OER as a certain solution for uncertain times: A reflection on the initiatives undertaken in Morocco during the covid-19 period

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Abstract. The COVID-19 pandemic has generated a high degree of uncertainty about the state of education. During this critical period, the entire educational landscape was in need of relevant educational resources that could be shared between and within educational networks. In this regard, open educational resources (OER) and open educational practices (OEP) have played an important role in ensuring educational continuity. Research has shown that open approaches will help make the higher education ecosystem more resilient to future crises and the sustainability of this ecosystem can be fueled by the widespread use of OER and OEP. However, additional work is still needed in this area either at the personal, organizational, or institutional level. In this paper, we discuss the potential of OER and OEP, as certain solutions, to improve quality and widen access in uncertain times such as the COVID-19 crisis, we also present an analysis from an OER perspective of the initiatives undertaken at the Cadi Ayyad University (UCA) in Morocco as example in order to assess the extent to which they can be considered as OER. On the other hand, we highlight the benefits of this experience, as well as identify the barriers that hinder the adoption of open solutions in order to propose some recommendations and guidelines to foster the implementation of these solutions.

Keywords: OER; OEP; Open Education; Higher Education; Crisis time; Resilience; COVID-19

1   Introduction

Education has been and will always be an undeniable human right, the foundation of just, equal and inclusive societies. Its sustainability is paramount for the growth and development of all nations. Over the centuries, education has faced several challenges, ranging from natural (earthquakes, floods...), human (wars, terrorism...) or pandemic (cholera, plague, COVID-19...) disasters. These disasters have always been a turning point in the history of humanity, demonstrating each time the flexible and innovative character of human beings; they always give rise to new reflections on how to avoid them or mitigate their effects. This was recently the case with the devastating COVID-19 pandemic which, in addition to the millions of victims and the major social and economic disruption, had an impact on virtually every sector, especially the education sector.

This unprecedented coronavirus pandemic has affected education systems around the world, resulting in widespread school closures in affected countries. According to United Nations Educational, Scientific and Cultural Organization (UNESCO) monitoring, more than 100 countries have implemented a nationwide closure, impacting nearly 90% of the global student population.

To address this paradigm shift, and to ensure a means by which learners at all institutional levels, everywhere, can safely access learning, it is, therefore, more important than ever that the global community acts together to support and expand access to information and knowledge through open educational resources (OER). They have been at the heart of UNESCO's recommendations because of their rich potential to improve equity in learning, even beyond times of crisis, as a rigorously developed, customizable, and low-cost material, as well as their potential of saving time in preparing learning materials. Today they are emerging not as a solution to a temporary problem but as a global long-term and sustainable solution to ensure wider access to relevant resources and effective learning opportunities.

In order to be aligned with international standards and to know how far we are at the local level, it is necessary to have a closer look at the situation of higher education institutions and the way they have managed this difficult situation. We took the example of the Cadi Ayyad University (UCA) in Morocco. During the crisis, the university has multiplied its efforts to face the new challenges by carrying out several initiatives ranging from production and contextualization to the dissemination of a large number of educational resources by several means.

This study is important because on the one hand it provides an exploratory analysis that can serve as a background research to rethink our education system and orient it towards more open, innovative and above all robust approaches. On the other hand, it highlights the possibilities and weaknesses that need to be addressed by using a combined quantitative and qualitative data analysis method in order to respond to the following research questions :

- How can the Covid-19 crisis guide us to rethink our teaching methods?

- How can the online resources put in place by the university be turned/transformed into OER in the specific context of UCA in Morocco?

- What are the barriers/weaknesses that hinder the effective implementation of an OER-based pedagogy?

- What recommendations and guidelines can be drawn from this crisis?

The objective of this paper is to highlight the potential of OER and their offspring open educational practices (OEP) to foster the resilience and flexibility within education systems, as well as the ability to mobilize alternative modes of delivery through the implementation of appropriate education policies and programs to better cope with times of crisis. We also examine, from an OER lens, the initiatives that have been undertaken at UCA to ensure educational continuity during the COVID-19 crisis to identify the necessary capacities at individual, organizational and institutional levels that need to be strengthened to include adaptive responses to crises.

The article is organized as follows: the second section discusses OER as a global solution for wider class courses, the third section describes OER in Morocco, the fourth section focus on the initiatives launched by the UCA to support the adoption of OER, the fifth section is devoted to the discussion, and the last section is dedicated to the conclusion.

2   Literature Review

In March 2020, COVID-19 triggered a state of emergency worldwide that has resulted in a forced shift toward the virtualization of education. Universities, schools, and vocational training institutes were challenged to make an abrupt move from face-to-face to what can be described as an emergency remote education [1].

The impact of the crisis on education globally and especially on developing countries, of which Morocco is a part, will certainly have heuristic value for the design of mitigation and remediation strategies in a wide variety of contexts in the immediate aftermath of the pandemic and beyond.

In addition, the pandemic has exacerbated pre-existing problems and created new ones, overwhelming education systems with multiple new demands for which they were unprepared and, in many cases, under-resourced, which negatively impacted learning outcomes and increased inequalities between learners in different parts of the country, particularly in rural areas, and consequently increasing dropout rates, which requires innovative and sustainable educational responses.

Responding to these new, as well as existing, educational imperatives requires a commitment to "building back better"; it is not simply a matter of restoring education systems to their pre-pandemic level of functioning, but of realigning them with these new challenges. By examining the short-term response of stakeholders to the pandemic, it becomes possible to determine whether the direction of change needed is consistent with this philosophy and the type of priorities that should guide these efforts to better manage such crises [2].

In the digital age and new information technologies, several alternatives have emerged: the Internet, big data, Artificial Intelligence, 5G, and cloud-based platforms, in addition to other technologies, have all been put to use in education. However, a more innovative way of teaching and learning is not limited to infrastructure. In fact, infrastructure is merely the first step towards establishing a brand new paradigm of teaching and learning in the post-pandemic era. This paradigm shift could represent an innovative update of the transition from the traditional teacher-centered teaching and learning method to a more student-centered method, in which the educator is transformed from the "sage on the stage" to the "guide on the side", although this transition dates back to several years ago, it still presents a challenge for the Moroccan university due to several factors, mainly massification.[3]. This calls for a radical shift in thinking, conceptually and philosophically, about the process of teaching, and the connections between educators, learners, and instructional tools [4,5].

Among the major trends that have led to an inflection point in the fields of education and science is the concept of openness, even though it may be difficult to determine its meaning from a semantic perspective; the term 'open' has many dimensions in both disciplines. Open education has very ancient origins that were introduced by Greek philosophers (Socrates, Plato...) [6], in the contemporary world, it is more than a mere understanding of free access to knowledge, to an umbrella term that encompasses the properties of innovation, sharing, and equality with the aim of facilitating the learning process for all learners.

"Openness isn't the end; it's the beginning." – M. Heffernan

The COVID-19 crisis has highlighted the notion of openness; the closure of educational institutions has opened other alternatives. The institutions must adapt to new standards and expectations and adopt new practices in the teaching and learning process in order to guarantee the continuity of educational activities. Thus, open and distance learning (ODL) is no longer a choice but a necessity. The term open and distance learning was defined by UNESCO in 2002, it reflects both the fact that all or most of the teaching is conducted by someone removed in time and space from the learner, and that the mission aims to include greater dimensions of openness and flexibility, whether in terms of access, curriculum or other elements of structure [7]. For the student/learner open and distance learning means increased access and flexibility as well as the combination of work and education. It may also mean a more learner-centered approach, enrichment, higher quality and new ways of interaction [7].

Historically, there have been 2 approaches to distance learning: synchronous (occurring at the same time) and asynchronous (occurring at separate times). The most common form of synchronous learning is the face-to-face discourse, which involves students learning together in live environments, such as lectures. On the other hand, asynchronous learning allows learners to learn material on their own, at any time, and discuss it together in forums like emails or discussion boards, which provides time for material synthesis [8].

However, although distance learning provides a wider range of possibilities to support education regardless of the mode of delivery chosen, there is still a multitude of barriers that impede its merits. In the time of crisis, and the rupture of face-to-face communication, educators must share course materials with their learners, , several difficulties have arisen such as lack of preparation time, poor or non-existent connection speed especially in rural areas, lack of equipment and digital skills for both learners and educators. On the other hand, most educators do not have a digitized version of their courses. As the work cannot be done from scratch, this has prompted the faculty to look for other more open and sustainable solutions by exploiting all the tools available freely and openly. In this sense, Open Educational Resources (OER) form part of the "open solutions", alongside Free and Open Source Software, Open Access, Open Data, and crowdsourcing platforms.

The term OER dates back to 2002 when it was first introduced in the UNESCO's Forum on the Impact of Open Courseware for Higher Education in Developing Countries [9] to designate "the open provision of educational resources, enabled by information and communication technologies, for consultation, use, and adaptation by a community of users for non-commercial purposes" [9]. It should be noted that the origins of OER initiatives lie in online teaching and learning in the context of higher education with the aim to break down barriers of access and provide educational content with a high level of adaptability and customization. OER are openly licensed educational resources, where the copyright holder can publish the material on the web using a Creative Commons (CC) license which permits other users to retain, reuse, revise, remix, or redistribute (the 5Rs) these resources [10]. OER also contains public domain material, that is, material that is no longer protected by copyright or whose creator has dedicated it to the public domain and relinquishes copyright [11].

While the OER movement has been very effective in promoting access to education, providing quality and ready-to-use teaching materials, it is necessary to move beyond a content-centered

approach to fully utilize the power of OER by shifting the emphasis from resources to practices as shown in figure 1. A widely used definition of OEP, which originated from the OPAL project, was provided by Ehlers [12]: "practices which support the (re)use and production of OER through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning paths". They target the entire OER governance community: policy makers, organizational managers/administrators, education professionals and learners.
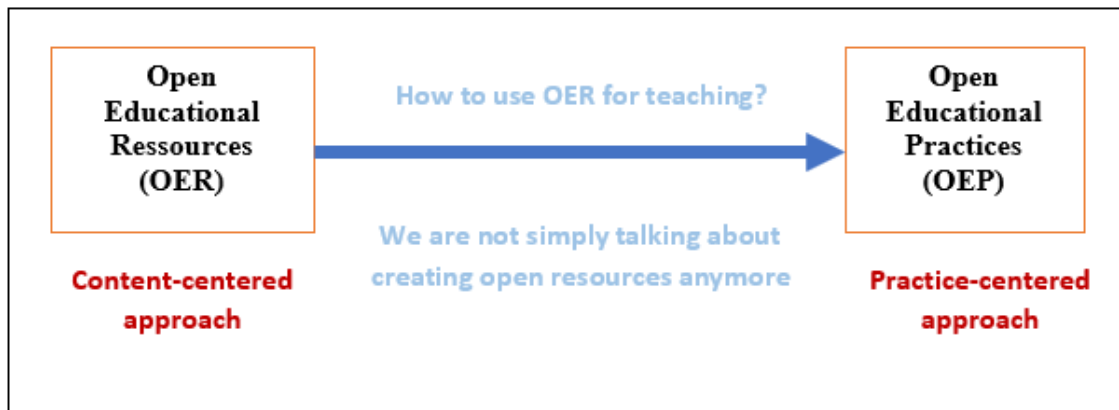
Fig 1: OER vs OEP

Although historically, OEP was born out of the OER concept, it is now a multidimensional concept with indefinite boundaries. OEP is a general term used to bring all the dimensions of openness in educational settings under one umbrella with a focus on the learner.

The necessity of digital transformation, in terms of both infrastructure and processes, has been strongly perceived as a key to ensure more effective delivery of education in crisis times. COVID-19 has also highlighted the need to address digital literacy and bridge the digital divide. In addition, the value of openness in education is recognized and valued, given the lack of awareness of open initiatives in general and particularly OER before the pandemic, especially in developing countries.

Today, in the aftermath of this crisis, the importance of supporting sustainable and resilient infrastructures as well as providing wider accessibility to documentation, research publications, and OER has been highly stressed. As a result, governments around the world have set up various programs to equip, connect, and essentially upgrade the digital skills of educators and learners as part of a strategic shift towards full digital integration. Beyond digital skills, curriculum review, competencies, and teacher training represent key issues that issues that the crisis of COVID-19 has brought to the forefront of governments' concerns.

2.1 Related works

Education is widely recognized as a principal human right. However, it is important to keep in mind that education represents a public good, it is "an enabling right with direct impact on the realization of all other human rights" [13], In this context, education implies much more than cognitive activities and its effects extend beyond education itself [14].

During the containment, the entire educational landscape needed educational resources that could be shared between and within educational networks. In this regard, OER and OEP have been the subject of UNESCO's OER recommendations as powerful and effective tools that can

help to ensure educational continuity while saving time and effort in such a crisis , As stated in UNESCO OER recommendations [15]: "the judicious application of OER, in combination with appropriate pedagogical methodologies, well-designed learning objects, and the diversity of learning activities, can provide a broader range of innovative pedagogical options to engage both educators and learners to become more active participants in educational processes and creators of content as members of diverse and inclusive Knowledge Societies". Apart from the broad support given to these resources, the most important issue is to examine the situation on the ground in order to identify the barriers that hinder the exploitation of the real potential of these resources.

There is no denying that OER emerged as one of the first solutions to facilitate the online education process during the global pandemic, but the importance of readiness and the wealth of infrastructure in countries cannot be ignored. Some universities had already established distance learning infrastructures and were practicing blended learning long before the pandemic. For example, Harvard University continued to use existing distance learning tools that were already in use before the pandemic. The university also set up a platform to collect resources on online best practices, tools, and support for online learning. Other universities in Malaysia and Singapore have also introduced blended learning in recent years, where learners study online as well as in the classrooms. The transition to online learning has thus been smooth during the Covid-19 pandemic thanks to the technological infrastructure. While for other countries, the digital transition has not necessarily been as smooth, especially in Sub-Saharan Africa, where despite the inadequate technological infrastructure; low internet density, and poor access to electricity and cell phones, which are essential for online learning [16], there have been attempts to overcome these regional handicaps with the help of OERS, such as OER Africa, Kwame Nkrumah University of Science and Technology (KNUST) OER, FundaOER, and OpenUCT, the University of Cape Town's (UCT) institutional open access repository.

By Convention, educational resources are copyrighted, which means that the use of these resources requires permission from or payment to the copyright holder. In an emergency situation, such as the COVID-19 crisis, copyrighted learning materials can be one of the major barriers to the dissemination of educational content. [17] investigated in a Turkish context whether the faculty were aware of OER and included them in their course preparation, in addition to intellectual property licenses. They found that only 39% of the respondents were aware of the concept of OER, while the rest were unsure or had never heard about it, pointing out that a majority of them were using OER without knowing the theoretical concept, which means that they were not even at the first stage of knowledge or awareness. In terms of licensing, almost 70% of the participants said they did not know what a copyright license is. In addition, 29% of respondents do not know that copyright licenses must be shared when making their own material available in a non-public space. There are also many misconceptions and hesitations that faculty have when it comes to sharing materials for teaching.

In addition, Van Allen & Katz [18] pointed out that there is a need to develop more repositories to organize, customize, contextualize and disseminate OER. This proves that there is still a lot of work to be done in this area, although the efforts and advocacy for greater openness were widely appreciated.

On the other hand, one of the main issues is undoubtedly the training and upskilling of professionals. The crisis of COVID-19 has revealed wide disparities in technological capabilities, which has been a challenge for the teaching staff. The differences in the skills and competencies (or often lack of them) of educators, trainers and support staff in using existing materials or appropriating new approaches, have certainly been a contributing factors in the degradation of the quality of the teaching-learning process and the decrease of the learning outcomes [13].

2.2 Case of OER in MOROCCO

In Morocco, the first formal introduction of information and communication technologies (ICT) in the education process dates back to 1999 with National Education and Training Charter [19], Article 10 of the Charter focuses primarily on the integration of ICT in education. Subsequently, the Moroccan government has adopted a strategy to make ICT widely used in all public institutions with the aim of improving the quality of education through the Generalization of Information and Communication Technologies in Education (GENIE) program, launched in 2005, which is a long-term initiative developed and implemented by the Moroccan Ministry of Education, Science, and Sport (MENPS). It aims to integrate ICT to improve access and quality of education by defining key elements of a national policy, namely infrastructure, teacher training, development of digital resources and transformation of teaching and learning practices.

Morocco's orientation towards digitization and the introduction of new technologies into the education system has subsequently gained momentum with the launch of several initiatives [20], but at the institutional level, the term OER was only officially introduced in Morocco after the OpenMed project (www.openmedproject.eu), the latter represents a turning point in the Moroccan educational system, providing a solid ground for strengthening the notions of openness, OER and OEP, which was concretized in the "OER Morocco Declaration" [21], [22] at the Open Educational Resources Strategy Forum organized by Cadi Ayyad University in collaboration with the University Ibn Zohr within the framework of the OpenMed project. This declaration was guided by two considerations. First, open education has the potential to expand access to education, knowledge transfer, social inclusion and the creation of a culture of collaboration and sharing. Second, there is a sound economic argument for open education: producing publicly funded educational resources under open licenses represents a return on investment for public spending [21]. This declaration outlines Morocco's vision for open education, which is based on seven pillars considered as the cornerstones of open education namely content, access, technology, research data, licensing, and policy. The declaration also offers several recommendations about combining initiatives and developing strategic framework and guidance to foster the culture change required to integrate open education into all educational levels[23].

2.3 Some initiatives undertaken during Covid-19 in Morocco

Morocco's case was no exception, as the containment paralyzed virtually all sectors. As of March 16, 2020, the MNEPS announced the closure of all its establishments ranging from universities and vocational training institutions to private and public schools [24]. The main challenge was to decide how to continue teaching and learning while ensuring the safety of faculty, staff, and learners during a rapidly evolving unprecedented public health emergency. As the shift to digital was the only possible way to ensure the continuity of learning. The Ministry has intensified its efforts to make distance learning accessible to all learners by putting in place various resources and distance learning modalities.

UCA University, for example, including 14 faculties and institutions of higher education, have combined their efforts to ensure that learning never stops. Within two and a half months, a variety of educational resources were made available to learners; including different formats of lectures, exercises, interactive classes, tutorials and others, through several delivery channels, taking into account both synchronous and asynchronous learning modes:

- LMS Platforms : UCA as is the case with Moroccan universities, has adopted a digital strategy several years ago, the university's institutions have accumulated a rich database of educational resources; In 2013, UCA professors conceived the UC@MOOC platform in
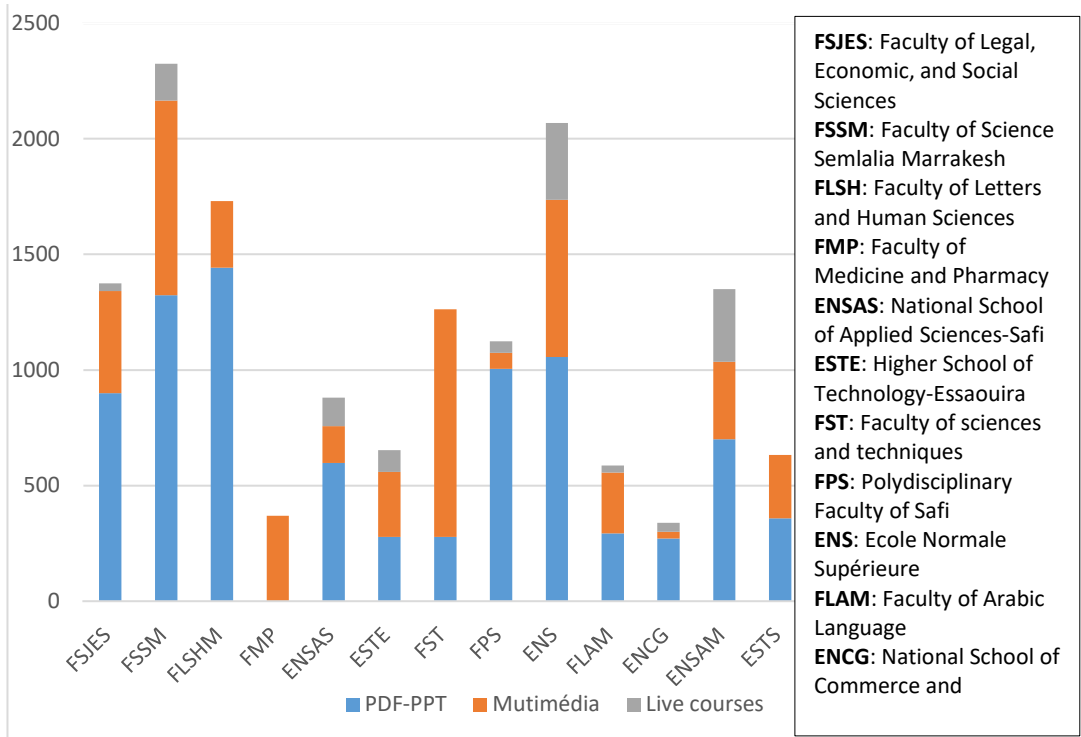
order to provide learners with high quality resources, adapted to the Moroccan context with an emphasis on accompanying learners and thus minimizing the effects of massification. The main contents of UC@MOOC are mainly podcasts, tutorials and videos accompanied by exercises [23,25,26]. During the time of crisis this platform has been a major contributor in saving the academic year. On the other hand, UCA has set up an innovative platform (UCA DIGITAL CAMPUS), gathering the content of its 14 institutions, enabling more than 95,000 students enrolled for the 2019-2020 year to follow their courses remotely. For each of the 14 institutions, learners are provided with a login and an access code as well as a detailed users' guide that allows them to search for the pedagogical activities and courses by modules and subjects. For their part, educators have access to reading, creating and editing content, and also to technical assistance if needed. Furthermore, the Ministry, in collaboration with the National Agency for Telecommunications Regulation (ANRT) [27] and local mobile telecommunications network operators, has succeeded in making outgoing and incoming traffic to the platforms implemented for distance learning at no cost, allowing learners to access digital resources, join discussion, and take quizzes and tests without any impact on their data volumes.

- Live Streaming Courses : The university has also adopted another means of distance education, support and follow-up by using the new synchronous and online platforms. The synchronous approach means that the learning process takes place in real time, requiring the engagement of the instructor and students at the same time, but who may be in different locations. For areas with stable, high-speed Internet connectivity, it is recommended that distance learning be conducted using synchronous support tools such as Google Meet, ZOOM or Cisco Webex. Such an approach fosters positive relationships between the instructor and learner, as learners feel connected to their peers and instructors [28]. Additionally, it allows learners to get instant feedback from the instructor and their peers [29].

- National TV Channel : In order to reach more learners, especially those in rural areas where internet speed and mobile network coverage are very low or non-existent, the Ministry in collaboration with UCA has begun filming lessons and developing educational content targeting several disciplines, and broadcasting them on national television channels to ensure equitable access for all. For example, the lessons broadcast by the Tamazight and Al Ayoun television channels target primary and secondary high school learners, while Arryadia's programs are deliberately aimed at university learners [30].

- Social Networks : In times of crisis, we cannot deny the crucial role played by social networks, they are classified as informal learning networks, Following the definition of Richter and colleagues [31], we define informal learning networks as "not following a specified curriculum and [...] not [being] restricted to certain environments". The transformative potential of informal learning networks appears to be particularly present "in difficult contexts and vulnerable circumstances" [32]. The rise of social networks has led to a multitude of online communication spaces, in the time of crisis they have provided a powerful tool for teaching-learning, educators and learners can widely access to courses, and disseminate a variety of learning materials. They can also form a small work groups using social networks such as Facebook or WhatsApp. They represent great spaces social opportunities [33].

3   Results

During the first months of the COVID-19 crisis, the 14 faculties belonging to UCA have consolidated their efforts to provide a wide range of educational resources to ensure pedagogical continuity, this process has been facilitated through the existing resources before the crisis, which have been revised, adapted, organized under the different platforms, and shared through various means of delivery that were put in place (synchronous and asynchronous).

FSJES: Faculty of Legal, Economic, and Social Sciences
FSSM: Faculty of Science Semlalia Marrakesh
FLSH: Faculty of Letters and Human Sciences
FMP: Faculty of Medicine and Pharmacy
ENSAS: National School of Applied Sciences-Safi
ESTE: Higher School of Technology-Essaouira
FST: Faculty of sciences and techniques
FPS: Polydisciplinary Faculty of Safi
ENS: Ecole Normale Supérieure
FLAM: Faculty of Arabic Language
ENCG: National School of Commerce and

Fig 2: Total online resources classified
by faculty and by category

By the end of the 2019/2020 academic year, UCA has accumulated over 15852 educational resources covering all of UCA's academic curricula with approximately 70% of resources developed since the beginning of the pandemic, providing learners with a wide selection of educational resources tailored to meet their needs [34]. Figure 2 shows the number of materials produced by each faculty divided into 3 categories: the first one is the resources in PDF-PPT format, which is the most used in all faculties with a total of 8504 materials forming a percentage of 61% of the total number of resources for all faculties. The second is the multimedia format; including audios, videos and capsules designed for broadcasting in TV channels, with a total of 5014 resources representing a total percentage of 39%. The third category is live courses, delivered through remote conferencing platforms in synchronous mode (ZOOM, Google Meet, Webex...). Statistics have shown that this category of resources is the most underused in all faculties with a total percentage of 7% considering the connectivity problems that mostly occur for learners especially those living in rural areas.

The results in figure 2 also highlight a very important aspect of resource production. According to previous findings, institutions teaching scientific and technical subjects place more importance
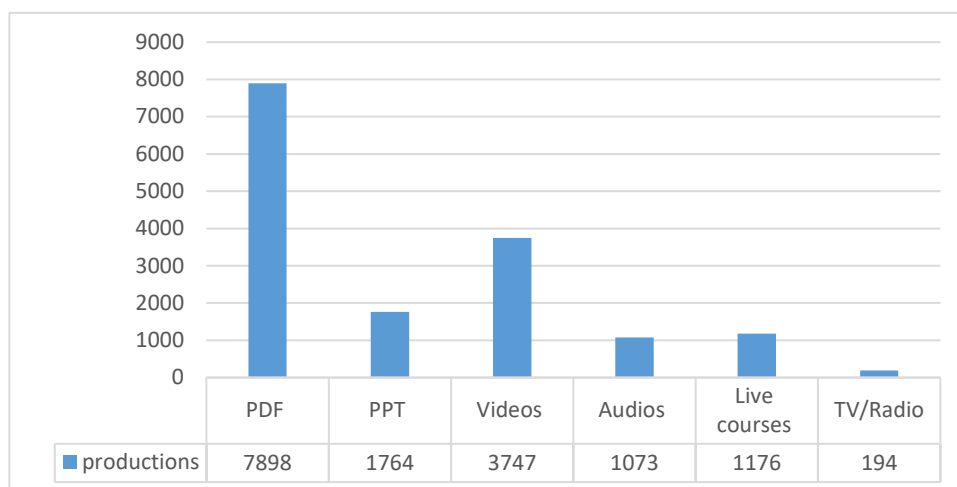
Fig 3: Online educational resources produced
by type and format

on digital resources than those teaching arts, architecture, and philosophy. The case in Morocco is not an exception. The Faculty of Science Semlalia (FSSM), being a leader in terms of resource production, infrastructure, and training on OER and OEP in Morocco, is ranked first, since the work of production and implementation of resources in several platforms dates back several years ago, considering that the faculty has an equipped studio and a staff experienced in producing educational content. Secondly, the Ecole Normale Supérieure (ENS) which specializes in pedagogy and teaching professions, given the interest of these resources as part of the training modules. Then we find the Faculty of Letters and Human Sciences (FLSHM) and the Faculty of Legal, Economic, and Social Sciences (FSJES) which have also provided a significant number of resources as they are open-access institutions and have the largest number of learners and training. The remaining faculties are engineering and technology institutions with limited access in terms of training and learners, which justifies the number of resources produced, with the exception of the Faculty of Medicine and Pharmacy (FMP), which adopted multimedia format only, a choice that can be justified by the nature of the disciplines taught. Looking at the nature of the resources used in all faculties as shown in figure 3, we can notice that the most common format is the text, as it is the easiest to produce and disseminate, followed by the multimedia format which has been supported in time of crisis by social networks especially WhatsApp; learners and educators exchanged audios and videos of lessons and explanations and also, in order to organize and follow up on the work carried out by the learners, either individually or in groups, and then live courses in synchronous mode, which is the least used given the technical problems that arise in the distance sessions on the one hand, and on the other hand learners and instructors sometimes lack the digital skills as they are not familiar with these tools.

In terms of efficiency and accessibility, videos occupy the first place as the most popular resource, since the majority of the courses filmed by universities, videos produced individually by educators, or even the recordings of the courses broadcasted synchronously or in social networks, have been grouped together in Youtube channels alongside courses broadcasted on national TV channels, making them the most accessible resources. In the second place, there are the resources available on the LMS platforms, which are therefore more "closed" since they are reserved for the university learners and are protected by a login and password. These platforms

contain a multitude of resources according to the particularity of the disciplines mainly lecture notes and practical works in PDF and PPT format. Then the audios and the live courses which are the least popular since they are reserved for the learners of the university or sometimes individually.

The response of UCA to the crisis of COVID-19, as an example of higher education institutions in Morocco, starting from the production of educational resources, their organization and implementation in the different platforms, until they reach the learner, was the result of a tremendous effort of all the actors of the teaching-learning process. to achieve this, the university has put in place, in terms of infrastructure, new studios to record courses, strengthen the internet network, in parallel with the organization of trainings for the teaching staff by offering them technical support to upgrade their digital skills [34], so that they can produce their courses and disseminate them through all possible means to reach out to the largest possible audience of learners.

However, by examining these resources with an OER lens, we can clearly see that they converge with this notion by being shareable and reusable resources but the fact that they are not licensed questions the right to benefit from the 5Rs, also, some of these resources may be stored in places that are only accessible to a restricted group of learners/educators, which freezes them into just digital resources.

4   Discussion

The COVID-19 pandemic has generated a great deal of uncertainty about the future of education worldwide. From the most developed countries to developing ones, the process of remediation to this critical situation has encountered several difficulties. In such situation, the search for certain and sustainable solutions has become a necessity.

There is no doubt that OER offers many benefits to educators and learners. This is more than merely static material, as the real value of OER resides in how they are incorporated into the curriculum to fuel a pedagogy more tightly aligned with the learners' needs in order to better address the ever-increasing learning demands in the wake of COVID-19. OER could therefore have the potential to change the teaching learning process in all educational sectors by providing access to a variety of resources, information and practices which converges with the goals of Sustainable Development [35]. Educators can reproduce and own a copy of OER (retain), use OER in personalized manners (reuse), adapt and modify OER (revise), merge two or more existing OER tailored to individualized needs (remix), and disseminate OER for their own instructional purposes (redistribute) at no cost [36,37]. However, research has shown that OER is still in the early stages of adoption and that wider acceptance requires improving recognition of OER repositories, ensuring the quality of content, as well as the development of collaborative communities [38]. On the other hand, the lack of knowledge about OER and copyright mechanisms plays a major role in limiting OER use as it is the case for the initiatives led by the UCA; the absence of an open license that manages the use of these educational resources has deprived them of the 'open' character and therefore their exploitation is not premised. By examining the nature of these initiatives and the challenging crisis framework in which they are developed, no one can deny the efforts deplored either at the faculty level or at the government level which has collaborated, facilitated and participated in all phases of the implementation of these initiatives, but the lack of awareness of the potential residing in these resources has frozen them in the status of 'educational resources'.

In addition to being cost-effective, OER can become a tool for achieving the Sustainable Development Goals (SDGs), given the challenges of accessing learning resources and the opportunities that OER offers to address these challenges and provide new ways for learning, especially in times of crisis. on the other hand, support for SDG 4 is associated with the call for the development of sustainability models for OER at the institutional, regional and national levels, as well as the the implementation and management of new sustainable teaching and learning alternatives. Furthermore, the pedagogical benefits of OER can also be seen in the concepts of open pedagogy and OEP, which have evolved in the debate on the pedagogical implications of OER. The adoption of such practice-centered approaches will promote student and teacher collaboration for greater learning outcomes. This means that researchers and educators should evolve from simply producing and disseminating OER to creating innovative educational practices that can be applied using OER [39].

In fact, the main challenge that hinders the effective use of the potential of OER in Morocco, and in developing countries in general, is not the reach of these resources, but the difficulty lies in overcoming these three main perceived barriers to using them, which appear to be (1) lack of equal access to the internet by educators and learners, due to problems related to network coverage, especially for learners located in rural areas, or sometimes lack of equipment; (2) lack of the digital skills of educators to implement the online education programs; and (3) a consequent lack of awareness of OER and OEP [40], [41].

Considering the case of UCA, the different faculties belonging to the university have deployed colossal efforts to properly manage the time of crisis, by employing multiple means, synchronous and asynchronous, which resulted in the provision of a wide range of educational resources in a record time so as to cover the need for resources in all subjects and branches. On the other hand, in order to measure the effectiveness as well as the perceptions of learners and stakeholders on the measures implemented during the crisis, online surveys were distributed in parallel with the analysis of preliminary results obtained on all LMS online platforms (UC@MOOC and E-Campus) throughout this period, the results showed that 20% of the learners were not able to access their courses on the platforms, and 70% of them didn't have access to the synchronous interactive courses, mainly because they lacked adequate computer equipment and Internet connection, particularly in rural areas where the connection speed is very low [34].

The COVID-19 crisis has demonstrated how the combination of technology and pedagogy can unlock learning opportunities and offer real alternatives for quality education access. The effective management of such a critical period in the history of education would likely not be possible without such a combination. This crisis has also revealed the great potential of the teaching body and their flexible character. Today, after this crisis, the objective is to keep these achievements and plan a roadmap to strengthen them through continuous training and innovative policies oriented towards openness.

In fact, although OER are not a panacea for all educational problems, they have proven their resilience in such critical times. For developing countries, the full, long-term integration of OER into teaching and learning in academic programs involves an increased focus on quality and learning outcomes. In the wake of the Covid-19 pandemic, more work needs to be done in the following areas:

- Individuals: Educators play a pivotal role in the provision of inclusive and equitable quality education. They are expected to have the knowledge, competencies, and ethics necessary to provide online education. The crisis has highlighted the importance of reimagining pedagogy in the digital age, considering that "good teaching can overcome bad technology, but technology will never save bad teaching" [42]. The urgent need now is to

equip, connect, and fundamentally upskill educators and learners as part of a strategic shift toward full digital integration. This objective can only be reached by raising the awareness of the teaching staff on OER, by organizing continuous training in order to better exploit the possibilities offered by 5Rs and open licenses.

- Organizations: In higher education, which has the specificity of offering academic freedom, the methods and practices of teaching and learning are very diversified. Therefore, institutions were and still are responsible for developing and implementing their particular pedagogical methods, infrastructure, materials and strategies that may vary within institutions, depending on the curriculum, the educators or sometimes the needs of the learners [40]. To do so, the starting point should be by developing internet services with broad coverage and high speed, enriching the university's data center with relevant OER repositories, and adapting the teaching approaches to the future digital universities, based on updated strategies of learning.

- Institutional: The lack of infrastructure and experience in distance education has challenged formal education in most countries worldwide. Policy makers and institutions are called to improve policies and regulations for the successful adoption of online education, build a solid framework for integrating the adoption of OER in the teaching learning process, and support teachers and learners with instant and continuous training on learning policies, optimal use of e-learning technologies, tools, and various applications, as well as strengthen the collaboration between government, universities, families and society.

5   Conclusion

While the year 2020 will be marked as a turning point in the history, it will also be recorded as a pivotal moment in the evolution of education, as it revealed the enormous potential of the notions of openness, OER and OEP, this potential which may not have been valued in the same manner outside of this crisis.

A significant part of this pandemic is how it has stimulated strong and creative new forms of collaborating both locally and globally. This is certainly reinforced by the development of open access publications and open data sharing, together with open professional networks and communities, as well as social networks. The pandemic has strongly illustrated the interconnected and interrelated character of the world. This is essentially supported by open approaches that also rely on the concept of common concern to encourage sharing and collaborating guided by the conviction that education is a common public good. It is fair to say that the impact of the pandemic would have been stronger and longer without open approaches. The current challenge in the aftermath of the crisis is how to build on this experience, by pressuring publishers and editors to maintain their engagement to open access, by calling on policymakers, institutions, and educators to expand and share their OER repositories. As Bozkurt & Sharma stated, "now is the time to ask what is past, what is present, and what is next", to transform this critical situation into an opportunity for a real rebirth of education [36]. By examining the intersections of the physical and digital spheres in education, times of crisis challenges us to develop essential skills that can enable us to be responsive and resilient in an uncertain future.

There is no doubt that technology has made a valuable contribution to education, there is always a need for technology when it comes to education. However, technology can have

desirable effects on education only if it is used in the right time, for the right purpose, by the right means and by the right people.

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