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Review

Challenges and Opportunities for Education Systems with the Current Movement toward Digitalization at the Time of COVID-19

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Abstract: The spread of coronavirus has caused the shutdown of businesses and classroom participation to enable social distancing. It has led to the promotion of digitalization in societies and online activities. This manuscript presents an overview of the measures education systems could take to present appropriate courses in accordance with the present movement toward digitalization, and other requirements of societies in the (post) crisis period.

Keywords: COVID-19; digitalization; education system; innovation

MSC: 97B10

1. Introduction

The COVID-19 pandemic emerged initially in the city of Wuhan in China and then spread to other major cities in different countries [1]. Since the contagion rate initially was high and there was no known vaccine at the beginning of the pandemic, governments imposed various restrictions to reduce the risk of infection and strongly urged citizens to uphold social distancing. Consequently, much administrative work was achieved remotely, and meetings were recommended to take place online. Since then, the restrictions have been lowered.

Researchers believe that although the COVID-19 crisis can be compared to other crises in the history of humanity [1–4], many differences make the COVID-19 crisis unique. Firstly, World War I (1914), the Spanish Flu (1918), and World War II (1939) affected directly only some parts of the world; however, the impact of COVID-19 is global and has affected almost all the regions in the world. On the other hand, although the Financial Crisis (2008) and Terror Attacks in the USA (2001) had an impact on businesses globally, the level of impact has been different for citizens of different ages. Currently, social distancing and using masks are recommended for citizens of differing ages, from kindergarteners to the elderly [2,3]. Moreover, most of the crises mentioned have been the result of a big event (e.g., the collapse of a number of financial institutions including Lehman Brothers, or the Terror Attacks on 9/11). However, the COVID-19 crisis is the consequence of a rise in the number of infections that are repeated in second or third waves. Unfortunately, we are now witnessing new waves of coronavirus and its impacts in different countries, e.g., Spain [4,5], Germany [6,7], Australia [8], Italy [9,10], Japan [2], Singapore [11], Malaysia [12], India [13], South Africa [14], Norway [15], Sweden [16], Pakistan [17], and The Philippines [18], to name a few. No-one knows where the pandemic will lead us and when the pandemic and the consequent crisis will finish in the world. Although vaccines have been provided to many populations, there are still many open questions regarding vaccination at the global level. At the time of redaction of the manuscript (28 September 2022) only 68 percent of the population worldwide has been fully vaccinated [19].

The strategy that many governments recommend is to follow the regulations and uphold social distancing to avoid the risk of person-to-person infection (which mostly

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takes place from encounters in close proximity) [20,21]. Therefore, digital-based meetings offer the best preventative solution until governments relax restrictions or the appropriate vaccine is distributed globally. However, the recommendation of scientists and governments to continue the current practice of virtual meetings and remote working should be considered [22–26]. The benefits gained by employers range from lower monthly bills for electricity and other operational costs, up to their freedom in firing some employees, without the fear of the legal consequences [24,27,28].

The recent practice of remote working has also impacted universities and educational organizations. Hence, classes have been shifted toward virtual meetings, remote instructions, and distant mentoring [15,20,29–34]. Therefore, on the one hand, while faculty members and teachers needed to put into place a new scheme of distance teaching and mentoring [35–39], on the other hand, the students were also required to adopt the skills of using new technologies in order to learn the contents of their courses, relying on Moodle [40–42] and other digital devices [17,27,43–46], alongside the difficulties in dislocation from their classmates that semester [2,27,47].

The overall impact of the COVID-19 crisis for educational centers is estimated to include the loss of internship, clinical and laboratory practices that downgrades education quality [22,30–32,48–51], mental difficulties and stress [45,52,53], difficulty in promoting digital skills [5,14,26,35,36,54–56] and the extension of visas for international students. These have all resulted in loss of revenue for the private institutes [27,57–59]. Some issues at the administration level are still unclear, e.g., the selection procedure for entrance to the universities and the mismatch of the skills of graduates and the market which would create different risks and opportunities and make the financial stability of the universities more uncertain in the future [5,11,26,49].

Some researchers have indicated the marginal outperformance of the online learning process for students and proposed that blended learning methods are more fruitful and satisfactory [2,60–64]; such results are useful when online learning is a choice for the teacher [7,65–69] and the students have access to digital devices. What we are witnessing is that the move to online practice has put the education of 2/3 of students at risk globally [70,71], due to their restricted access to the internet and digital inequalities [2,3,17,72], or that graduate students suffer from the risk of losing their visas to stay in the developed countries where they have chosen to study and immigrate for greater employment opportunities [11,27]. Hence, the success of students in online classes and the mental health of the current students in the aftermath of COVID-19 might be questioned [3,70,72–77]. On the other hand, the parallel risk of unemployment has put the mental health of the employees of the universities at risk [5,15,61,78–80].

Due to the transformation in class participation during 2019–2020 with the spread of the pandemic, students needed to adjust to the imposed restrictions [64–66,81,82] in a short time. Likewise, long-term planning by universities was required urgently to restrict further loss in the middle of the crisis [83–86]. However, the administration and faculty members also are part of the society impacted by the risk of contagion and not separated from the core crisis. In the case of private universities, the risk of closure of the center and unemployment of staff will intensify the urgency for appropriate remedies [66,67,87,88] to maintain revenue generation [6,9,35,59,89,90].

In the current circumstances, as businesses have decided to prioritize remote working plans for their employees, universities have started to take the opportunity to devise appropriate curricula for the preparation of students for the job market through embedding the required digitalization and internet-based working skills [23,27,57,58,88,91,92].

Therefore, the present manuscript aims to study the impact of the coronavirus crisis on education systems, and the leading role digitalization can play in multidisciplinary education by universities. The immediate impact of the coronavirus crisis has been the higher attention given to software programming, AI development, automation, online marketing-related skills, biomedical, digitalization skills, and smart devices in educational systems [31,35]. Reports [35] demonstrate that, for instance in the UK in 2018, about

4.5 percent of the total jobs were in the digital sector, its highest level since 2011, and within this 49.7 percent were in "Computer programming, consultancy and related activities".

The strategies of different countries have been differed, ranging from the "Kursbuch" provision in Germany as Digitalstrategie der Bundesregierung to the strategies proposed by Department for Education of the UK for education providers and the technology industry [35,36], however, this paper will not focus on the detailed description of a particular country in the digitalization plan for education. Yet, it will provide a review of the digitalization of the education systems at the time of the pandemic and tries to summarize the dominant spirit in the digitalization process of the education systems and industries in the world due to the impact of the coronavirus crisis, which will apply to a great number of schools and institutes. Hence, the interested reader wishing to understand the digitalization plan of every particular country should refer to the related cited references.

The research method utilized in the paper is that we first review the literature on the impact of the pandemic crisis on education programs, and then focus on the subject from the viewpoint of operational policy at the centers—as a choice of the administration for revenue generation and attraction of new students, and also from the viewpoint of industry demands. Both of the above factors imply a transformation in learning schemes and demand for a higher level of IT-based connections to continue the provision of education, which results in financial burdens. Given the pressures of the demands for stronger IT infrastructures, the demand of revenue generation and attraction of new students in the face of travel restrictions, etc. (particularly at the private institutes), reduction in (or pause of) the government's support at the time of the pandemic, the educational centers developed resilience through course (re-)design, AI-based innovation and emphasis on the continuity of education (even at this most difficult time and with the presence of obstacles). We have tried to support the premise of our research with examples of the different fields and explain how digitalization has assisted in the resilience plan. In each case, interested readers are referred to the related publication for deeper study of the proposed strategy. However, we have tried to cite some examples within the limited space of the current paper.

As the spread of the pandemic is impacting different industries and work routines in businesses and the medical care sector [22,30–32,49–51], higher attention is paid to the computer science and digital skills in society, which will impact the career planning of students to pivot in the direction of the post-coronavirus ICT-based society.

Therefore, we will try to present a global overview of the impacts of the pandemic on education systems with a special focus on the digitalization process and the roles it can play to assist job creation for graduated students in small- and medium-sized businesses or prepare them for industry or clinical work. We also will preview how the administrators and executives in different departments and schools can pilot the proper plans to balance the number of interested students for entrance with graduates in all the fields of study, with a direct focus on the current wave of digitalization (i.e., computer science, programming, electrical engineering). Some instances of market-oriented privatization have been reported in [88].

2. The Coronavirus Crisis Makes Changes to Educational Programs

In order to present an overview of the transformations in education systems in the (post) coronavirus crisis (in the next section), initially we study the concerns of the administrative positions of the universities in the coronavirus crisis. The information has been obtained through the survey conducted by Inside Higher Education [93] across presidents and chancellors at key American universities. The survey represents the first study of the concerns in academia after the emergence of the COVID-19 pandemic. The majority of the participants declared that the classes and meetings were transferred online, staff were working remotely, the majority (or all) the buildings were closed, and the international travel of the students, staff, and faculty was suspended [93].

Other researchers have confirmed that in the closure period, the first concern was the mental health of the students, teachers and employees [3,5,15,70,72,75–80]. The men-

working remotely, the majority (or all) the buildings were closed, and the international travel of the students, staff, and faculty was suspended [93].

Other researchers have confirmed that in the closure period, the first concern was the mental health of the students, teachers and employees [6,9,13,70,72,75–80]. The mental health challenges added other kinds of short-term financial crises inside the organization [26,70,88]. The second concern was the decline in student enrollment and the increase in student attrition [6,9,35,89]. The overall result of the study urges planning for the appropriate transformation of educational centers to guarantee the financial survival of the university within the current crisis, plus the promise of useful course planning and management of the educational programs for the mutual benefit of the students, faculty members, other employees and society [2,12,94–96]. In the following, some guidelines for the appropriate transformation within education systems will be presented (Figure 1).

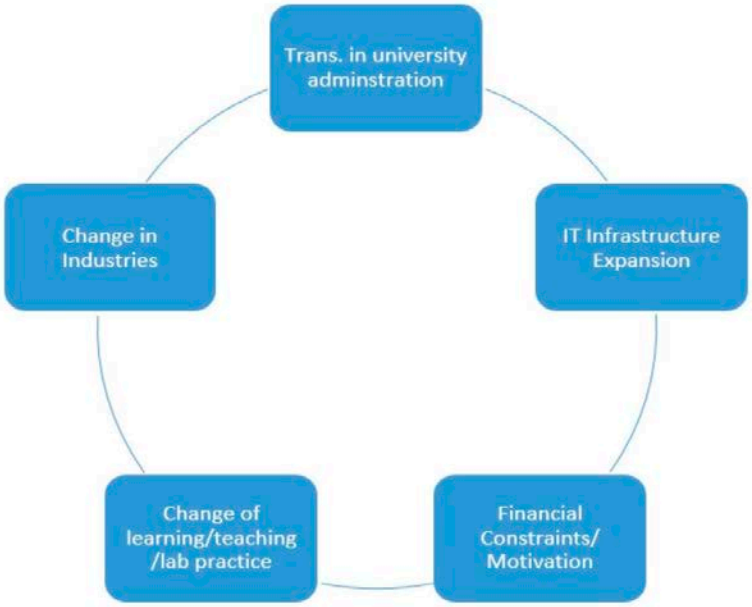

Figure 1. The summary of transformation inside educational programs.

2.1. Transformation of Operational Policy of the Centers

The emergence of the COVID-19 crisis has produced disruption in the common practice of universities. Hence, many of the educational classes, short courses, businesses and industrial practices have been delivered online since the Spring semester of 2019–2020 [15,20,22–26,30–34]. However, there are great concerns over a loss of interest of the students and learners in in-person participation during coming semesters [6,9,35,89], which will cause substantial financial concerns for the presidents and chancellors of universities [26,70,88]. With the emergence of the new practice of online classes, the business model of revenue generation in the universities has evolved toward providing more technology-based solutions to the learners and students as the customers of their services [6,9,28,35,37,39,88–90]. In the new business model, the educational centers would need to invest in the new logic of attracting customers (i.e., the learners) interested in paying, while the governmental relief plans for the crisis period seem uncertain [23,27,58] (The interested reader is referred to [97–99] for further reading on the dominant logic of businesses.) In general, the new logic of business should encompass the following characteristics:

(1) The universities started to focus on value generation for the students and learners through the provision of online courses and agility in course planning. Hence, they modified the old common practice of long-term courses and prioritized short-term courses of digital skill learning [54,57,59,90]. Studies [35] demonstrate that online courses on digital education, especially technology re-skilling and up-skilling for adults, were much in demand in recent years due to learners' lack of time, the competitive labor market, and their caring responsibilities, etc. For instance, in the 2018

Autumn Budget, the Government of the UK announced £100 million of new funding to continue the testing and development of the National Retraining Scheme, to re-skill and up-skill adults.

(2) Differentiate properly the practices of academic teaching and assessment from skill-learning courses for older students and value generation for learners, practitioners, and non-paying audiences. In many cases, value generation for learners is accomplished by certification, to broaden the recruitment potential of higher-age learners [24,100].

(3) The role of the faculty members, mentors, and advisers should be modified for service provision to the whole of society at different ages and of different backgrounds (instead of a focus on academic students) [88]. It has been recommended in [36] (p. 6) that three groups be distinguished: working people, university learners and 15–18s.

(4) Seeking new streams of revenue generation to compensate for the reduction of the number of students from overseas and uncertainties in the financial support of the governments [27,57,59,88,90]. The long-term sustainability plans and the management of the programs suggest the need for longer-term horizon scanning and a "Digital Skills Observatory" to assess and anticipate skills gaps and build up the bases of research, analysis and intelligence according to a mapping of society [36].

(5) The reduction of operational costs (e.g., building rent costs, building maintenance, costs of heating systems, dormitories) [24,27] for the higher profit of the education centers.

The points mentioned above are fairly generic for the management of the departments and their financial survival. However, since the COVID-19 crisis has stimulated a radical transformation in the digitalization of businesses and society as a whole [64,81,82], therefore, it will bring a special focus to the role of online and distance-learning courses of universities in digital skills for leading the digital revolution in the aftermath of the COVID-19 crisis [87,101]. Therefore, we highlight some new values that need more attention for course planning, curriculum design, and revenue generation.

2.1.1. AI-Based Solutions Will Teach More

In the aftermath of COVID-19 and the spread of the new scheme of online classes, many AI-based solutions for teaching and technology-based learning methods have been presented by different universities and private educational centers [31,100,102,103]. Therefore, the students and learners have started to have more access to information and advanced algorithms. They will learn more in broader aspects in comparison to the traditional learning schemes [24,33,68,104]. An example of the case where an AI-based solution is expected to remain in place is the use of a 3D visualization system to supplement more traditional laboratory-based lessons on anatomy and dissection at the University of Wolverhampton [35].

2.1.2. Assessment Will Be the Tool of Value Delivery and Innovation

With the progress in online methods of learning and the higher demand for AI-based skills, assessment practice and the resulting certification will be considered as a main method of value delivery and revenue generation of universities [13,48]. The highest emphasis will be on the digital skills of the students and learners for job-seeking in the post-coronavirus period. The departments can establish different short-term skill-based programs and long-term educational courses in novel fields such as digital psychology, motivational courses for remote employees, and digital management, to name a few [1,2,11,20,22,40,56,104,105]. In particular, in some fields such as medical education new competencies will be expected from the graduates [30,32,48,106,107].

2.1.3. The Importance of Personal Preference

With the expansion of online methods of teaching, students will have more choice in selecting their field of study and the pathway toward their career. Besides, various streams of education will become more available to students, and the same topic will be available to study through different channels, e.g., animation, virtual reality, video, online teaching, and

in-person teaching. Therefore, the learner will have more freedom to follow their personal preference in their learning endeavor [31,32,106]. An example of a case where an AI-based solution is used for enabling personal preference can be found at Bolton College where IBM Watson is employed as a virtual assistant and helps delivering on-demand to requests by students for information, advice and guidance [35].

2.1.4. The Importance of an Ethical Foundation and Customized Learning

With the growing importance of customized learning and the availability of new learning tools, competition between universities will grow to attract students and learners from a wider spectrum of backgrounds and deliver value for revenue generation. Therefore, an ethical foundation and customized learning will be more critical in diversifying study plans and attracting more learners to the offered programs [2,100,104]. An example where an AI-based solution is offering customized learning can be found at the Highfurlong School in Blackpool in the UK, where the assistive technologies are employed for communication with students who need special care [35].

2.1.5. Education as a Service

Studies in the UK, Australia and the USA [36] show those studying computing courses with industrial collaboration—generally under the umbrella of "sandwich courses" (or studying similar courses with the same Code)—will have the lowest level of unemployment and are more likely to earn more [36] (p. 5). With the digitalization of industries and businesses, greater digitalization skills will be required for the citizens to survive in the market [27,57–59,90]. Therefore, the demand for educational programs in the digital fields and related skills will increase. In light of that, computing departments will promote their activities for the delivery of higher service to society and expand their value chain [26,38,48]. The domain of an educational program at computing departments can vary from digitalization of entertainment and communication, where "algorithms" are influencing search engines and news broadcasting channels through to health and social care and innovation in public services [35,36] (p. 1). It is worth mentioning that the Institute of Coding is one of the UK Government's responses to the "digital skills challenge" as it aims to bring together a consortium of research- and teaching-focused universities, large corporations, small- and medium-sized enterprises (SMEs), established industry groups, experts in the delivery of distance/non-traditional learning and professional bodies [36].

2.2. Transformation of the Industries

With the current high level of attention on social distancing, the application of industrial automation, AI solutions, data analysis, and risk optimization in many processes will grow in the future. Therefore, a partnership of electrical engineering and computing departments will establish the foundation for offering novel AI-based skills in various fields of science, technology and medical care [30,31,48,49]. The contents of such new courses will be in accordance with the demands of the industries and the digitalization process of businesses in the various fields of the coming future and with the consideration of the superiority of the face-to-face classes compared to the distance learning, especially in skills-based fields of studies or medical care [22,32,50,51].

2.2.1. Widespread Remote Working Practices

At the beginning of the COVID-19 crisis, when businesses started sending employees home for remote working, they had concerns about the efficiency of the work processes. However, after a short while, reports declared the same level of efficiency of the employees working from home, or even higher productivity [108]. Although initial studies have shown it was the fear of losing their jobs that provoked employees to sustain the level of efficiency, and concerns of balancing their private life and work are still present, many firms have announced their intention of keeping employees at home even after the lessening of the coronavirus crisis [24,27]. Given this prospective work environment, universities

should plan properly to prepare their students for the dominant scheme of telework, distant collaboration, and team working, besides their remote employee management schemes [2,4,18,23,26,51,76,93,106].

2.2.2. New Schemes of Process Optimization and Integration

The higher level of digitalization of industries will ensure a higher level of integration of work processes. Therefore, the gaps and weak points will be resolved, and there will not be a single point of weakness for possible failure [11,51,100]. The higher level of process integration will require higher technical skills in either machine-to-machine interaction or in the interpersonal skills of engineers and managers for their business relationships with distant coworkers and partners [5,12,68].

2.2.3. Funding Resources Move to the New Fields

The COVID-19 crisis will stimulate new demands on the engineer's skills and technical innovation [8,20,52,55,77,104,109]. Therefore, it opens up new fields of research and will lead to the emergence of new spinoffs, start-ups, and app development [31,48]. Recent studies have been carried out to find out why different groups of people choose (or not) to learn, work or train in the digital skills [36] (p. 6). It is expected that new pipelines of revenue generation, with tailored and inclusive curricula, will be developed according to the gender, ethnicity and diversity of the students and learners. Participation of the government in such plans will impact positively on the development of the digital economy [36].

2.3. Transformation in Learning Schemes

The emergence of COVID-19 saw confusion among the students, administrators, and faculties in the Spring semester of 2019–2020. The starting date, quality, and conditions of the future academic semester are still uncertain in many countries, and many questions are unsolved [3,36]. Universities and their departments need to study the value chain and answer the new open equations related to value generation to find the best practices for the coming semesters and the longer-term future [11]. However, it is clear that the transformation is not just about the course plan of the current semester, yet, the educational program of the consequent semesters of the future years will go through a digital transformation, as well. Some features of the transformation will be as follows.

2.4. Education Is Going Online Globally

The coronavirus crisis has caused uncertainties and difficulties in travel and immigration. Not only would parents prefer to have their children study close to their home given the risk of infection by the coronavirus, but some countries have also started new policies for granting student visas [81,84,87]. The private universities have advanced further in the internationalization of activities and they offer online programs for students abroad [11,57]. Therefore, this can be an excellent opportunity for universities to commence global virtual educational programs and increase the admission of students, to off-set to the reduction of their tuition fees for virtual educational programs [1,11,14,22,48].

2.5. More Attention to Mental Health of Learners and Alumni

With the expansion of telework schemes, the opportunities for networking and socialization of the current members of education programs and research groups are limited. Therefore, there should be appropriate programs in place to promote socialization and networking between colleagues [5,15,77–80]. Also, the universities should dedicate more attention to the teamwork spirit of the faculty members and colleagues [3,70,72,75,76].

2.6. Innovative Methods of Mentoring and Planning

The application of different AI-based methods and digitalization plans have been considered for the automation of work processes and upholding of social distancing [2,30,32,40,48,106,107]. It will be necessary to focus on the application of AI

methods for career planning and consulting with students and fostering their decision-making. The application of the improved methods of offering distant personalized guidance will be able to replace the lack of real social experience and the "skill mismatch problem" [1,20,22,36,104]. The skill mismatch problem in the UK may be summarized as "students aren't industry ready" [36]. A higher level of innovative methods of mentoring will equip students for a career rather than a specific job [11,56,105]. Also, it is expected that some fields of study and research such as AI-based psychology will appear in the future [22,104,105].

3. The Demand for Higher IT-Based Connections

The expansion of the IT-based services of the universities, on the one hand, requires promoting the IT infrastructures of the universities. On the other hand, it will facilitate the reach of online courses to a broader spectrum of participants. Normally, the expansion of IT connections is not highly cumbersome. However, it requires a dedication of time and cost for the infrastructures to be updated and personnel trained.

4. How to Overcome the Financial Constraints?

The cost of the IT-based educational program updates in universities may be recovered by the possibility of a higher number of participants accessing the required digital skills courses [6,9,35,59,89,90], according to the economy of scale. Additionally, the savings made by reductions in the costs of building maintenance, parking lots, etc. will lead to greater financial stability [24,27]. The agility of the decision makers for commercialization of the activities will assist highly in new revenue generation and leadership in the global competition for the survival in the (post) period of crisis [23,27,57,58,88,93].

5. An Overview of the Road Map

In this manuscript, it has been discussed that the COVID-19 crisis and the demand for upholding social distancing have started to transform social life and work in our societies, and calls for online methods of socialization and remote working. Alongside this, the teaching and learning practices of universities are becoming largely virtual and online. Therefore, educational programs will face new challenges and opportunities in the digitalization and smart working of society (summarized in Figure 2).

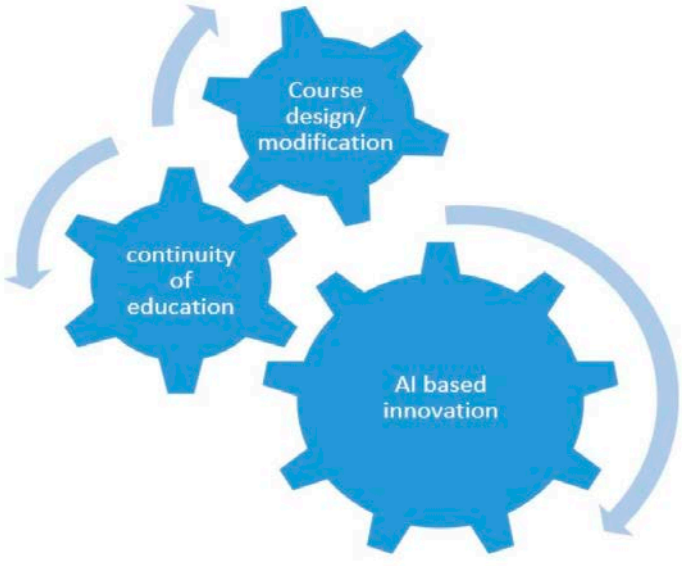

Figure 2. Road map of academia to face the challenges and create opportunities.

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The first and principal concern that the departments should pay attention to is the commitment to the continuity of education for the students and learners [2,22,27,32,93,95,96]. This is important to avoid the limitation of face-to-face class participation and to create value and opportunities [4,15,34,68,83,89,110,111,112]. Yet, this is an opportunity to create value and strengthen the mutual and bilateral relationships between universities and educational centers with the distant students and learners—for the establishment of a robust ecosystem of education and value chain optimization enabling the delivery of educational service and well-being to all [27,39,58,59,90].

This method of thinking will help the decision-makers devise new schemes for long-term planning of capacity building in a younger generation facing many challenges [113–119]. Special attention should be paid to the "skill mismatch" problem and national priorities (e.g., data science and cybersecurity [36] (p. 5)) The coronavirus crisis can be used as

is important to avoid the limitation of face-to-face class participation as an excuse for the lack of access of the students and learners to learning opportunities [4,15,34,68,83,89,110–112]. Yet, this is an opportunity to create value and strengthen the mutual and bilateral relationships between universities and educational centers with the distant students and learners—for the establishment of a robust ecosystem of education and value chain optimization enabling the delivery of educational service and well-being to all [27,39,58,59,90].

This method of thinking will help the decision-makers devise new schemes for long-term planning of capacity building in a younger generation facing many challenges [113–119]. Special attention should be paid to the "skill mismatch" problem and national priorities (e.g., data science and cybersecurity [36] (p. 5)) The coronavirus crisis can be used as the driver for bringing equality in digital access to education for all. Hence, the development plans in many countries such as the UK [36] (p. 6) aim to give factors such as gender, diversity and ethnicity special consideration. Besides, they can bring valuable experience and benefit society in the ending the current crisis and also other possible crises in the future [117–119].

The second challenge is the endeavor for proper course design and modification of the curriculum to deliver coherent capacities and skills to students and learners given the requirements of the upcoming digitalized industries and practices [24,42,104,111]. It is believed that during the eight weeks of the COVID-19 crisis emergence, the world advanced in technology adoption at a rate that previously took years. Therefore, universities should focus with the same level of intensity on implementing the digital methodologies and skills toward the development of a digital context in educational programs and enabling access to the required tools and simulators for the advancement of online classes and virtual laboratories [26,30,31,36,112].

The effectiveness of digital tools and simulators should be studied in parallel to the lack of internship opportunities (at the industries or medical practices) during the coronavirus crisis and the limited access to laboratories [22,50,51]. Studies demonstrate that the professional development of medical educators through the digital methods impacts the collaborative spirit at the work place, and communication and interaction with the patients, which are considered to be threats to distant medical education [51].

Such great movements parallel the call for a higher level of AI-based innovation to enable the practitioners, instructors, faculties, students, and learners to engage with a digitalized engineering experience. We are witnessing the assistance of AI-based algorithms and digital methods in pedagogical tasks, which might lead to the dependence of human technicians on robots and smart devices in many industrial fields and practices. It is estimated that, in the near future, and with the huge movement toward digitalization in the aftermath of the coronavirus pandemic, AI-based algorithms will dominate the role of professors in many educational programs, and human technicians will be replaced by robots and smart devices in many fields [1,37]. However, there are still debates whether the educational task regarding the key foundation topics and threshold concepts can be achieved without in-person interactions [4].

6. Conclusions

The emergence of COVID-19 has changed social life and industrial processes at a global level. Scientists have recommended the upholding of social distancing, which provoked higher applications of artificial intelligence, automation, and machine learning in our societies. Since the education systems are assumed to be committed to the requirements of society and industrial demands, it is expected that the educational systems and course planning in the current circumstances will reshape themselves. Also, the possible reduction in financial support of governments is the other factor that may provoke educational systems to modify their course planning for further digital learning programs and smart educational courses for students and learners of different backgrounds.

The present manuscript tried to predict the possible plans of the educational systems to adapt to the current reality and trace the possible trajectory for their transformation

in society toward a higher level of digitalization and smart working. On the one hand, the curriculum and course plans for teaching digital skills will assist in upholding social distancing and lowering the risk of the coronavirus spreading, preventing the fear of financial loss and unemployment. On the other hand, based on recent experience, the educational centers will utilize the service-based dominant logic of marketing to place a focus on digital skills and attract more students as the customers of their services to maintain their cash flow.

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