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Open Knowledge, Threats, Challenges and Opportunities in the 21st Century

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Abstract: We live in a world of constant change driven by digital technologies and in the complex world in which we live, changed daily by a volatile world, due to frequent changes; Uncertain, due to the unpredictable nature of events, complex, the multiplicity of factors that can arise interconnected and ambiguous, related to complex and unclear situations to understand, education faces a paradigm shift that exposes vulnerabilities and threats of Open Education models in the face of propensity to trade, given its great advance, it would be normal to draw the attention of capital. The digital revolution presents challenges, but it also opens unprecedented opportunities for democratization and accessibility of this educational model. The transformation process of Open Universities must maintain the reference for the deep incorporation of pedagogical and technological innovation based on research and seek new organizational strategies to maintain its quality and guarantee its relevance and leadership in the search for the massification of high and high quality higher education availability.

Keywords: Digital revolution, Open Universities, Pedagogy, Technology.

I. Introduction

With the advent of the internet, a profound transformation in the way people communicate and produce within the academics may be verified. The digital revolution facilitated the freedom of access to information. The possibility of creating and sharing knowledge increases daily, and to attract new audiences, the educational agents have been diversifying their offer, combining courses in the distance modality with virtual learning and the in-person regime, resorting to Open Online and Massive Courses, especially the English Massive Open Online Course (MOOC). This movement has brought new challenges and the need to differentiate the identity of the Open University (OU). The world is witnessing a competition between the traditional higher educational institutions (HEI), which misconstrues the concept of open and distance learning, thus dissort its application. The target audience of these courses are specific, well structured, and generally, seek a higher education certified as a solution to their professional and personal goals. However, the commercialization of education is abundant, and the threats to accessibility and equality are felt globally. This expansion requires a large contribution from the distance and the open education modalities. In this global higher education challenge, Open Universities can be the nuclear vehicle of expansion, especially in face of the sustainability challenges defined by the United Nations. Open Universities turned lifelong learning respectable for the first time in the history of higher education, changing the mindset about access opportunities to higher education. The Open Universities have also innovated through the use of technologies, first with the help of classical Radio Television broadcasting, and for 30 years, with the challenges and opportunities of the digital revolution. Another important aspect of the pioneering of Open Universities was the innovation of educational logistics, with the offer of pedagogical services in scale, with efficiency and quality. The educational logistics was, in fact, a discipline created by Open Universities. The scale was another important characteristic of the Open Universities. Its goal of providing educational opportunities to as many students as possible implies growth and continuous expansion of services and capacities. This attitude contributed to modifying the mentality of higher education future research directions.

II. The Digital Revolution and the Trajectories of Open Universities

The digital revolution, along with vast structural changes in higher education, led to the erosion of the advantages of pioneering and leadership that Open Universities enjoyed with

the distance learning during their first 25 years of existence [1]. The threats and challenges created by the current scenario demonstrate several weaknesses inherent in the institutional consolidation of partially stalled and complacent models. These threats put not only in question the ability of Open Universities to contribute to the UN's sustainability goals, but also in some cases its own survival. Face these challenges requires profound transformations in order to cultivate an incorporation culture of deep innovation and leadership. The question is: Is the 50-year-old institutional model that has been in action all along suitable for the future?

The Open University (OU) of the United Kingdom, the mother of all Open Universities, marks 50 years of existence in 2019. Although there are reasons for celebration, there are also reasons for concern [2]. The number of students has decreased, about 33% since 2010. This reduction causes severe stress in the institution, with loss of human and economic resources, and puts it in an unsustainable situation. The number of students is now stabilized, but the target audience over the 50 years old who sought in the UK Open Universities personal opportunities, has disappeared, and so the OU has ceased to fulfill its lifelong learning role. In Europe, this model also undergoes governmental scrutiny. Four European Open Universities are under threat of shutting down. However, the news is not bad at all because two another two Open Universities are experiencing vigorous growth. The panorama is mixed and it is necessary to reflect on this model in a skeptical and inquisitor way. What is still valid in this model, in view of the contemporary teaching environment challenges? Is it a suitable model for the next years? To answer these questions, more research is needed on the ODL policies and Strategies [2]. In this path, it is necessary to rethink the concept of open education, which has several constituent elements in rapid development, such as Open Educational Resources (OER), Open Educational Practices (OEP), the Massive Open Online Course (MOOC), and the incorporation of non-formal qualifications in the HEI (Higher Education Institutions). It is also necessary to analyze the emerging currents of informal learning at the margins of the institutions and incorporate them into innovative, collaborative and more student-centered curricula, then redesign the structures of the degree conferring courses, whose little flexibility and duration marginalize a large part of lifelong learning.

Having as its starting point the philosophy and the *modus operandi* expressed in the missions of Open Universities, several threats and weaknesses of the current models are identified, but there are also great valences and virtues that can be constituted in forces of equity and accessibility in the massification of higher education. The OU Virtual pedagogical model is based on four pillars: student-centered learning; flexibility, interaction, and digital inclusion [3]. The Virtual pedagogical model of OU, goes against the model that [3] initially proposed. The model assumes that learning occurs in the community, through the interaction of the three interconnected nuclear components, and is based on the constructivist paradigm. The constructivist principles advocate the focus on the student and the belief that all information and learning are conceptualized through experiences and interactions in the Virtual Learning Environment (VLE) because the social context substantially affects the nature of pedagogical activities and its results. One of the main concerns of constructivism is the way the student interacts with his/her environment. In the research community (RC), the community is represented by students and teachers participating in the VLE. The investigation represents the process through which students obtain new knowledge and understanding of the curriculum. To acquire this new knowledge, the elements of the community have to act and interact through their social, cognitive and teaching presences.

This model emerged and was made possible by the technologies that came with the digital revolution. In the present, characterized by many as the entry of the post-digital era, there are some pillars that remain as conductive wires of coherence since the beginning of the open distance learning. However, there are also several salient trends that will shape the future of the sector, several of them already with translation and applicability in existing pedagogies and technologies. The key lines that are transversal to the accelerated change of the current paradigm meet in the concepts of openness, diversity, flexibility, personalization, quality, and authentication and will inevitably have to sustain itself in the pillars of research and innovation, pedagogical and technological.

The technologies used for learning are increasingly cheap and disseminated and are progressively more controlled by students [4]. The evolution of e-learning since the definition of the Edinburgh sceneries shows that there will not be a single uniform future for this field. Distinguished in four categories, these scenarios were designed to be neutral in relation to digital technologies employed and, after 15 years, its predictive character and accuracy are reaffirmed. The scenarios referred to are as follows:

- Virtually Vanilla – eLearning Technologies controlled by large companies and institutions;
- Back to the Future – A return to traditional values and classroom education, promoted by the loss of confidence in eLearning;
- Web of Confidence – The Web offers people new forms of collaborative learning and work, leading to decentralization and a shift of power out of large organizations;
- U Choose – A world where people are frustrated by new technologies and reject them but find new ways to regain control of their learning and increase their independence from central authorities.

As the study of the generations of DL also demonstrates, the emergence of a new pedagogical generation does not cause the extinction of the former; On the contrary, they coexist, expanding through the new possibilities conferred by technology [5]. The technologies evolve through a process of construction

and recombination. Each innovation is relying in the previous and, in turn, opens new possibilities for innovation, as well as constraints, limitations, and threats. It is therefore expected that all Edinburgh Scenarios persist and originate new forms of digital learning; some of them are already in the process of current creation and growth. No scenario will dominate the others, because they will all find their niches. The borders are also struggling because although the institutions maintain the tendency to centralize in Learning Management Systems (LMS), both students and teachers use increasingly personal learning networks supported by social networks, informal and formal learning platforms. Diversity will be the most salient characteristic of the future of pedagogies and the organization of DL.

On the other hand, the replication forms of teacher control of the pedagogical models in the eLearning, through the LMS platforms and evaluation activities, undergo conceptional challenges and design practices that allow to regain the motivation lost by the perception of lack of control of the process and alienation of the participant's interest. Several experiments carried out, for example in MOOCs, reveal the inherent weakness of the tendency. Even with mature, competent and skilled students, when they withdraw control, certification, and accreditation of online courses based on classroom pedagogies, they demonstrate their lack of evident value in the low rates of success and completion of the participants.

III. Emerging Technologies in Distance Education

DL can (and must) be a choreographed dance carefully orchestrated between technology and pedagogy [6]. In terms of technology, several initiatives are identified that will open up great possibilities for the future. The "Next Generation Digital Learning Environment" by Educause [3] and the "Learning and Performance Support System" in development by the National Research Council of Canada [7], are real examples of the tendency to focus on individualization and customization of highly sustained learning in the network. This tendency aligns with the growing and long-announced relevance of the realization of personal learning environments or personal learning atmospheres (PLAs). Many technological advances will enable this pedagogical innovation, highlighting the following [4]:

- Analysis of learning data and information flows through adaptive and customizable *hypermedia*;
- Collective Technologies (collaborative filters, labels and labels semi and customized, reputation systems, research algorithms, and network mining, etc.) that enable the communication of many to one;
- Deep learning and artificial intelligence will enable intelligent mentoring systems and already offer contextual help and automatic translation;
- Disaggregated, compatible and interoperable tools and services will overcome monolithic LMS and facilitate the collection and aggregation of digital evidence of learning activities to enable the emergence of competence accreditation systems distributed in networks;
- Mobility and diversity of devices, which will enable the paradigm change to learning embodied in the daily reality and independent of time and space;
- Internet of things and ubiquitary computation will allow a growing interaction between people and objects;
- Virtual and augmented reality and 3D printing will increasingly merge the real with the virtual, creating learning scenarios of high authenticity and increasingly imbuing teaching with genuine experiences, engaging and inspiring.

Data analysis, collective technologies and artificial intelligence will facilitate the delegation of many teaching processes to computational agents, making it possible to scale and massify the educational offer without compromising its quality. The breakdown goes against two overlapping tendencies, of easing and increased control of the educational process to the student [4]. This opening will broaden the educational offerings beyond the traditional institutional boundaries and will allow the customization of learning environments. The mobility and diversity of devices with immersion and overlapping of the Web in physical reality are supported by the aforementioned trends, but further expand the possibilities of eLearning leaving the classrooms, freeing it from computers Personal and secretaries. These technologies will ultimately allow you to incorporate eLearning in the real world, in the everyday flow of all people, anywhere and at any time. This tendency represents the extinction of several aspects of the control of learning by the traditional teacher, demanding the creation of pedagogies that recognize the new paradigm of profound incorporation, without separation between life and education.

IV. The New Pedagogical Generation of Digital Education

In this technological context, [8] and once education is the most important instrument for changing the economic condition [9] have nicknamed the new pedagogical generation of "holistic generation", not only by the integration of previous pedagogical generations but also by the profound integration of pedagogy in all aspects of the student's lives. This new generation of pedagogies, teaching and learning methods will undoubtedly focus predominantly on the student's individuality, and social networks will be the central means of the personalization process. The integration of social networks into institutional structures of education will enable the creation of individualized and highly adaptable academic pathways to the needs of each student. By maintaining the clear structure of the learning objectives provided by the institutional supervision

and curricula while combining it with new ways of sharing the control of the educational process of learning experiences, it will be possible to increase the quality and efficiency of education and at the same time positively influence student's motivation.

This transition requires great effort in research and development for the design of pedagogical methods. As data analysis becomes an increasingly powerful tool in teaching, the creation of pedagogical methods will often emerge from the data collected, and not just from theories defined as priorities. It is highly possible that the new generation of pedagogies is discovered rather than invented [4].

The transition also requires research and the development of new policies for the creation of educational informatics tools that aggregate the learning activities distributed in the network and validate the certification of education combined with the closed institutional frameworks. This disaggregation will lead to a redefinition of the teacher's role, since it loses some control, becoming a service provider. Depending on the context and phase of the teaching process, the teacher may have valences from the direct orchestration, but his model, guide and learning support functions will gain relief. The disaggregation will also create challenges related to the granularity and accreditation of the courses, as the organizational structure of the institutions becomes flexible to allow the customized academic pathways.

V. Digital Revolution Threats to Open Education

As major technological opportunities arise for the expansion and fairness of education in an opening model, the threats that expose the weaknesses of the Open Universities model are also growing. Open Universities are faced with a paradox between the mercantilism of private education, the pressures of surveillance capitalism on the one hand, and the effort to increase the openness of public science and education by another [6] [10]. This fight will continue among agents seeking profit in digital education at any cost, and the people and institutions that consider knowledge as a social good gains value as it is distributed in an open way.

The spirit of innovation that defined the genesis of Open Universities is losing itself over time, as institutions grow and settle. The erosion of the advantage of the first move is happening, in the face of the digital change [2]. Most traditional universities already accept a combination of the in-person model with independent study formats based on e-learning and offer mixed programs. The private sector has also not adhered to these modalities. They have been applied irresponsibly by people without skills in a DL and there have been several cases of misapplication and malpractice of these modalities, which has stripped them of credibility in the eyes of society. The challenge of Open Universities is in the maintenance of their identity as innovators of higher education. The generalization of MOOCs by default of Open Universities is emblematic and poses a major threat. There are many criticisms of the MOOCs, but they have stirred the world in an undeniable and inescapable way. It was not the intention of Open Universities to originate this phenomenon, but they had felt outdated in their mission to innovate and invent new ways of educating. After the initial period, Open Universities accepted and even somehow embraced the MOOCs, having corrected some flaws and adjusted the trajectory with qualitative improvements.

In terms of scale, there are currently several mega-universities and DL that are not open. The current scenario is complex. Some Open Universities remain uncompetitive, by the government's mandate that defines them as monopolistic distance learning (e.g. Indonesia). However, in most countries, this is not the case, and many Open Universities have great difficulty in securing its future in the digital era, with great difficulty in transitioning from the second generation of DL.

In terms of REA, most Open Universities still persist in rhetoric. They are better advocates than users, as they are more effective in promoting the use of their REA than to incorporate those of third parties into their practices.

In the current scenario, several Open Universities record disinvestment, decreased students, loss of regional centers and political disinterest, but still a lot of resistance to change in the academy.

VI. Challenges, Opportunities and Strategies for the Future

The digital revolution has brought changes to all fields, including education. It is currently ubiquitary, as is evident by the presence of LMSs in all universities. So what differentiates Open Universities? How do you keep them in the leadership of education? Open Universities need to reformulate their innovation policies and strategies so that they can remain active and relevant in their mission to educate the world fairly and affordably. It is necessary to rethink innovation. Open Universities should be institutions of embedded innovation [12], where constant and continuous innovation is incorporated into the culture of management, strategic planning, and educational practices. At first, Open Universities understood that traditional teaching and learning models were inadequate for their mission, and innovated, both in the technologies employed and in the construction and development of pedagogical theories and practices. However, in the face of threats, it is necessary to reinvent Open Universities. They cannot remain in the model for 30 years, and for this change, it is necessary to put innovation at the heart of its institutional culture. The challenge of Open Universities is to ensure that they cease to be complacent and regain the status of the most innovative institutions in the way of combining technologies to find new solutions. It is necessary to develop leadership at all levels, and at the international level, it is necessary to cultivate the distributed leadership [6]. It is also necessary to develop the vocational training of teachers.

More attention is needed to the surrounding environment, for early detection of changes and strategic planning.

It is necessary to define development and quality of new forms and dominate the quality agenda of higher education since quality has been defined based on simplistic, antiquated, incomplete and asymmetric criteria that do not emphasize the important role and the capacities of Open Universities, which have the quality referential aimed at inclusion, lifelong learning, and sustainability.

It is necessary to develop the potential of ICT and incorporate them at all levels of the institution. One of the ways to innovate at this level that is already underway in Open Universities is to create more evolved personal learning environments, which integrate traditional LMS with social networks. Social networks are a source of enormous innovation. Recent research results on its use in the field of education are encouraging [6]. In the last 15 years, several professors and several institutions have used social networks to amplify their LMSs in the learning process, and it is possible to identify several benefits: timely notifications, increase in social presence, increased academic integration in the real world, network effects and background conversations, increased persistence, satisfaction, and learning perception. The use of social networks has the potential to achieve the goal of integrating the school into the real life of students and teachers, which extends naturally to the surrounding societies and aligns with the philosophy and mission of Open Universities. In the current panorama of accelerated but often unstructured incorporation of new technologies in education, Open Universities also have the opportunity to remain in the leadership of innovation and research for the development of pedagogies, practices, and policies that sustain and guide social learning [1].

In view of the investment capacity of large companies, which can easily take advantage of the commercial cloud and big data services, coupled with the most aggressive copyright protection tools, Open Universities need to be innovative in the way they are positioned in society and how they relate to other higher education institutions. With the sustained increase of tuition fees in higher education, there is a serious threat of inaccessibility to quality training opportunities for a large part of the world population. Libraries should organize training sessions, seminars, workshops and orientation programs for users at the regular intervals of time to keep them up to date with latest collection, services and technologies. Consequently, libraries must form their collections and facilities to meet users "satisfaction". University libraries have a solitary duty to sustain the purposes of the university through promoting education, learning and research collaboration with the access through the Open University [11]. The breakdown and the granular autonomy of online education systems can be effective strategies to reduce costs while maintaining the quality of education [1]. With the new support policy infrastructure defined from the OpenEdu project, open Education in the HEI is conceived in ten dimensions, including the resources and the repositories of free access in a broader concept of modernization of education boosted by digital technologies [13]. The goal is to remove barriers, promote transparency for the sharing of practices that allow broadening access and participation to all, making learning accessible, abundant and customizable. In this context of increased openness, implementation of shared practices and collaborative, networked work organization, Open Universities have the opportunity to play a driving force of change - thanks to their profound technical knowledge, human potential, and culture of open practices. This role can be played in various ways, namely as leaders in the adoption of practices, definition of policies, and in the training and education of scientific agents [14]. However, in order to take advantage of these opportunities, universities dedicated to distance education need to transform and adopt a new organizational approach, such as structured learning organizations in open networks [15].

In the context of competition for students' attention, the most dynamic educational resources, which could be modified, adapted and shared freely, have a great advantage over the closed resources. However, these practices have insufficient adoption, and there is still a widespread lack of knowledge of these concepts in the HEI [16]. Open Universities, such as policy leaders, OEP and OER, have a broad competitive advantage, especially at this moment of convergence of open education and open science movements, to serve as references to the principles of transparency, collaboration, and openness of knowledge. Open Universities must face this tremendous opportunity as one of their priorities, considering that the OER is pedagogies and disruptive technologies [1] that align directly with the mission of fairness and accessibility in education.

VII. Conclusion

Through the critical evaluation of these institutions in the global educational panorama, we identify the need for profound and imminent transformations. These transformations open up several paths of challenges and opportunities for the strengthening of open education. Through a huge effort of change, it will be possible to maintain the inescapable role of these institutions in promoting the growth and sustainability of higher education.

At the time when a decisive law project is being discussed to redefine the role of the Open University of Portugal, it must actively pursue the goal of maintaining itself as a leader in innovation and quality, so that it can continue to define the future of distance education and digital learning.

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