How Internet Changes Universities

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Abstract Universities and schools are profoundly impacted and transformed by the availability of cheap, pervasive, and widely used technologies that enable to introduce new forms of education and learning. This change has generated many expectations (and fears) about the new role of education institutions: do we still need them? What is their role going to be? This paper summarizes some arguments and suggestions on this topic, based on author's experiences. The paper does not aim at providing definite answers, but to contribute to an open discussion and reflection on such an important and critical topic.

1 Is Internet Going to Replace Universities?

The Internet and associated digital technologies and products are radically impacting all aspects and sectors of our society: industries, service companies, public administrations. Any human endeavor has been challenged to profoundly rethink its products, services, and processes and keep up with the pace of this astonishing wave of digital innovations. This change is far from being completed: indeed, the speed, scope, and degree of transformations induced by the Internet are increasing and impacting areas that were considered unaffected or "far" from these innovations and technologies.

This fast, pervasive, and ubiquitous diffusion of digital technologies is mainly due to few essential facts:

1. Computers and mobile devices have become consumer products used by an incredibly high (and growing) percentage of the population. Nowadays, regardless of age, geographical area, education level, or profession, almost any person owns and uses at least a smartphone or a tablet.

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2. Mobile and wireline broadband access is spreading very quickly across all continents. There is no single point of planet Earth that cannot be connected to the Internet using one of the many available infrastructures: fibers, mobile wireless networks (e.g., UMTS and LTE), fixed wireless networks (e.g., WiMax), conventional DSLs, satellite.
3. Software development and service creation activities are no longer limited to few powerful software companies or telco operators: any person can easily create new apps, services, and web sites, as development tools and environments are cheap, widely available, and increasingly easier to use.
4. Internet stores (e.g., Apple AppStore) have made it possible to easily sell and distribute software to any person on the planet, creating new markets, business models, development, and distribution strategies.
5. Digital technologies are increasingly small, powerful, and cheap. They can be incorporated in many conventional products to provide "intelligence", personalization, and new features.

Unsurprisingly, education and schools are not immune to this change: new disciplines and curricula have emerged (e.g., computer science and electronic engineering); new ways to study traditional disciplines have been introduced (e.g., CAD and simulation in mechanical engineering and physics); new ways of interacting and managing the teaching activity have increasingly revolutionized the processes and organization of schools and universities. In particular, the innovations in the teaching process are so profound and disrupting that many commentators and researchers suggest that the Internet and related services may even become a sort of replacement for conventional schools and academic institutions. Do we still need "physical facilities" as we can interact, listen, cooperate over the Internet, without the constraints and limitations of traditional approaches?

Indeed, the point is challenging (and frightening): is the destiny of conventional education institutions doomed? Are we going to live in a world where few, powerful, and renowned institutions will provide—remotely and universally—all the education services needed by the world populations? Is this true? To what extent? What are the consequences for our universities and schools?

1.1 MOOCs

Massive Online Open Courses (MOOCs) are the concrete incarnation of this dramatic change. They are a fairly recent innovation even if, in reality, there have been many teaching and education initiatives based on the exploitation of the Internet since the 90s. For this reason, one may argue that there is "nothing new under the sun" and MOOCs are just a new label for something which we were already used to, and has just been amplified by the explosion of broadband connection, mobile devices, and multimedia technologies. This is at least partially true. Nevertheless, MOOCs are not organized just as "pure" asynchronously-attended events, as many other online learning formats that exploit on-demand streaming of instructors'

classes or other multimedia documents/material. Typically, classes are scheduled as in traditional courses, students are requested to remotely attend them according to a predefined schedule, and professors teach "live". It is therefore an approach that eliminates the need for physical presence and, at the same time, maintains some of the feelings and experiences of conventional classes. In addition, most MOOCs (if not all) are free (as in "free beer") or very cheap, and this makes them available to all sectors of our society.

MOOCs have raised a lot of attention and, in many cases, very high levels of participation (thousands of attendees) with enthusiastic reviews and comments. This successful performance has led many commentators to observe that MOOCs can play a major role in promoting education, as they remove—or at least lower—the barrier to access high quality programs: any student, anywhere in the planet, is allowed to benefit from the programs and offerings of top schools. However, there are also skeptical positions claiming that we should better evaluate the results and effects of using MOOCs on a larger scale and on the medium term. For instance, even if it is true that enrollment in MOOCs are incredibly high, it is equally true that dropout levels are equally high: a recent study[1] reveals that "95 % of students enrolled in free, online courses from Harvard University and MIT dropped them before getting a completion certificate." Moreover, well-crafted MOOCs are quite expensive to create and run, and therefore it is difficult to imagine how they can be offered basically for free on the long run, unless they are part of a strategic marketing initiative or managed as a complement and side product for conventional classes and courses. For sure, it is quite important to take a prudent approach in evaluating the real effectiveness and sustainability of MOOCs.

1.2 Social Networks

Another important phenomenon of the past decade is the impressive development of social networks such as Facebook and Twitter. Entire segments of the population have chosen them as their preferred communication means, replacing other popular tools such as emails. Inevitably, the rise of social networks has affected also education programs and schools. Students are used to social networks in their daily life and are accustomed to their interaction paradigms and mechanisms. Schools are indeed communities organized around intense social experiences. It is therefore obvious that students and teachers are increasingly using social networks to support their interaction and cooperation. Social networks are very effective means to share ideas and documents, support workgroups, enable new forms of assistance and support. Actually, new social networks have been created, specifically conceived for schools (e.g., Edmodo and Schoology). In general, social networks have become the underlying support and collaboration platform for any modern education initiative.

[1] John Lauerm. "Harvard, MIT Online courses Dropped by 95 % of Registrants". bloomberg.com, January, 21st, 2014.

The exploitation of social networks in education activities have generated additional questions on the future of schools and universities, as they are perfect complements to teaching activities carried out using MOOCs. Indeed, many MOOC infrastructures do include or are structurally based on a social network. This way students are enabled to follow classes remotely and, at the same time, be part of an online community and benefit from a direct—even if "virtual"—interaction with teachers and instructors. Isn't this the ultimate evidence that education activities can really be accomplished "over the Internet"?

Again, the answer if far from being simple and obvious. Certainly, social networks are a wonderful opportunity to increase our ability to interact and cooperate. However, there is no proof that they can replace the value and meaning of face-to-face interaction.

1.3 Is This the Age of Online Learning?

It is undoubtedly true that we are living in a new age in which the Internet and digital technologies are and will increasingly play a crucial role in any aspect of our daily life. This is particularly true when we consider schools and students, i.e., the youngest part of the population and the typical users of innovative digital tools and technologies. It is essential to understand how we can exploit these technologies without jeopardizing the quality of the education process. Even more, we need to take advantage of these means to increase the effectiveness of our institutions and open them to a wider number of students. For these reasons, it is extremely important to reflect on the real essence and nature of the education process and the intrinsic characteristics of these technologies. We can avoid risks, pursue excellence, and increase quality only by carefully understanding and contrasting these important and critical factors.

2 What Is the Mission of a School?

The answer to this question might appear quite obvious. However, to assess the impact and value of specific tools and technologies on the education process, it is essential to frame a clear and shared view of what a school is all about, i.e., *the ultimate goal that we want to pursue and achieve.* A simple and fairly obvious answer is that schools and universities have to create and share knowledge. This result is not just the effect of research activities (typically carried out within universities), but also of a *rich interaction among students and teachers/professors* who, therefore, play an open and proactive role to achieve the ultimate goal.

In this context, what are students' goals? Again, the answer can be quite obvious but at, the same time, extremely difficult to articulate. A reasonable set of goals can be summarized as follows:

- Understand principles, notions and founding concepts.
- Learn to learn (in my opinion, this is the most important thing as we should never stop learning).
- Learn to unlearn.
- Learn to relearn.
- Learn to reason.
- Learn to work together.
- Develop curiosity.
- Share experiences.
- Acquire information.
- Test technologies and tools.
- Understand the principles of ethical conduct.

In this process, teachers and professors are key actors [1]. To qualify and identify them, I prefer to use the term *educators*. An educator is more than just a "simple" lecturer or evaluator. An educator has a central and critical role in supporting and assisting the growth of students, as the etymology of the term suggests:

> Wikipedia: Etymologically, the word "education" is derived from the Latin ēducātiō ("A breeding, a bringing up, a rearing") from ēdūcō ("I educate, I train") which is related to the homonym ēdūcō ("I lead forth, I take out; I raise up, I erect") from ē- ("from, out of") and dūcō ("I lead, I conduct").

In general, education is the result of a direct and continuous interaction and leadership activity. If this is true, is it really possible to educate "over or through the Internet"? Can we really consider e-learning (or e-teaching) to be equivalent to educating? In my own opinion, even if I am a professor of Computer Science and I am obviously passionate and fond of what I do, *the answer is definitely no*: education requires a direct and continuous interaction that cannot be completely replicated over the Internet, in what is often just a one-to-many, anonymous interaction.

The key fact that we should never forget is that a university (or a school) is not just a collection of individuals reading books or listening to speeches. It is a community of students, educators and stakeholders, as well as of the other actors who are actively participating in the life of the university, such as industries, public administration, public institutions, non-profit organizations. Indeed, a community exists and lives beyond professional and teaching activities. Can the Internet fully recreate and support the life of a community over the Internet?

To a certain extend, the answer is yes. Just imagine Twitter, Facebook or blogs: they have interconnected billions of people spread aroung the entire planet. However, despite the existence of virtual communities and social networks, the importance of physical face-to-face meetings should not be underestimated. As a matter of fact, even bloggers and Internet lovers use to organize bar camps, i.e., physical meetings where people meet and talk face to face in the same place at the same time. Indeed, *there is an incredible value in the direct interaction among people.*

Finally, another key aspect of university life is its infrastructures, such as labs, complex tools, devices, and instruments, greenhouses, medical centers, etc. Is it possible for all of them to be simulated or recreated over the Internet? Can one

actually become a doctor or an electronic engineer without visiting and working in a real lab together with colleagues and instructors?

The above observations suggest that the mission and ultimate goal of a school/universities cannot be pursued and achieved by uniquely exploiting the Internet and digital technologies. There are specific facets, dynamics, and factors that determine the quality of the education process and that heavily rely on the physical interaction and co-location of the different actors involved in the education process [2].

Nevertheless, the Internet and related technologies and tools do have a role in the education process. How can we qualify and characterize it?

3 What Does the Internet Offer and How?

During the past 25 years, the Internet have incredible expanded its reach and capabilities. Nowadays, we can identify three main classes of features that the Internet can offer to the education process:

- *Communication*: today we can meet anybody who is anywhere in the world, in a both synchronous (e.g., Skype) and asynchronous way (e.g., email). More specifically, technology can support three main multimedia interaction paradigms:
  - One-to-one.
  - One-to-many.
  - Many-to-many.
- *Information and knowledge creation and sharing*: Anybody can be the author of any type of media or message using a computer. This can be done in a collaborative way, sharing contents and information anywhere around the world. Indeed, there is not a single point on the planet that is not reached by the internet (actually, even in the middle of the Pacific Ocean or at the North Pole you can have satellite connection).
- *Cooperation*: people can interact and cooperate from remote locations, using a number of different technologies:
  - Distributed workforce management and coordination platforms.
  - Online community management.
  - Social networks.

These features and technologies are extremely powerful, cheap, and increasingly easy to learn and use. However, can they completely address the needs and requirements of an education process and recreate it in a virtual environment? Initial experiences appear not to be positive. For instance, many MOOCs have very high dropout rate (New York Times, February 20th 2013 [3]: "So far most MOOCs have had dropout rates exceeding 90 %.") Certainly, most people try MOOCs just for the sake of curiosity. However, we should question the assumption and belief according to which it is possible to totally replace a physical infrastructure and

environment—better, a community such as a university—with a virtual and digital environment provided over the Internet. Certainly, we should and must exploit the Internet to improve our schools, universities, and education processes in general. However, this goal must be pursued by carefully matching needs, expectations, and real opportunities offered by the Internet.

4 How Does the Internet Change Schools?

The Internet can and do certainly affect, alter, and impact the education process in many ways, the most important ones being summarized as follows:

- *The Internet is an enabler*. The internet enables new forms and ways to organize the education process, and thus it is instrumental to enrich, diversify, and speed up the learning experience.
- *The Internet may be a surrogate*. The Internet might surrogate traditional teaching activities in situations in which costs and physical distribution make it difficult to attend a classical course.
- *The Internet is not a replacement*. The Internet cannot completely replace the experience of attending a course in a university.

In general, looking at the evolution of universities and schools, we can argue that an inversion is taking place: we are moving from "pure learning" to "living an experience". Traditionally, a university campus was the physical location where courses and labs took place. Nowadays, a lot of information can be acquired on the Internet, and this enable some learning activity to occur outside the traditional borders of university campuses. Conversely, universities and schools are the locations where real-life experiences take place and where it is becoming easier to meet testimonials, get in contact with other experiences, increase the ability to learn and share. Probably, this is the future of university campuses: places where communities are created, and where rich professional, human, and cultural experiences occur. In general, there is no doubt that *universities must change*. Certainly, the Internet cannot replace a university campus. However, it is not possible to ignore the consequences of the introduction of the Internet into our education processes. The different effects and contributions of these technologies, processes, and methodologies need to be properly considered and taken into account.

- The onsite experience needs to be enriched in order to exploit the physical presence and the value of communities and places. There must be an added value in visiting and living in a campus.
- The Internet must be the main support and enabling platform. For example, the concept of office hours does not make any sense anymore, as the tools provided by the Internet completely replace the necessity of having them. Nowadays, any professor can interact with students using tools such as e-mail or Skype, anytime and anywhere.

- Probably we need hybrid models (onsite and online), with different levels of hybridization depending on the course level and topic.
- Educators must reevaluate and extend their role as mentors and not just teachers or instructors.

5 Conclusion

Based on the brief discussion proposed in this paper, I believe that there are three main conclusions that can and must be drawn:

- The Internet does change universities, but it does not replace them.
- The change is not obvious at all: it is not a mere transposition of physical classrooms in the cyberspace. If that was the case, then the universities would be transformed into media companies.
- The Internet is a key enabler of innovation and extension of the learning and education experience. It should be considered as something we cannot live without, something that cannot be ignored, something that should not be underestimated. On the other hand, the Internet should not be considered the solution for the problems of universities and, more in general, of our education systems.

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