pain points are key, as is the need to continue to support the new breed of authors and focus on achieving learning outcomes”. Macmillan Digital Education is an investor in Veduca, EnglishUp, MathsDoctor.

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1 The Leitner system proposed by the German science journalist Sebastian Leitner in the 1970s. It is a simple implementation of the principle of spaced repetition, where cards are reviewed at increasing intervals.
By 2025, education will be conducted on technology platforms that combine the best educational content, assessment and adaptive algorithms to personalise the user journey. These platforms will combine self-study, peer learning and classroom activities and the traditional model will become increasingly unimportant as the world gains low cost high quality access to education that has been impossibly for 1,000 years and is now transforming the lives of the poor and opening up real prosperity in developing parts of the world.

In 2025, Maria’s children will learn through their digital device at school and beyond and can expect a better life, thanks to the revolution in E-Ducation.
Conclusion

Implementing technology in the landscape of education is not an innovative concept. The practical implementation of the technologies mentioned in this report is, however, innovative. Together these technologies are causing a shift in the landscape of education. An increasingly decentralised, bottom-up format is being favoured over the traditional hierarchical, top-down structure. This shift is placing students as independent learners, rather than teachers as instructors, at the forefront of delivering education. Teachers are increasingly becoming information guides rather than educational instructors. Consequently students are being encouraged, by these technological advancements in education, to take a more active role in their own education. This, however, is only possible because of how these new educational technologies have been used as a standard part of modern daily-life.

It has become the education sector’s duty to use this technology as well as everyone else does. This transformation of educational ideas and methods could not have come at a better time as new generations of students increasingly see these ‘innovative’ technologies are mere necessities in their daily-life. The technologies highlighted in this report are, therefore, called revolutionary because it seems that implementing them will actually change the landscape of education. After all, many of these technologies have become non-remarkable features of daily-life. The standardisation of technology in every-day life has largely been a consequence of the Internet. The Internet has fundamentally changed how society interacts, communicates and presents information. The Internet has made digital literacy a fundamental skill of the modern age, but also has been the key to the development, advancement and implementation in education for most of the technologies in this report.

The common feature of the technologies in report is that they are moving education into the virtual world. Web 2.0 platforms, MOOCs, cloud computing, VLEs and learning analytics would not exist in the capacity they do today without the Internet.
The Future of Education: the Impact of Technology and Analytics on the Education Industry

The virtual world is also largely barrier free; it is universally accessible. It isn't concerned with your gender, race, religion or socio-economic status and it can be accessed at any time. Innovative educational scenarios like the ‘flipped classroom’ would also be impossible without the Internet. More importantly, these Internet technologies will be pivotal in making education universal as they allow education to be delivered cheaply beyond the classroom and via great distances. If, by 2013, these technologies and mobile learning devices have already become globally ubiquitous, there is a high potential of them becoming universal in the next decade. As the physical world increasingly merges with the virtual world, it will be increasingly imperative that students have secure and constant access to both the Internet and a mobile learning device. However, this will simultaneously ensure that education cannot be anything but individualised, customised and accessible for every student.

The major consequence of moving online and towards a virtual society is the data trail this leaves behind. This data trail will allow education to be interactive, individualised and adaptable, as it will record students' preferences, strengths and areas of improvement. This amount of data on students is a frightening concept that has the potential to be misused. However, it will also allow teachers to help their students on an unprecedented level. Class time will be revolutionised by game-based learning, Web 2.0 platforms, the ‘flipped classroom’ and learning analytics as teachers will be able to guide, monitor and support students on an individual basis. Students will also be able to utilise this data to reflect on their learning styles, progress and set achievable short term and long term goals. The virtual online world can offer students the ability to acquire and implement knowledge, experiment and receive feedback in a safe environment that lacks the consequences of the real world such as failed tests and broken science equipment.

This report has focused on how technology is impacting the future of education. The impact of technology on education, however, is not reserved for the future; technology is currently innovating the ideas and methods of education. It seems to be a very exciting time to be a student, but the best thing about the technology discussed in this report is that it allows all of us to be a student, anywhere, at any age and at any time. The global population is educated to an unprecedented level and, yet, many are still unable to receive primary education. The technologies in this report will both reinvent and revolutionise education; they will make the UNMDG for universal primary education achievable by 2015, if correctly implemented, and will also help us to deliver the globally innovative, engaging, customisable and accessible education that our students and future generations deserve.
Nicolas De Santis
President of Gold Mercury International
Nicolas De Santis is the President of Gold Mercury International. His career has been devoted to the advancement of visionary leadership strategies and anticipatory governance practices. De Santis advises international organisations, corporations and governments on national strategy, strategic visioning, cultural transformation, business model innovation & global brand strategy.

With the advent of globalisation, he has more recently created a new framework to understand and frame global complexity called GLOGO – The Global Governance Monitoring System®. GLOGO organises our planet in eight global areas (peace and security, environment, resources, culture, health, international law, science and technology and economic policy). GLOGO includes a governance scale and rating system to determine how decisions will affect future outcomes and sustainability. As an internet entrepreneur, Nicolas De Santis was one of the founding management team of OPODO, the European online travel portal and of BEENZ.com, the first digital global internet currency.

Sherry Coutu
Chairwoman of SVC2UK
Sherry Coutu is Chairwoman of Silicon Valley comes to the UK (SVC2UK). Sherry is an angel investor and serves on the boards of companies, charities and universities. As an entrepreneur, Sherry established and successfully sold two businesses in the financial services industry. The first (acquired by Euromoney plc) has operations in more than 70 countries. The second was floated in 2000 on London and Nasdaq and the company was valued at more than $1 billion before being acquired (by AMP plc). Charitable / Government affiliations include the Prince’s Trust, Cancer Research UK and NESTA. SVC2UK is a not-for profit series of industry supported events led by business leaders, investors and serial entrepreneurs and run by students. It is designed to improve the ecosystem for entrepreneurship and drive sustainable growth in the UK, Europe and beyond. SVC2UK organised the Education Summit 2013, hosting key entrepreneurs who are leading the transformation in the world of education.

Dr David McNally
Dr David McNally is currently Director of Digital Systems for Macmillan Science and Education’s corporate venturing arm and Chairman of DC Storm, an online marketing analytics and optimisation company. He is a twice graduate of St Andrews University. David has spent the last 15 years helping organisations navigate the analogue to digital transition including the creation of Europe first digital video on demand platform and transforming content distribution at BBC Worldwide. At Macmillan Science and Education, David is driving the introduction of new and innovative digital education models that have the potential to disrupt the Companies traditional textbook publishing businesses, but with much greater scalability and global reach. David’s work is instrumental in discovering, developing and marketing innovative global technologies and new digital products that make learning more engaging, pushing the boundaries of where, when and how we learn: Teacher to student; student to teacher; and peer to peer.

Eduardo De Santis
Founder & Chairman of Gold Mercury International
Eduardo De Santis is the Founder & Chairman of Gold Mercury International. His interest in social issues, governance and international affairs led him to create Gold Mercury International in 1961, to improve international governance and corporate responsibility. He developed the Gold Mercury Awards to recognise companies, organisations and governments that advanced good governance practices and peaceful co-operation. The Awards have been presented to many global corporations and world
leaders since 1961, including US President Ronald Reagan, Soviet leader Leonid Breznev and Ellen Johnson Sirleaf, President of Liberia. De Santis has focused his think tank work on the development of anticipatory governance and foresight development tools, which he believes dramatically improve decision making and governance. Eduardo De Santis is a Commander of the Italian Republic and was recently awarded the Ordine della Stella d'Italia – OSI (Order of the Italian Star), by Italy’s President Napolitano, for his services to the nation.

Morgan Bennett
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Morgan has a Bachelor’s Degree in Philosophy (Honours) from the Australian National University and a BSc in International Relations from the London School of Economics and Political Science. Her research interests include transnational politics, international relations, political science and history. Morgan has an active participation in a range of community activities and voluntary work including fundraising around the world. She was the Community Liaison Officer for the United Middle East Society and has done large fundraising activities for the Red Cross and the Victorian Bush-fire appeals. Morgan has also participated in the Model United Nations programme where participants are required to research and represent the opinions of a country in different UN bodies, like the Security Council.

Chon Kemp
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Chon has a Bachelor’s Degree (Honours) in Geography from the London School of Economics and Political Science. His research interests include European Politics, social identity, globalisation, and sustainable development. He has a particular interest in technological development, and as a result his Independent Research Dissertation: “A Study of the Presentation of the Self in Online Communities,” examined how the internet has shaped human interaction and identity formation in powerful ways, across various communities. Chon has also reported on the Princess Diana Inquest for Wilberforce Chambers, which partly fuelled his passion for writing.

Claudio Navarro
Vice President, Gold Mercury International
Claudio is a Corporate Vision® Strategist with over fifteen years of experience in the execution of global projects and advises in the areas of global brand reputation and branding, education, global culture and digital strategy. He advises corporations and organisations such as Google, PRIISA, Canal+, Coca Cola, Santillana and Lezama Foundation, Ministry of Culture of Spain, Municipality of Madrid and the Turkish Chamber of Commerce.

Maria Mateos
Creative Studios, Gold Mercury International
Maria has a degree in Fine Arts from the Complutense University in Madrid where she specialized in graphic design with honours, she complemented her studies at the European Institute of Design where she focused on improving her skills in the editorial and branding fields. Maria has won several creative awards and mentions in national and international competitions. Her work has been exhibited in several cultural institution such as the Palazzo Grassi in Venice or Toletv and Signes Foundation in Barcelona. Maria has been part of Gold Mercury’s Creative Studios since 2005 working on creative strategies for global clients and think tank projects such as GLOGO the Global Governance Monitoring System.
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Global Governance Centre for Sustainable Globalization

Preparing the required transition to a new global culture

CENTRE OVERVIEW - INNOVATION WITH PURPOSE

GLOGO - the Global Governance Centre for Sustainable Globalisation focuses on identifying and monitoring the most critical global and industry challenges, developing invaluable insights and foresights in the process. Using this intelligence we develop anticipatory and sustainable strategies, new business and social models and partnerships to address these global issues and industry challenges.

Our Global Governance Model proposes a new framework to understand global complexity and organises our planet into eight global governance areas with sustainability and business model innovation at its core - what we call: Synergy Design™. GLOGO develops best in class intelligence, case studies and frameworks to assist organisations, businesses and governments in their strategic and cultural transformation to create the sustainable future.

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Our world is a complex system consisting of interdependent parts. GLOGO organises the planet into eight global areas according to our unique Global Governance model, to better frame the key challenges, issues and trends in each area. We call it: Organised Complexity™. GLOGO is monitoring the most critical global and industry challenges affecting the 8 global areas.

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The Gold Mercury Network is our expert network of key specialists, leading thinkers and expert sources. The Gold Mercury Network includes international organisations, think tanks, academic institutions, the media, the private sector and individuals that can actively contribute to the development of new innovative models and the advancement of sustainable globalisation.
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Federico Mayor Zaragoza
Former Director-General of UNESCO and President of the Foundation for a Culture of Peace
Gold Mercury works with companies, organisations and leaders to navigate global complexity and develop the strategic visioning and innovation required to build the sustainable business models, cultures and brands for the future. Since its founding in 1961, Gold Mercury has been a pioneer in developing corporate visioning frameworks that integrate the future in strategic planning, policy and governance. Our CORPORATE VISION SYSTEM® brings together the most important organisational components to define, manage and maintain a corporate future: Strategic Visioning, Global Branding, Business Model Innovation and Organisational & Cultural Transformation.

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