

FUTURE EDUCATION WITHIN DISRUPTIVE TECHNOLOGIES DEVELOPMENTS

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Abstract: *Our contemporary world is on the verge of crucial changes of an unparalleled pace. The 'technological changeover' is the new paradigm caused by the unprecedented evolution of the disruptive technologies. The present world has the tendency to evolve at least exponential, therefore future educational environment is fairly different than its present layout. An entire array of nowadays studies widely recognizes that the progress of the disruptive technologies will pose a meaningful impact over the educational system evolution. Among the most spectacular technologies with disruptive features we should encounter Artificial Intelligence, Blockchain Technology, Cloud Computing, and the like. In an era of technological disruption the education is seen as the new currency. With the help of Artificial Intelligence, for instance, the education system could track how people learn from kindergarten to retirement. Besides, the technology domain will move the centre of gravity from the institutional area to that of the education's beneficiaries, as we might expect that they will recruit and employ the needed teacher staff, not the institutions. Moreover, the education's recipients will be the main creators of tomorrow's professions and within their community the overarching events will happen and the main decisions will be taken in the educational domain.*

Keywords: disruptive, technologies, education, future, change

1. Introduction

The contemporary world changes rhythm has reached an unprecedented level. The present evolution is performed within all major domains of the social-economic environment. Among these, education is keeping its position as a prevalent factor, that could decisively drive all the others domains transformation.

The major change that is nowadays initiated and will generate much bigger effects in the future social-economic environment refers to the conclusive technologies' presence. The present technologies have evolved with an unparalleled pace and, within the actual conditions; a part of these has the tendency to develop much faster and with more important influences than the rest of these.

These technologies, denominated as disruptive, are bringing the biggest transformations over both the present and future global environment. Moreover, unlike the former times, in which education was the progress driven factor, this paradigm is about to dramatically change, due to the fact that the disruptive technologies will be those to bring the crucial shift into the educational environment and they will also represent the advancement factor of the future, taking this role from education, in this respect.

Organizations, institutions, society and whole mankind, on the one hand, like any individual, on the other hand, have to be aware that we cannot avoid the arrival of the new realities the disruptive technologies

bring, but on the contrary, we have to adapt our behavior and to make the requisite steps towards the future.

Therefore, in the present approach we have to project the course of the educational environment and the way the disruptive technologies will shape it.

Thus, in the first chapter we will approach the nowadays disruptive technologies and examine how they will alter the contemporary and future world. In the second chapter we will analyse the evolution trajectory of the educational environment, while in the last chapter we will refer the way it will be shaped by the disruptive technologies. The conclusions side consists of the chief ideas of the present endeavour through the evolution trajectory of the educational environment.

2. The Nowadays Disruptive Technologies

2.1. Conceptual Delimitations

Previously, with more and more obstinacy, the researchers' present concerns have been focused on paradigm change in the technological domain. In the academic environment, it is axiomatic to say that technology means progress. The new technological paradigm regards those technologies that manage to generate the most profound switches in the present social-economic circumstances.

In the followings, based on Clayton Christensen's innovation taxonomy [1] – augmenting the Schumpeter's theoretical developments – we will establish the present world technologies that have the ability to provoke disruptive changes, meaning those producing fracture lines to normal forecast of processes and phenomena, and having the stamina to create unpredictable and unprecedented effects. Despite the fact that initially, they had been regarded to belong to more 'exotic' types of innovations, due to the fact they have generated tremendous changes in a wide range of sectors, they have been integrated afterwards to the cutting edge

technologies or even to the society 'transformation leaders'.

Importantly, a disruptive technology reveals itself when emerged processes, mechanism and services have the ability to produce a major perturbation and to crucially modify both the fundamental society structures and the essential generating added value mechanisms, provoking a fracture in the society evolution linear model.

2.2. The Disruptive Technologies Relevant Influence over the Contemporary Environment

Within the environment of the data analysts and researchers there is a quasi-unanimous opinion that the nowadays technologies will evolve over a trajectory in which these will rule more and more present and future fields of activity. In the same time, there is the tendency to delineate, the most relevant technologies from the importance perspective, or those that will conclusively influence a large number of essential domains of social-economic life.

For the present approach, we have considered to be relevant the technologies that are decisively influencing the present, but mostly, the future educational environment. From these we can delimitate Artificial Intelligence, Blockchain and Cloud Computing technologies.

Artificial Intelligence represents one of the technologies with the most spectacular evolution. Its disruptive feature comes from its undisputed capacity to generate revolutionary and irreversible transformations. Artificial Intelligence is the exhibit of intelligence at the machine level, in contrast with the natural one, displayed by humans and animals. This staggering technology has the capacity to significantly enhance the life quality and to maximize the general human abilities.

In the contemporary world Artificial Intelligence has developed such that, at the present moment we encounter a multitude of its facets. Firstly, there is the Intelligent Automation which represents the fusion between automation and the Artificial

Intelligence domains referring to the natural language processing, digital workforce management and machine learning.

Chatbots, an Artificial Intelligence domain constantly expanding, represent software applications that simulate human conversation performed through voice, text or both, replacing human operators working in the customers' relationship services.

Besides, in the healthcare and pharmaceutical services Artificial Intelligence has taken the innovation rhythm to the next level. Thus, the algorithms helping to discover new medicines have been optimized, decreasing the period between a disease occurrence and its treatment. On the other hand, under the circumstances that over 50% of the total amount of time of a doctor to put a diagnosis is spent in order to analyze the information recorded by different monitors, machines and sophisticated technical devices, these charges might be immediately taken over by Artificial Intelligence technologies with a higher degree of accuracy.

The Blockchain technology mainly consists of a permanent extensible list that contain data or records, designated by the term 'blocks'. These blocks are interconnected and secured through encryption methods. From the structural point of view, a blockchain is a simple chained list – a dynamic structure, in which every list's knot contains, besides the useful information, the following element address; through this the access is allowed using the address of the first element.

The administration of a Blockchain is done through a collective network that joins a certain protocol in order to validate new blocks. This particular feature sets an advantage for the Blockchain technology; therefore it is mostly adequate for confidential information registering, such as those contained in a medical file or a performed transaction. Due to this features, the Blockchain technology is used for crypto currencies administration – virtual

coins – such as 'bitcoin'. This technology success is granted through the peer-to-peer networks, without using a central administrative or control system.

Cloud Computing is one of the most striking disruptive technologies of the present moment. Even though, at a first glance, this technology represents only an extension of the computing systems already employed capacities, the way in which these have been used are defining the new technology. Its inclusion in the disruptive technologies series is given by the way in which it is dramatically changing the shape of the actual information society.

Cloud Computing technology represents the next level of the present computing systems development. This technology uses the resources sharing propriety the computer systems use, especially the data storage and computing power, without users' direct interference, by placing all these provided resources in 'cloud' available for everybody. Basically, this technology depicts the data centers available for different internet users. The disruptive feature of this technology is used in specific sectors of the present social-economic environment, since is based on resources mutual sharing in order to get coherence, co-ordination and resources merging – requirements needed to achieve economies of scale. Economies of scale, the set goal of every entrepreneur, refers to the economic effect of cost diminishing while the good and services production increases [2].

On the other hand, Cloud Computing technologies seem to be one of the reliable protection solutions against attack vectors from cyber space. Due to the fact, some recent solutions of Cloud Computing use the global computing resources available at a specific moment, of any unallocated computer system – like Airbnb tourism – the file sharing scheme that split a file in 30 separated pieces, each of them in a different location, using a specific encrypted key, make the effort of a hacker - to decrypt all these keys, for recomposing the original

data, only to get a single file – useless.

2.3. The Artificial Intelligence, Blockchain and Cloud Computing Disruptive Effects over the Contemporary Society

One of the first feature of these technologies, even though collateral, refers to the fact that they evolve and impose themselves with such a speed that the terms denominating specific technologies are immediately included in the vehicular languages and technical phraseology, without even being translated. Their acceptance, sometimes in contempt with linguistic rules is done due to the fact they are quite difficult to adapt or translate, with the use of existing terms of the respective language.

The mutual resource sharing is the way in which the above mentioned disruptive technologies manage to provoke unparalleled mutations and to boost the innovation rhythm. Besides, these technologies allow the assertion of the collaborative economy, through enabling extensive access to products, services and expertise, unlike the traditional models based on individual access and limited resources use.

Furthermore, due to these technologies ability to individualize and personalize every user, they provide autonomy and decision-making discretion. Meanwhile, these technologies allow the decisions decentralization, so that the most important aspects of the social-economic life are not decided at a central level and administrated by governmental entities with enhanced control level, but on the contrary, by individuals placed on the other decisional chainend. These individuals will eventually decide over the future global environment layout, take the most important decisions and have the opportunity to decisively influence all the social-economic life issues. Not least, these technologies proliferation and their disruptive feature is given by their ability to protect the private attribute of all personal life aspects, while providing the

advantages of making autonomous decisions and influencing all the life aspects, affecting their life circumstances. Thus, the personal data files, medical directories, transactions performed, and the goods and services preferences will be confidential, removing the inherent risks of a central administrated network.

3. The Educational Environment Evolution

The education and the educational environment have represented the subject of every society concern, due to the fact that their evolution crucially affects the entire society transformation.

Along with the constant evolution of the information society, the educational domain changing is performed over a trajectory evolving at least exponential. Some studies [3] assert that, on the one hand the human society begins to experience the shock generated by the disruptive technologies impact, and on the other, the fact that this collision will revolutionize the inner nature of educational system itself.

Firstly, the present moment education does not have to be approached from the actual professions training perspective, but on the contrary, from the angle of the present jobs evolution, and the future professions viewpoint. Furthermore, individuals the present education is training have to be the ones inventing future jobs, and consequently their education should be performed in this respect. This is the paradigm that has to be changed, and in the same time the starting point of education every transformation process.

Moreover, the paradigm changeover of approaching the future education has to go further than the dichotomy STEM versus STEAM. While STEM (Science, Technology, Engineering, and Math) focuses on forming a convergent thinking, moving to STEAM (Science, Technology, Engineering, Art, and Math) restore the attention to the approach that Leonardo da Vinci have suggested since the Renaissance

period ('Study the Science of Art. Study the Art of Science'), bringing the factor 'Art' within the present education paradigm. The term 'Art' brings under spot the development of creativity, innovation, and critical thinking skills. Even though, at a first glance, STEAM seems to be a cure-all for the present education issues, the mere introduction of the term 'Art' does not solve the problems brought by the future collision over the educational environment. Between the two extreme stages – Ignorance and Fully Educated – education is requested to be provided both in formal and informal as well as non-formal contexts. The actual matter some analyses [4] underline is that the formal education, against all criticism, seems to be still useful, however not in its traditional shape or provided by established educational entities, but on the contrary, those developed by different interest centers or non-governmental organizations. Despite the above considered situation, the present analyses regard the traditional roles education have to fulfil – playing a productive and military role, socializing, cultural patterns transfer, innate human potential development, self-knowledge – that have to be partially altered or even totally revised.

4. Future Education within the Disruptive Technologies Development

At the current moment the educational environment confronts with multiple strains. In the first place, like any other domain of the social-economic life, it has to adapt itself for the inherent future impact that place itself in a relationship regarding change. Secondly, the inner traditional educational environment structure, consisting of nurtured values, fulfilled roles, and approaching ways seems to collapse, giving rise to a tremendous reconfiguration.

But the most significant impact is provoked by the disruptive technologies that it is supposed to influence the various domains

of both the current and future social-economic context, and mostly the educational environment.

The disruptive technologies scrutinized in the previous chapter are essentially influencing the future educational environment, providing innumerable opportunities and, proportionally, the same amount of risks. Therefore, these developments compel us to open as wide as we can the knowledge horizon, in order to be able to absorb the impact shock of the events taking place in a not so far future.

Thus, the disruptive technologies broadening use within the educational environment, and mostly the Blockchain technology, will vitally change this domain paradigm, as education will behave as a genuine exchange currency, but this turn with an information exchange role. From this perspective, the educational environment will be the benchmark variable to convert all the changes within the entire society.

In addition, the disruptive technologies imply that the physical presence of the education recipient is not needed any more within the traditional institutions as classical education provider. Under these circumstances, the chief challenge of the present and future moment is posed by the challenge of providing equal access to technology, and whenever this is accomplished this should be validated within authentication means for both the education recipient and the learning outcomes.

Besides, the disruptive technologies possess the best ability to change knowledge into innovation, related to the evolution trajectory of the information society towards knowledge society.

In addition, the disruptive technologies, and mostly Artificial Intelligence, have the ability to monitor how people traverse different educational stages, while individuals are evolving through their existence. Moreover, under these technologies impact the education

recipients' role will alter from mere receivers to decision makers in the educational field, regarding the individuals direct involvement, and not only. To this extent it is supposed that the decisions center of gravity will move such as the teaching staff will be hired as a consequence of the taken decisions of the education beneficiaries, and not by the institutions administrative services. Under the direct education recipient pressure, the latter will drop a great amount of the decisions they take in specific situations. Furthermore, the disruptive technologies entrance within the educational environment will lead to the reconsideration of its basic theories, like that of the multiple intelligences, adding to the established ones, meta-knowledge, meta-cognitively, meta-subjectivity, and meta-conceptualism [5]. The educational environment is the one to receive the highest influence from the disruptive technologies, which will be felt both in restructuring and reconfiguring the basic education elements, as well as within the way in which it will be perceived and provided for the education beneficiaries, and the roles the education participants will have. Within this context, the challenges the future educational environment will have to face consists of the means in which the human abilities will evolve under the circumstances of releasing from time pressure the tremendous creativity energy of the mankind.

5. Conclusions

The future shock will be felt in all social-economic domains. The changing vectors are of different kinds; among these the disruptive technologies exhibit a force provoking the most spectacular alterations within all essential domains of the current and future social-economic environment.

The domain to fully receive the blast of the changing impact caused by disruptive technologies - Artificial Intelligence, Blockchain and Cloud Computing – is the educational environment. Its transformation will be so substantial that it will be felt as a paradigm changeover. As a consequence of the disruptive feature alterations, education will be provided completely different than the traditional model, required be education services recipients that will make the domains main decisions.

The present analyses importance comes from the fact that the educational environment, receiving the full impact of the transformations, provoked by the above examined disruptive technologies, is the one to decisively influence in the long run the essential aspects of global social-economic life. This matter will crucially alter the education role as an initiating factor of the essential changes within all social life aspects, so that this part will be took over by the disruptive technologies which, at the present moment, are Artificial Intelligence, Blockchain and Cloud Computing.

References

- [1] Christensen, Magleby Clayton, *The Innovator's Dilemma*, Harvard Business School Press, Boston, Massachusetts, 1997, pp. 10.
- [2] Jackson, Dudley, *Profitability, Mechanization and Economies of Scale*, Ashgate Publishing, New York, USA, 1998, pp.34.
- [3] Seldon, Anthony, *The Fourth Education Revolution: Will Artificial Intelligence Liberate or Infantilise Humanity*, University of Buckingham Press, London, United Kingdom, 2018.
- [4] Idem, pp.6-7.
- [5] Taguma, Miho, Feron, Eva, and Hwee Meow, *Future of Educations and Skills 2030: Conceptual Learning Framework*, OECD Conference Centre, Paris, France, 2018, pp.8.