

# ADVANCED TECHNOLOGIES PROMISE TO GENERATE OPPORTUNITIES TO FUTURE DISTANCE LEARNING MODELS

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## ABSTRACT

The actual education ecosystem is under the pressure of disruptive forces which are putting at risk the same existence of the institutions. The Distance Learning offers today a real option to the traditional models. Also, it acquires new meanings and higher potential if and when developed over Social Media technologies and Social Network principles, allowing to develop effective and efficient distance learning models which are applicable to diverse educational contexts.

Big Data analytics and Cloud Computing can significantly contribute to the effectiveness and the sustainability of educational system by generating opportunities to reduce overall cost of ICT, acquiring strategic information for the Institutions and offering valuable decisional tools for both the Organizations and the Students.

The latest advanced technologies promise to enable the future of the education.

**KEYWORDS:** Social Network, Social Media, Distance Learning, Mobile Learning, Adaptive Learning, Big Data analytics, Cloud Computing, Sustainability, Innovation, Enabling technologies.

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## 1. INTRODUCTION

The complexity of today's global educational system is subject to an evolving process with the final objective to respond to current and future challenges of cultural, political, social and technology changes as well as the emerging demand coming from developing countries and the continuous evolution of the social behaviors in the way individuals collaborate and interact each other. "The pressure on public finances, and notably on public debt sustainability, has led in most countries (and notably in Europe) to gradual, but significant cuts in university spending. At the same time, the social justification for universities has come under growing scrutiny. The emphasis has shifted towards university education as a private benefit to individuals, who should therefore largely fund their high level training" [16].

Such scenario makes the actual education system inadequate and unsustainable, which requires the implementation and use of appropriate learning models and supporting tools.

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Many of the identified forces are making pressures to the same existence of traditional institutions in the education space and opening, at the same time, to unprecedented innovating process which brings new players and learning elements in the complex education scenario, like MOOCs (Massive Open Online Courses) [1].

This paper addresses the continuous and rapid evolution and expansion of the boundaries and interdependences of the global education system with the objective to provide useful indications and contribution to the understanding and evaluation of the current and future context as well as perspectives of the education system and how the actual technologies are an essential enabling factor to future state. These challenges can be taken on by developing innovative and dynamic learning models (adaptive learning) to be successfully implemented and delivered by using appropriate enabling technologies [13].

## 2. TECHNOLOGY AS THE ENABLING FACTOR TO THE FUTURE EDUCATION

The adaptive learning is considered an alternative learning model to the traditional one - inspired to the "one-size-fits-all" philosophy - and which encourages the development of dynamic learning models. This is characterized by the diversity where a formative content thought for some users may not be appropriate for others and for the tool or the communication channel being used to deliver it (interactivity). The learning process in the adaptive learning requires that the customized contents are accessed through advanced web-based environment and where docents play a role of mentorship when required [21].

The repository of Big datasets will be fed by data collection processes from disparate sources and will be extended by data analytics solutions (Business Intelligence) which will allow to develop customized adaptive learning models with a more "learner-centric" approach.

The information about learners and other individuals who share same personal attributes or live in the same environment or have same experiences will be gathered and analyzed and - based on the outcome of such work - advanced distance learning models, making use of the "digitized learning", will be developed, allowing the technology to bring added value to the learning models.

The term "digitization" often refers to the conversion of analog processes to digital processes while the term "digitalization" refers to the creation of a Business value from the digital assets. The "digitization" is the first-order effect of technology while the "digitalization" is the second and third-order effect.

The digitalizing processes will bring a real "disruption" to the traditional educational institutions from both a learning model and organizational perspective:

- We'll assist to the creation of extended and open community in the education, thanks to Social Media technologies.
- New knowledge will be created about the student's learning needs and expectations with the support of Big datasets fed by diverse and new data sources.

- New learning paths will be developed as the distance learning strategies are defined, based on the new information generated (Big Data).
- There will be new roles and skills defined for docents, where the approach will change from a more didactic to a more pedagogical one, with a role of tutor, mentor and coach of students. The docents will be the consumer of the information generated by the student activities rather than the managers of such data.
- More flexible and sustainable learning models will be developed through the use of enabling technologies.
- The institutions themselves will become more focused on the individual (learner-centric) in order to meet the future learning needs by implementing adaptive learning models.

The institutions will have to understand that the competitive context will be reviewed in consideration of the new learning models. They will have to be ready to consider new models of distance learning where the education can be made outside the traditional places and constraints. The institutions and organizations that will not have taken appropriate actions and sufficiently believed to the digitalization of contents and on-line education as well as properly used technologies and data analytics solution which facilitate the development of such adaptive learning models, will remain excluded from such transformation and from the future competition in the education space. The public education system will leverage the distance learning through the adoption of alternative models – pure e-learning or blended – customizing then the offer for the students and enabling them to work in a collaborative way although individually evaluated. [13].

Distance learning promises to resolve the problem of the scalability of the education at a reasonable cost. Considering the global scale to which distance learning models refer to, MOOCs can become an additional and great opportunity of development and, at the same time, a competition war. Few Universities like Harvard University, State University of New York, University of Tennessee, Tennessee Board of Regents, University of Colorado system, University of Houston system, University of Kentucky, University of Nebraska, University of New Mexico, University System of Georgia, West Virginia University System or- on the opposite side of the globe - National Taiwan University and Chinese University of Hong Kong have stated to have extended - or being in the process of – their offering by adopting and integrating MOOCs within their courses to better understand how students learn on-line. The Marconi University either has recently added MOOCs to their offering, recognizing the students with credits for the enrolment to a University Degree course. Such interesting approach allows potential students to try the e-learning model free-of-charge and take confidence on it, getting rid of it in the case of further enrolment (see: [mooc.unimarconi.it](http://mooc.unimarconi.it)).

Such new learning models will become even more dynamic as the institutions and players in the education field will establish strategic alliances to develop a common knowledge which is instrumental to support decision-making processes and take appropriate actions towards a more effective and sustainable education. Organizations which deliver same learning content,

in same way and in different places, will be able to reach larger number of individuals, expanding their presence and opportunities. The institutions that will implement “standardized” learning path, at least for the first year, will enable higher mobility of students between different Universities for instance, and fostering, at the same time, the adoption and development of adaptive learning models [20].

By 2025, the demand of education will be much higher than current capacity and 8 million of students are expected to move to other places, States, Countries to study, more than three times today’s level. [4]

By 2016, 50% of K-12 learning paths won’t require the docents to assign specific activities to the students.

By 2016, the governments will require the education institutions to completely review the student’s curricula based on Big Data.

By 2015, more the 25% of the universities will introduce a “chief content officer” in their organizations [20].

The “disruption” process will impact the entire actual educational ecosystem.

The education industry is always more driven by global forces and the institutions, which have historically been driven by independent internal forces, are becoming now much more dependent from external tools and services. The “education inflation” can be either the enabler or disrupter to the institutions with the potential of generating an explosion in the business of the education.

“First, a job that once required a secondary education now demands a bachelor's degree, and what required a bachelor's degree now requires a master's degree, and so on. Second, global demand for higher education is exploding, up 68%, from 80 million students in 1995 to 135 million in 2005 and another 17% increase from 2005 to 2008 (a total of 158 million students). In the U.S. alone, the demand went up by 34% from 1994 to 2008, and is projected to increase another 17% by 2019 (and this in a mature market)” [14].

The financial and economic pressures are creating a new normal condition. The cost containment is in the today’s agenda of every institution and organization because of the higher attention to the ROI, even in the public sector, and the increasing regulations and level of transparency required.

The institutions are not exempt from that transformation, being them in the process of understanding and evaluating the impact on costs and revenue. They will have to look at generating significant savings where, certainly, the budget for technology shouldn’t be reduced but rather preserved or extended as it is an enabling element to other opportunities. Cloud Computing technologies will be essential to the achievement of such objectives.

The constant and continuous reduction of public funds allocated and/or the increase of private contribution to the public education highlights how the politicians, in different places in the world, are passing the responsibility and future of the education to the market forces. However, “as in many other sectors, if the public pulls back from direct provision of certain activities, it is fundamental that it will play a role as intelligent forward looking regulator of the

system” [16]. It should be clear by now that the education – the higher education particularly - is being transformed in a new area of Business, globally. The future challenge will be around the “consumerization” of the education - which is based on the “anytime, anywhere” principles (on-line education) and the predictive analysis of the consumer needs (Big Data analytics) - and how the institutions will deal with the problem of the scalability of the educational system in order to meet the increasing demand generated by the education inflation.

The distance-death of on-line learning will give the institutions the opportunity to operate on a much wider scale and – on the MOOC philosophy - to do it for hundreds of thousands of participants.

The described evolutionary scenario will be made possible and real by the use of key enabling technologies: Social Media, Big Data and Cloud. The technology will offer the opportunity to successfully move from traditional learning to more scalable and sustainable models.

### 3. WHEN SOCIAL MEDIA MEETS DISTANCE LEARNING: BENEFITS AND FEW IMPLEMENTATION CASES

In order to develop a modern and agile learning environment, the institution should look at the wide spectrum of Social Media technology options. Starting from their actual information system, the institutions will need to select and add new technology elements and components to develop new capabilities and functionalities as a response to students and docents needs. Incorporating such new technologies within the current learning ecosystem will require a clear understanding of main industry trends in the ICT and, at the same time, a progressive involvement of students and docents in the development of the new learning environment [9].

In fact, through their involvement, it can be made a more pedagogical use of existing technologies - like blogs or wikies – before adding any new technology. For many institutions this will be the starting point. Unfortunately, most of the members of the actual institutions are too busy or worried about the technology to fully understand the opportunity that the technology offers them. The result has been a limited use of alternative learning environments where, rather, many of the technology elements – which are available and paid already - were never used.

In the future, the institutions will have to make sure that students best use the available learning environment even though the faculty itself does not. For example, as soon as a course is published, a certain number functionalities or services such as virtual collaboration tools – forum, blogs, chat, etc. – should immediately be made available to students without any intervention from faculty members. For example the LMS platform of the Marconi University makes immediately available to students an internal forum and messaging as well as virtual room tool to interact with the docent and students real-time (see: [virtualcampus.unimarconi.it](http://virtualcampus.unimarconi.it)). In other words, if and when the learning environments will

replicate the characteristics of a Social platform – a Social Network – students will feel comfortable with using such environment and limiting any learning curve.

A good example of learning environment fostering the involvement of students is what the Purdue University - Indiana, USA - implemented by using the Mixable platform which uses real-time collaboration tools leveraging Social Collaboration knowledge of students in the context of their classrooms (see [www.purdue.edu/mixable](http://www.purdue.edu/mixable)). The well-known Google Plus service also was used in the education field. The Kadir Has University - Istanbul – successfully used it for the development and delivery of interactive courses and where, thanks to virtual collaboration capability of Google Plus - a cross-course communication was effectively fostered. [19]. Other good example is what the University of Limerick – Ireland – has made using the Social Network (Facebook) to realize a 6-weeks welcome plan to new students, based on the fact that 73% of Europeans of age between 18 and 24 use the Social Network to interact and communicate and the student's dependency from the Internet is 82% and rapidly increasing [5]. The Università di Genova – Italy – used a Social Network platform to support a language course for a group of Erasmus students to teach Italian language. In this course, in addition to the traditional classroom activities, a Social Network platform (Ning) was used for synchronous (chat) and asynchronous (form, email, blog) communication and content (pictures, documents, video) sharing, fostering then the interaction and practice of the language, verbal and written. The student's feedback was absolutely positive where more than 80% of interviewed stated they had significant benefit from the experiment in terms of learning progresses when compared with traditional classroom learning activities [3].

If the institutions will not provide such capabilities to students, the students will find them themselves outside the learning environment, reducing the ability of institutions to interact with students in a controlled and regulated way [9].

A group of students of the University of Barcelona Institute for Lifelong Learning – Spain – realized an informal initiative of knowledge sharing using Social Network technology. The mentioned university – which offers professional and post-graduated course in either pure e-learning and blended models – focused on the course of "Community Management and Social Media" where a group of students have autonomously and successfully applied acquired knowledge on Social Media by using most popular Social Network platform – Facebook, LinkedIn and Twitter – to create an external collaboration environment where to share experience and learn collaboratively. Students who used that environments stated what they exchanged and learned on the Social Networks was helpful to integrate what they learned through the university's e-learning system (LMS) [18].

A final decision on which model to take as a reference will have to be evaluated by taking into account additional elements. In fact, the existing experiences about use of Social Media and Social Network platform to higher education are still far to support any absolute conclusion. However, they indicate that an appropriate use of them – which will require a good strategy and execution - can surely help creating a stimulating environment where students can interact openly and spontaneously and learn better and more.

#### 4. OPPORTUNITIES AND BARRIERS TO THE INTEGRATION OF SOCIAL MEDIA WITH DISTANCE LEARNING

A significant trend in the IT industry is the increasing number of technology options available today. Different technologies are combined together creating a second and third-order effect. A good example is the public network infrastructure – Internet – which can be considered as the first-order effect of the technology and on which a Social Network platform is based, for instance, as the second-order effect and which provides digital contents, services and other functionalities as the third-order effect [14].

The “consumerization” of the technology and the penetration of mobile devices in the consumer market have significantly contributed to the creation and diffusion of large-scale Social Media applications and services and the Social presence on the Internet. Facebook alone grew of 250 million users – from 350 to 500 – during the 2012 only and reached 1 billion users at the end of the 2012.

Collaborative tools are not new, rather they have been existing for a long time already. However, the Social Collaboration technologies like crowdsourcing, ideation, activity streams, wikis and blogs are making them as enabling technology on larger scale. They enable hundreds of thousands – even million – of users to collaboratively create content, share experiences, build new relationships and knowledge.

The Social technologies are different from other kind of software for their intrinsic ability to create a mass participation facilitating a scalable collaboration. The capability to allow individuals to participate – anytime, anywhere – to a project, content, discussion, sharing of experience is what makes the Social technologies unique. The Social Networks – and more in general the Social Collaboration – count on the capitalization of the mass participation to generate Business value [22]. Facebook, the most popular Social Media platform as of today, is representative of the characteristics that other platforms have; Facebook, just like others such as LinkedIn, Twitter, Youtube and more, should be taken as an example rather than as the absolute reference.

Each of them, in fact, may offer some opportunities of same or different target of individuals, even the education field like students and docents. In other words, these platform should be considered for what they do and as a real case of what can be done rather than as the absolute target point.

The strategy should be to understand, list and apply a series of Social Media general principles which make sense for the education initiative, using the terminology and characteristics acquired from the Social Network platforms that are already making use of them and considering such platforms as an instance of the general principals.

What are then the major benefits coming from the integration of the Social Network and Distance Learning?

- The opportunity to leverage the magnitude and widespread diffusion of the phenomenon.  
The Web offers unique opportunities of expansion and build of social networks in terms of

new type of relationships established among individuals. This offers a privileged channel to convey communications and facilitate interactions to build new knowledge.

- The opportunity to consolidate information about individuals and their social network and knowledge through unique profiles, avoiding the fragmentation and dispersion of information in different sources and the inability to build relationships on them.
- The ability to share and build knowledge, openly, with students and docents of the single courses. This allows them get in touch each other and create new communities where communicate and collaborate.
- The ability to make it happen quickly, in real-time potentially. Such advanced environment will expand the communication, collaboration and knowledge over the traditional boundaries of Universities or other institution, becoming available and accessible everywhere.
- The capability of customizing contents, tools and the learning environment to set-up a personal and customized environment for the individual, improving his/her personal experience.

Also, Social Media technologies and the Social Network platforms can be leveraged to develop diverse innovative learning models and which might be applied to specific situation or context; examples are the Learning by doing, Learning by problem, Learning by project and in general the Cooperative Learning where the individuals learn by doing different activities related to a job, problem or project.

The "gamification" is a new frontier of the Social Media technologies - and the Social Network which implement it - when applied to on-line education. With the term "gamification" is meant the application of videogames characteristics and design for the development of on-line games to be used in the non-game contexts. It has been used successfully in many web based businesses to increase user engagement and it seems to have high potential when applied to students in the context of on-line education as well. "[...] gamification can have a great emotional and social impact on students, as reward systems and competitive social mechanisms seem to be motivating for them. Reward systems suppose an innovative, fun and encouraging way to represent progress within an online educative experience." [6].

Depending from the final objectives and the community of users being targeted, there are different categories of enabling Social Media technologies or platforms:

- Enterprise collaboration tools, to be used internally the organization or institution to facilitate the collaboration. The limitation is often their ability to build mixed social networks where external contributors can join, interact and collaborate.
- Social Media technologies, to be openly used from the individuals like blogs, wikis, idea generation tools and more. Such tools, although usable without any specific constraint, remain under the control of the organization or institution, ensuring the effective and appropriate use for the original purposes.



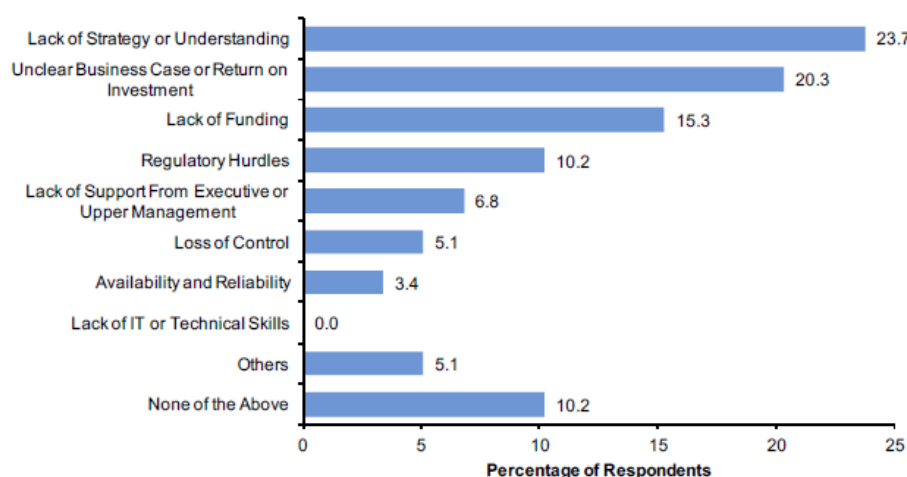
- Access to public Social Networks like Facebook, LinkedIn, Twitter and others, mainly as a public channel to communicate with stakeholders or institutions which have presence on them. Appropriate policies, terms and conditions may be developed and applied to this cases.

The strategy will not be to prescribe the use of a particular technology or platform to a specific target of users - like the students - but rather to support docents and administrators to build a Social environment which is compatible with their roles and activities [10].

As described, the potential offered from the application of Social Media or Social Network to the distance learning becomes interesting. But, undoubtedly, it's not sufficient. Just like any big transformation, it requires the right people at the right place to understand it and support it to become part of it. In short, the technology alone is not sufficient to innovate, rather the human factor is crucial. The path to get there is not easy and the adoption of such technologies is exposed to many resistances.

A Gartner research highlights the significant lack of understanding of the opportunities offered by the Social Media and Collaboration tools while confirms the readiness of technology and technical competencies to make it.

Figure 1. Most Significant Barrier or Challenge to Adopting Social Media and Collaborative Tools in Education



Source: Gartner (March 2012)

The main barrier to adopting Social Collaboration tools in the higher education is then the lack of a clear strategy. The institutions will have to understand the generated value from such initiatives with respect to the traditional business and that the Social Media shouldn't be seen as the objective but rather as the means to expand the collaboration within the education ecosystem [10].

The advancing of mobile technologies represent an additional engine and opportunity to develop innovative learning models. The "mobile learning" leverages mobile technology for a facilitated "everywhere learning" [11]. The use of mobile devices in the distance learning enables better integration of contents in the context of where it's used and where the student

is located, which is usually outside the traditional environment in mobility. Also, by accessing to the learning platform in mobility and using the Social Media technologies specifically adapted for mobile devices, students can efficiently and effectively communicate and interact by sharing experiences and knowledge in a Collaborative Learning environment. Using such technologies, that interaction can be enriched with the power of the Instant Messaging tools – like short messages, pictures and video, micro-blog – and the integration with Social Network platforms that students and docents can use to extend learning opportunities. [7]

## 5. BIG DATA ANALYTICS AND CLOUD COMPUTING AS THE ESSENTIAL SUPPORTING TECHNOLOGY TO THE SUCCESS OF FUTURE EDUCATION

Big datasets and analytics are based on our lifestyle, behaviors, preferences and activities we daily perform - using Facebook or a Learning Management System for instance - and how any related information tracked and stored. The analysis of the aggregation of such big amount of correlated data, the “Big datasets”, allows to generating new knowledge and statistic meaning. As an example, a CRM system can provide strategic information on where and when to start a specific education project for a particular target of individuals. The Big Data trend will bring interesting dynamics in the education ecosystem globally; in fact, in order to be effective, it will require a huge amount of data to be managed and stored, much more than any institution can do alone [14]. The data about students and docents activities managed by e-learning platforms will be collected and analyzed by Big Data analytics; the outcomes will support the definition of algorithms to be used with innovative adaptive learning models.

The most promising adaptive learning uses meta-data associated to contents, learning activities and the information related to their use and effectiveness in the context of the on-line learning path. This “empiric” adaptive learning offers an alternative approach to the one where adaptive learning algorithms and data analysis outcomes are used instead. The adaptive learning models will adopt them in the appropriate proportions as the number of participants will grow. The adaptive learning will become then a strategic asset in the education. The mentioned meta-data – qualitative data – and the statistics on the use of the learning environment components – quantitative data – will be strategic data for the institutions that will want to expand their presence and activities on a large-scale or just optimize their internal costs. Also, Big Data analytics can contribute to higher education problem of “student retention”, generating valuable information to develop personalized learning paths and giving the students useful information to make right choices at right time for their educational career.

“By 2016, adaptive learning data will be hard currency, creating open online education wars (and coalitions)” [20]. Good case is the WICHE Cooperative for Educational Technologies' (WCET's) - a USA based institution – that has made alliances with many Universities in the

USA with the common objective of developing effective e-learning programs, openly and collaboratively.

The nationalization of student's data for Big Data analysis will most likely start with primary and secondary education because of their public nature in most of the Countries. However, in the places where the Public institutions control the entire education system, the demand will come from the Governments directly.[20] Producing the evidence of increase or decrease of interest to a specific content, service, capability or course is a way of weight the effectiveness of using Social Media and to support decision-making processes on further investment. For the "bottom-up" nature of the Social Network, it's quite hard today to establish clear and accurate quantitative objectives and create appropriate metrics. Therefore, it will be necessary to get metrics evolve overtime and when there will be much clear correlation between use of Social Media and the learning and Business impact [10] .

In order to successfully create flexible, scalable and sustainable future education system, the institutions will have need to embrace and implement required enabling technologies by switching from the "tools" approach to the "services" approach which is often generalized with the term "Cloud". The Cloud Computing is the set of technologies used to offer application in the form of flexible, scalable and sustainable services.

There are a few interesting applications in the market already which promise to effectively and efficiently help institutions and students to take better decisions. "Civitas Learning" is an interesting option of a Cloud-based Big Data analytics tools which promises to support students, faculty and administrator to take better decisions by generated statically-valid outcome from the analysis of large datasets. The fully Cloud service model ensures no on-premises system to manage and reasonable cost of use [15].

The Cloud can dramatically contribute to the reduction of investments and recurring cost of technology used for distance learning and offering, at the same time, the opportunity to dimension the investments and costs to real needs of the organization. Implementing a "services" approach also means adding external service providers into the education ecosystem. This can happen by outsourcing the internal information systems – passing from internal managed "tools" to external managed "services" – or by doing something more articulated like Moodlerooms does (see: [www.moodlerooms.com](http://www.moodlerooms.com)) which uses Opensource application components in a Dell Cloud and all offered with SaaS model – Software as a Service – hence a Business model where application services are provided to customers based on customers need and where customers pays for what they get, without making any capital investment upfront – and with the flexibility to get more as soon as they need more (scalability). Other "disruptive" model comes from 2U Inc. which offers all-in-one educational services, including Cloud on-line learning platform, to transform a traditional education institution in a distance learning model (see: [www.2U.com](http://www.2U.com)).

Then, the Cloud defines a new industry paradigm, the "flexible and scalable consumerization of the technology". This can happen through the purchasing of managed technology services – and not of hardware and tools – in the form of IaaS (Infrastructure as a Service), PaaS

(Platform as a Service) or SaaS (Software as a Service) where systems are hosted outside in distributed data centers data and applications are available in the Public Cloud, Private Cloud or Hybrid Cloud, ensuring the proper level of services and security of data according to the Institution needs.

The new paradigm will allow the Institutions to make focused and better dimensioned investments to actual needs as well as reduce fixed and recurring costs of the technology infrastructures while keeping the ability to easily scale up the technology as the Business grows. In the mature markets the Cloud business is reporting a double digit growth. The School of Management of the Politecnico di Milano – Italy – predicted that, although the huge contraction of investments in Italy – the 2013 allocated budget by Companies and Institutions for Cloud projects has increased of 11% on average at least, and will much higher – up to three times – in the developing Countries. Cloud Computing will be then the enabling technology to make Big Data, Social Media as well as basic ICT services – like the email system –sustainable and scalable to future needs.

“In the 2011 CIO agenda, 64% of higher education CIOs expected to move more than 50% of their infrastructures into the cloud before year-end 2015. The corresponding number for software as a service (SaaS) was 49%. In this year's higher education sourcing survey, we find that 49% of institutions are already involved in some type of cloud sourcing, and 67% expect to be by year-end 2012” [12]. Although the result is not statistically significant because of the small sample - 1% only of the entire education institutions - it represents anyway an indicator of the increasing attention and understanding of Cloud technologies applied to the education fields. However, the institution will have to approach the Cloud within their sourcing strategy instead of taking uncontrolled actions in order to plan for getting bigger benefits and savings from its implementation. Also, legal and regulatory aspects will have to be sorted out, especially in the domain of the data privacy. Cloud services are today truly flexible in that sense and will have to gain trust from the institution before they can really been seen a big opportunity.

## 6. CONCLUSIONS AND RECOMMENDATIONS

The expanding education ecosystem is creating the condition for the disruption of traditional learning models and a substantial switch of the instructional role from a didactic support to a more facilitation, mentoring and coaching role. Some institutions will embrace the changes, other will resist and fail [17]. Resistance to change is certainly not a new thing. Anticipating them will surely cut down on surprises and prepare the institution to move forward more quickly and efficiently. In order to make it happen, the institution will have to embrace enabling technologies as well, as a strategic partner for them to shape and implement future state of education. Technologies will be an essential enabling element for the effective and efficient implementation of innovative and sustainable qualitative-alternative learning models

which are based on the distance-death principal. Thus, distance learning models, together with blended models, will give the traditional education institution the opportunity to establish a more sustainable, open, effective and on larger-scale education programs through the adoption of adaptive - student-centric - learning models. Governance, budgets and campus policies as well as National governments and education institutions are, in most cases, not ready nor aligned yet to consider the future learning environment. Despite it may be concluded, the Public must keep a central role in the future education environment as a "regulator" in order to ensure fair competition and qualitative education services delivery to students [16]. In other words, although it will be a crucial ingredient of future education, the technology alone won't surely generate any positive impact without the firm belief of Public in such "disruption". The same MOOC phenomenon will require at a certain point a regulatory function in order to incorporate them into the student learning path.

Major enabling technologies will be Social Media, Big Data analytics and Cloud Computing, with the support of Mobile technologies. These technologies will give the institutions the opportunity to develop efficient and effective customized learning models on the specifications of the students through adaptive learning models by making largely use of predictive analytics software tools and service-based technologies. Although some interesting real-case example of implementation of such technologies, substantial use of them are foreseen to happen in the very near future. It will not come by itself but rather will require the institution to deeply analyze technology trends and learn from other applications around their effective use before making any significant investment on it. In other hand, the institution will have to define a clear vision and strategy around designing and implementing sustainable and innovative alternative - distance learning - models, ensuring proper investment in the enabling technologies will be required for the specific case. This may also mean starting experimenting with adaptive learning now to gain experience with the strategies and processes, and to determine where it is applicable. Establishing strategic alliances among institutions - where it will make sense - will help them to leverage the experience and contributions of each partner with minimal competitive risk - just like the GUIDE association promoted by the Marconi University does effectively - and make experiments to understand the feasibility, sustainability and effectiveness of such technologies when applied to innovative learning models [18].

As the depicted future scenario as well as the real-cases examples described in the paper demonstrate, considering the mentioned technologies as essential ingredients of a sounding strategy for the future of the education will not be an option. There will be no scalability and no personal learning at reasonable cost without them.

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