

Chapter 19

How Do Moroccan Higher Education Students Behave During the Remote Education in Time of COVID-19?



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Abstract This paper aims to assess how did Moroccan higher education students behave during the transition from face-to-face education to a complete remote education triggered by Covid-19 pandemic. Hence, we could accordingly deduce even a first conclusion if they are ready and accept education 4.0. For that purpose, a survey is carried out for 1030 students from different Moroccan universities. Results show that students are not satisfactory of remote learning mainly because of the lack of connection means and the interaction with teachers and classmates. However, students and teachers surveyed are convinced of the utility of digital educational tools and are ready to use them. Thus, we can conclude of their readiness for education 4.0 revolution that will accompany the Bachelor reform.

Keywords Continuity of distance higher education · Covid-19 · Student engagement · Digital educational tools · Moroccan higher education

19.1 Introduction

COVID-19 pandemic has been an occasion to make policy makers and education actors more aware of the industrial revolution 4.0 and the need to accelerate the implementation of education 4.0 to prepare the future workforce. Moreover, it reveals many opportunities in modalities of teaching and learning thanks to which pedagogical continuity was ensured when distancing measures and social constraints were applied. Higher Education Institutions (HEIs) have been led to occur the unprepared and sudden shift from face-to-face towards online teaching and learning. This

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later remains the only solution to ensure the continuity of education from distance to the best extent possible; although, it may not guarantee the same level of quality compared to face-to-face education.

Indeed, the use of remote educational tools in large scale to ensure continuity of education in time of university closure was a deep preparation to pass the transition to education 4.0 and also an opportunity to convince the most reluctant actors of the importance of those educational tools for the future of learning. Therefore, a deep change in mindset has occurred as reported by the International Association of Universities survey (Marinoni et al., 2020). Hence, educator staffs are more ready to change modalities of teaching in order to propose more flexible learning possibilities based on blended learning i.e., a mixed of synchronous and asynchronous education tools. Thus, they can open up to lifelong learning opportunities. This experience has in fact opened a new horizon of opportunities for teaching and learning. To build on this experience, it is compulsory to review the examination approaches and to digitalize the administrative processes and the access to the library's resources and documents. This experience will ultimately, enhance the institutions crisis management readiness and their resilience and agility to deal with other or similar unforeseen crises in the future.

Alongside these opportunities, HEIs have to cope with the disruption of teaching and learning activities by managing teaching continuity, foreseeing exams and planning the next academic year. According to the International Association of Universities survey that concerns 424 HEIs based in 109 countries from 4 regions (Africa, Americas, Asia and Pacific and Europe), the disruption caused by Covid-19 has affected teaching and learning activities at almost all HEIs (Marinoni et al., 2020, p. 23). 67% of surveyed HEIs have replaced classroom teaching by distance teaching and learning; while 7% have cancelled teaching activities and 24% have suspended most activities meanwhile they are working on developing solutions to continue teaching and learning through digital or self-study means. Teaching cancelled in Africa reached 24% HEIs, while it does not exceed 3% in others regions. Moreover, African HEIs that were able to quickly move teaching and learning online represent only 29% compared to 85% of HEIs in Europe. In other words, two-thirds of African HEIs were not prepared to move teaching online and when they closed their campuses, they had to suspend teaching.

The results of this survey are obviously hard to generalize for all HEIs in the world, as there might be an implicit bias of self-selection in the respondents of the survey, nevertheless, these results show the impact of Covid-19 disruption depends to a large extent on the readiness and preparedness of HEIs to deal with remote learning. Moreover, 2% of surveyed HEIs are not impacted by Covid-19 disruption mostly because they are virtual universities.

Regarding the management of exams 45% of the surveyed HEIs were planning at the moment of the survey to carry out exams for the semester as planned but through new measures, 6% as usual, while 24% intended to postpone exams or to put it on hold. 80% of surveyed European HEIs and 62% of Asian & Pacific HEIs and 69% of American HEIs have planned to carry out exams for the semester, while only 32% of African surveyed HEIs have planned to do so (Marinoni et al., 2020).

It is true that the sudden shift to online teaching and learning was a solution to ensure the continuity of teaching and learning when the lockdown became effective. However, it has reinforced inequalities between student that get access to learning because they have a computer or tablet and internet access, and those who do not, mainly in countries of mid and low incomes. These later are the hardest hit by the educational disruption. Noteworthy, discrepancies exist even in countries with good internet penetration.

Despite the efforts made by several actors, the quality of teaching and learning has been affected by comparison with face-to-face teaching. First, the lack of training in remote teaching pedagogies leads many teachers to learn by doing or imitate what would have been the face-to-face way of proceeding. Second, owing to the need of some study fields to practice on laboratories or in instruments which cannot be performed well when working from home. Therefore, teaching has often been limited to the theoretical aspects of the curriculum what led to a deficit in learners' achievements.

This paper tackles about the Moroccan university transition triggered by COVID-19 circumstances and lockdown from the face-to-face education to wholly remote education based on digital education tools which are one of the pillars of education 4.0. Despite the exceptional conditions of the implementation of the remote learning, however, the students' behaviour and their feedbacks could let us know about their readiness and acceptance of education 4.0 and then, their adherence to remote university project and Bachelor's degree reform. Thus, this paper attempts to answer the following questions:

How do Moroccan universities behave towards COVID-19 disruption? What are the students' perceptions about the use of digital education tools? Do they accept the transition to the online learning and use of digital education learning? Are they ready to get involved in education 4.0 to answer the future labour needs enacted by industry 4.0?

Fist, this paper presents the foundations and the scope of education 4.0, in addition to the main initiatives of Moroccan university. Second, the paper describes the students' methodology survey and sample. Finally, results are discussed according to theory and a previous teachers survey.

19.2 Education 4.0: Scope and Overview

19.2.1 Industry 4.0 and the Need for Education Revolution

The meaningful change in the industry business model, commonly called Industrial Revolution, leads to a wide disruption. First, in job supply to the point to occur a deep change in the job market face. Many jobs will be destroyed when others will be created in response to the new industry needs. Accordingly, workers dismissals will increase because they are replaced by a machine or an artificial intelligence which

is the case of the current fourth revolution. Second, the unemployed workers will be exposed to precariousness and poverty which might lead to a social crisis. Third, education system is asked to solve a part of this social crisis by ensuring in emergency more fit-for-purpose outcomes in preparing students for the workplace otherwise, it will be accused of being responsible for the increase in the unemployment rate and the decline in the country's competitiveness.

Industrial revolution 4.0 consists of automation jobs by applying connected machines, robots and artificial intelligence to replace many tasks currently done by the workforce. Thus, companies will be able to reduce costs, increase business productivity and competitiveness.

This industrial revolution is very specific and disruptive. First, it occurs in a very critical period marked by a global economic contraction owing to COVID-19 pandemic-induced lockdowns and the most severe crisis for job market since the Great Depression of the 1930s (International Labor Organization, 2021, p. 20). "Working-hour losses in 2020 were approximately four times greater than during the global financial crisis in 2009" (International Labor Organization, 2021, p. 1). They are equivalent to 255 million full-time jobs, moreover, labour market recovery is uneven and modest. In these circumstances, businesses (84% of interviewed employers) are convinced to accelerate the digitalization of work processes, the remote work, as well as the automation of tasks to strengthen their resilience in the face of further health crisis. Second, it will transform tasks, jobs and skills (World Economic Forum, 2020a). The surveyed companies by the Forum's Future of Jobs that plan to introduce further automation indicate that 55% of them set out by 2025 to modify the composition of their value chain and 43% expect to reduce their current workforce, while 41% plan to expand their use of contractors for task-specialized work and 34% plan to expand their workforce (World Economic Forum, 2020a, pp. 27, 29). Moreover, by 2025 15% of estimated time workforce in 2020 will be replaced by machines. Thus, the estimated time spent by humans at work based on 2020 tasks is on average an equal parity on the time spent by machines for the overall tasks (World Economic Forum, 2020a, pp. 28–29). Machines and artificial intelligence will mainly focus on redundant tasks which will be likely the declining jobs (Table 19.1). These jobs (processing information and data, administrative tasks and some aspects of traditional manual labour) representing 15.4% of the workforce are expected to decline by 2025 to 9% (6.4% decline), and that emerging professions will grow from 7.8% to 13.5% (5.7% growth) of the total employee base of company respondents to the Future of Jobs Survey (World Economic Forum, 2020a, p. 29;33). However, tasks of managing, advising, decision-making, reasoning, communicating and interacting are expected to continue to be carried on by humans (World Economic Forum, 2020a, p. 29).

Overall, the shift in the division of labour between humans and machines may likely displace 85 million jobs by 2025, while new jobs estimated at 97 million would be more adapted to the new division of labour between humans, machines and algorithms may emerge (World Economic Forum, 2020a, p. 29).

These important shifts concern mainly non-emerging roles (among others 75% in Sales, 72% in content roles and 67% of Engineering roles) and require a labour force reallocation which is already underway.

Table 19.1 identified top 20 emerging jobs that are consistently growing in demand among 99 recognized by Future of Jobs Survey (2020) across 20 economies, in addition to the other declining in demand.

The *World Economic Forum's Jobs Report* expects that the number of jobs destroyed will be exceeded by the number of 'jobs of tomorrow' created. These

Table 19.1 The Jobs Landscape in 2025 /Top 20 job roles in increasing and decreasing demand across industries

TOP 20 emerging jobs		TOP 20 declining jobs	
1	Data analysts and scientists	1	Data entry clerks
2	AI and machine learning specialists	2	Administrative and executive secretaries
3	Big data specialists	3	Accounting, bookkeeping and payroll clerks
4	Digital marketing and strategy specialists	4	Accountants and Auditors
5	Process automation specialists	5	Assembly and factory workers
6	Business development professionals	6	Business services and administration managers
7	digital transformation specialists	7	Client information and customer service workers
8	Information security analysts	8	General and operations managers
9	Software and applications developers	9	Mechanics and machinery repairers
10	Internet of things specialists	10	Material-recording and stock-keeping clerks
11	Project managers	11	Financial analysts
12	Business services and administration managers	12	Postal service clerks
13	Database and network professionals	13	Sales Rep., Wholesale and Manuf., Tech. and Sci.Products
14	Robotics engineers	14	Relationship managers
15	Strategic advisors	15	Bank tellers and related clerks
16	Management and organization analysts	16	Door-to-door sales, news and street vendors
17	FinTech engineers	17	Electronics and telecoms installers and repairers
18	Mechanics and machinery repairers	18	Human resources specialists
19	Organizational development specialists	19	Training and development specialists
20	Risk management specialists	20	Construction Laborers

Source Future of Jobs Survey, World Economic Forum (2020a)

later will be wholly new occupations, or existing occupations undergoing significant transformations in terms of their content and skills requirements.

However, job creation is slowing while job destruction accelerates which would not fail to increase unemployment rate and social pressure. Thereby, expanding social protection, including support for retraining to displaced and at-risk workers are more than necessary to mitigate the social impact. Moreover, public policy should focus efforts on supporting and retraining displaced worker by improving the access to reskilling and upskilling to insure their professional integration.

Finally, an education revolution should take place to prepare future workforce for ‘jobs of tomorrow’.

19.2.2 Scope of Education 4.0

University face big challenges to ensure an educational revolution while the number of students increases considerably (by 70 million in lead up 2035 compared to 2017) mainly in Asia (63.3%) and Africa (26.5%) (Boudjelloul, 2021).

The artificial intelligence and the increasing automation processes triggered by industry 4.0 need new workforce skills requirements that machines cannot offer. These skills are collaborative, socio-emotional and transversal. Thereby, they form the comparative advantage of the future workforce namely the main component of employability in addition to the core skills that university should focus on in educating students. The World Economic Forum (2020a) identifies in Table 19.2 the main 15

Table 19.2 Top 15 skills for 2025

1	Analytical thinking and innovation
2	Active learning and learning strategies
3	Complex problem-solving
4	Critical thinking and analysis
5	Creativity, originality and initiative
6	Leadership and social influence
7	Technology use, monitoring and control
8	Technology design and programming
9	Resilience, stress tolerance and flexibility
10	Reasoning, problem-solving and ideation
11	Emotional intelligence
12	Troubleshooting and user experience
13	Service orientation
14	Systems analysis and evaluation
15	Persuasion and negotiation

Source Future of Jobs Survey, World Economic Forum (2020a)

required skills namely critical thinking and analysis as well as problem-solving, and skills in self-management such as active learning, resilience, stress tolerance and flexibility.

To acquire these skills for students, it is necessary to change both *learning content* and *learning experiences or mechanisms* (World Economic Forum, 2020b, pp. 7–10). *The change in learning content* aims to improve basic fundamental skills and the integrated adaptation of curricula to the demands of the labour market in order to prepare students to become both productive contributors and responsible citizens. In addition, the design of competency-based programs requires the participation of public and private sector employers alongside the university to ensure the training employment match.

The WFE (2020b) establishes a framework proposal for Education 4.0 based on the following 4 key skillsets to be broken down into curricula (Fig. 19.1).

The transition to education 4.0 will also require a deep shifting on *learning mechanisms* based on vetted innovative teaching pedagogy and new learning technologies (virtual reality, MOOCs, SPOCs, remote learning, ...) to closely mirror the future of work, and thus, meet labour market requirements. Moreover, organizing training in eco-systems to best simulate real working conditions allows students to put into practice and develop the 4 key content learning skillsets.

Indeed, the shift in learning content could not manifest without a shift in learning mechanisms. These latter depend on 4 principals:

1. **Personalized and self-paced learning:** in fact, education 4.0 offers a flexible learning mechanism to enable each learner to progress at his own pace likewise it takes into consideration the individual needs of each learner. Thus, each student should have a professional personal project in bachelor's degree. Contrary to

1. **Global citizenship skills:** Include content that focuses on building awareness about the wider world, sustainability and playing an active role in the global community.
2. **Innovation and creativity skills:** Include content that fosters skills required for innovation, including complex problem-solving, analytical thinking, creativity and systems analysis.
3. **Technology skills:** Include content that is based on developing digital skills, including programming, digital responsibility and the use of technology.
4. **Interpersonal skills:** Include content that focuses on interpersonal emotional intelligence, including empathy, cooperation, negotiation, leadership and social awareness.

Fig. 19.1 Schools of the future: defining new models of education for the fourth industrial revolution. *Source* World Economic Forum (2020b)

the period of industry 1.0 and 2.0 when educative system offers standardized training to perform standard and uniform tasks.

2. **Accessible and inclusive learning:** the new learning technologies make learning accessible anywhere that allows students from isolated and disadvantaged backgrounds to get access to learning.
3. **Problem-based and collaborative learning:** this learning pedagogy aims to get closer and simulate future working conditions. It is requiring peer collaboration what is an opportunity to put into practice Global citizenship skills, Innovation and creativity skills, Technology skills, and Interpersonal skills. Moreover, this innovative pedagogy makes education playful, experiential, computational and even embodied.
4. **Lifelong and student-driven learning:** it is important to educate students in self-education to make them able to update themselves and adapt to new changes in working conditions. Flexibility and the ability to adapt to changes are the key factors for sustainable employment.

19.2.3 Overview of Education 4.0 in Moroccan University

Education 4.0 was introduced in Moroccan university long before COVID-19. Thanks to institutional initiatives of universities and the ministry on one hand, and to personal initiatives of teachers convinced of the positive effect of technology on student learning on the other hand. Some disciplines had commonly used online platforms such as Classroom, Moodle since 2015. Nevertheless, the use of these digital educational tools remains on the whole, unusual in Moroccan university particularly in the humanities and social sciences faculties.

Indeed, COVID-19 conditions have forced the use of digital educational tools at a large scale to ensure the continuity of learning while the HEIs closure. It has been in fact an upgrade occasion for teachers and students.

Before COVID-19, many initiatives have been undertaken first, to acquire laptops or computers for students and teachers as well. Nafida is a program for teachers of higher education and primary and secondary schools that grants a subsidy of 2,000 MAD (200 USD) to 150 000 beneficiaries to acquire computers or laptops, in addition to a discount of 25% in internet costs. The second edition of this program has started the 10th June 2021 with the same specifications.

Injaz is a program for students that offers computers at a reduced price next to an internet subscription for one year. Nearly 138,500 students have benefited from this offer.

Second, the Ministry in charge of Higher Education has strengthened through E-Sup program, the capacity of the university network and established the Digital network environment in terms of Educational Resources and E-learning. Also, the E-Sup program has encouraged the technological development and innovation activities in the use of ICT in education.

Furthermore, the Net-U project has aimed to deploy an outdoor Wi-Fi network within universities, faculties and university campuses, i.e., 108 sites.

The e-learning centres were implemented in each university to produce MOOCs in partnership between the Ministry of Higher Education and the group «GIP FUN-MOOC» and offer training on the use of digital educational tools to teachers. The Moocs produced are available in the national platform “Maroc Université Numérique (www.mun.ma)” (digital Moroccan university) since, July 2019.

During COVID-19, the Ministry of Education, in partnership with the French Embassy in Morocco, has launched a call for projects to strengthen distance education in the Moroccan university and hence support the launch of the Bachelor’s cycle planned for the academic year 2021-2022. The call for projects concerns mainly modules and softs skills programmed in the first year of the Bachelor’s cycle, and teacher training in online teaching and assessment.

Furthermore, to solve the student connectivity problem, Moroccan universities have implemented at the start of the school year (2020-2021) Moodle Platform to allow students to remote learning without needing internet credit. Also, they decided to set up in each HEIs an e-learning center to record courses.

19.3 Methodology and Sample Presentation

19.3.1 Methodology

In order to assess whether Moroccan higher education students accept and are ready for the education 4.0 based on both digital and pedagogical innovation, this paper study the students’ behaviours in the use of digital educational tools during the containment period, and their engagement degree.

To this end, an online survey was disseminated via an email campaign in addition to social networks in French and Arabic from 05 August to 24 September. During this period, several reminders were made to improve the response rate and expand the sample. Finally, 1030 Moroccan higher education students responded to the survey. It must be emphasized that the mode of questionnaire administration adopted “online” although the best suited to the health crisis, however, it introduces a selection bias for respondents which immediately excludes students who do not have access to online education. This does not affect the quality of the study, since the objective is to study first, the behaviour of students in distance education in times of COVID-19 and second, their feedback on using the digital educational tools to check the possibility of integrating them into their future customs and habits within the framework of education 4.0.

It is true that the sample is made up of students coming from all the universities of the kingdom and studying in different disciplines, however, it is not representative in the same proportions as the basic population. Thus, the sample is defined on the basis

of a voluntary sampling based on the students who agreed to complete the online questionnaire.

The questionnaire consists of 64 questions spread over 5 axes: institutional communication about the use of digital educational tools; the use of digital educational tools before and during the containment; student engagement during the containment; exams and supervision in carrying out research work (dissertations, doctoral theses); the assessment of the digital learning experience; and finally, the perspectives of the future of learning; in addition to the profile of respondents.

This survey was administered in parallel to the teachers' survey that obtained 202 responses. Some results of this survey will be used to discuss the results of the students' survey.

19.3.2 Sample Presentation

The surveyed students were mainly women (55.1%). The vast majority of respondents (79.3%) are aged between 17 to 25 years old. They study in bachelor's degree (38.25%), in engineering (34.56%), and in master's degree (21.17%). 59% of surveyed students are from all Moroccan universities, while 41% are from public and private higher education schools. 41% of students study Law, Economics and Management, while 19% study Arts and Humanities, and 40% Sciences. The language of instruction is primarily French (74.1%), followed to a lesser extent by Arabic, then both Arabic and French (7%), and French and English (5,8%).

Moreover, 57.9% of surveyed students declared having a good mastery of Information and Communication Technologies (ICTs), while 36.1% have a little knowledge, and 6% no mastery. 75% of the students surveyed have the required tools for remote learning, namely internet (WIFI, 4G, fiber optic) and digital tool (computer, tablet, Smartphone). These characteristics of the sample can not be generalized to all Moroccan students regarding the choice to administrate the survey online. However, they seem close in a certain extent to the data of the International Telecommunication Union (ITU) of 2019 that shows that 94% of Moroccan own an individual mobile phone and 99% are covered by at least a 4G mobile Network. Moreover, 81% of households have internet access at home and 60% a computer at home. Regarding the ICT skills, 49% of individuals have basic skills, 34% standard skills, and 9% advanced skills.

19.4 Results and Discussion

19.4.1 *How Do Moroccan University Students' Study During the Remote Learning?*

Remote learning during the lockdown period

To support students' learning in the lockdown period when face-to-face teaching is suspended, Morocco used a variety of tools to broadcast educational resources to reach the largest proportion of students mainly those who do not have access to connectivity, namely radio, television and online educational resources. Nevertheless, broadcasts can be limited to covering only a few subjects due to the short amount of time devoted to TV and radio programmes.

Moreover, many HEIs have decided in the first weeks of their closure to post on their website their teachers' course materials mainly in pdf or ppt format, besides audio and video resources. Indeed, the Mohamed V University of Rabat, the Cadi Ayad University of Marrakech and the Hassan I University of Oujda have distributed more than 10,000 online course materials in Word, PDF or PPT format. Video and audio media is used at the second level primarily by the Sultan Moulay Slimane University in Beni Mellal that broadcasted the most with 4566 videos and audios (El Mendili, Saaïdi, 2020, pp. 86–87). Moreover, live resources (videoconferences) were mainly used by teachers of the Chouaib Doukkali University of El Jadida, the Mohamed V University of Rabat, the Abdelmalek Essaadi University of Tangier and the Ibnou Zohr University of Agadir. In addition to this, personal efforts have been made by teachers to make courses available to students via other platforms (Classroom, etc.) or even the most used social networks in Morocco namely WhatsApp and Facebook.

In the OECD and partner countries, online platforms were the most popular tool used during the lockdown (Andreas, 2020, p. 15). Online platforms were used in nearly all OECD and partner countries. Online learning tools ranged from educational content which students could explore at their own discretion and conducted at their own pace, to real-time courses led by their teachers using virtual meeting platforms. Moreover, TV broadcast was also a popular learning arrangement to reach students without remote learning means.

Table 19.3 shows that 71% of surveyed students have received the course material from their teachers in pdf or ppt format and have benefited from remote education using synchronous (videoconference) or asynchronous (audio or video recording) tools. Nevertheless, 10% of surveyed students reported to have received the course material only, while 3% their teachers have not kept in touch with them and thus, they did not continue their learning remotely.

Hence, all surveyed students have a priori the required tools to get access to remote learning. This observation is due in large part to the forced choice of administering the survey online given the health crisis and social distancing measures. Therefore, we should take into consideration this selection bias. In other words, the method

Table 19.3 The way that remote learning is kept by surveyed Moroccan Higher Education students

The way that remote learning is kept	%
No remote learning	3
Course material only in pdf or ppt format	10
Use of synchronous or asynchronous tools without course material	16
Course material and use of synchronous or asynchronous tools	71

Source Survey Data

Table 19.4 Tools used in remote learning by surveyed Moroccan Higher Education students

Tools used in remote learning	%
Virtual meeting platforms (Meet, Teams, Zoom, Webex, skype)	56
Online platforms (classroom, Moodle, Edmodo)	31
Social network (Facebook, WhatsApp)	13

Source Survey Data

of administering the questionnaire has systematically excluded students who do not have the required connectivity tools. Also, the lack of statistics on students with ICTs at national level does not allow us to weigh and put these results into perspective. 77% of surveyed student have a personal computer and 10% a tablet, 90% a smartphone and 86% access to internet. It is true that the sample consists of students coming from all the universities of the kingdom, however, it is not representative of the proportions of the basic population. Moreover, it is important to note that 57.5% of surveyed students have already used digital education tools before COVID-19.

Table 19.4 reports that the main tools used in remote learning by surveyed Moroccan Higher Education students (56%) during the university closure are virtual meeting platforms allowing videoconferences and so an interaction with teachers simulating face-to-face teaching as much as possible. They used primarily Meet (40%), followed by Teams (30%) and Zoom (29%), and to a lesser extent by Webex and Skype. In addition, roughly 31% of students reports having used online platforms. They used mainly Classroom followed to a lesser extent by Moodle and Edmodo (1%). Some students have used social network to continue their education remotely by Facebook and mainly by WhatsApp.

Overall, surveyed students preferred the most Classroom, followed by Meet, Teams and Zoom.

In addition to these tools used in remote learning, it is worth noting that Moroccan universities have produced before COVID-19 e-learning courses available on line. Unfortunately, only 58% of surveyed students have visited it and solely 11.5% have known about the e-learning courses produced by all Moroccan universities available at Maroc Université Numérique (digital Moroccan university) web site (www.mun.ma).

Dissertations remote supervision

33% of surveyed students concerned by dissertation declared having benefited from a supervision during the university closure and are well satisfied, while 32% seem to be not really satisfied, and 35% report did not benefit from any supervision.

Supervision was provided mainly via mail and videoconferences. During the university closure the libraries were also closed. Thus, students have found difficulties to get access to references to prepare their dissertations. To overcome this, university presidents have set up a commission to facilitate access to national and international digital libraries. In addition, the Moroccan Institute of Scientific and Technical Information has provided an e-resources platform. However, 57% of PhD students surveyed were not informed.

Furthermore, only 21% of surveyed students preparing their dissertation of master degree have defended it.

Remote Exams

Moroccan universities have decided to take the spring semester exam at the next academic year (2020–2021), unlike the majority of engineering and business schools. However, some universities have scheduled Master degree exam of retake autumn session remotely. Those of Bachelor degree were carried out before HEIs closure.

Thus, 21% of surveyed students concerned by the retake session have taken their exam remotely.

19.4.2 Student Engagement During the Lockdown Period

40% of surveyed teachers consider that the number of students attending classes has decreased compared to face-to-face teaching, mainly (according to 75% of teachers) by lack of means.

22% of surveyed students report having no barriers to follow-up their learning remotely during the lockdown period. However, the other students attribute their lack or weak involvement to many reasons. Primarily, the lack of internet access and its high price that represents 3.9% of the Gross National Income (GNI) per capita, while it is equivalent to 1.7% in Spain, 1.2% in France and 0.9% in Switzerland (International Telecommunication Union, 2021). They also evoke the lack of motivation, the interaction need with their teacher and classmates, the lack of organization, self-discipline, skill to manage time, and the need to devote more time and effort than face-to-face. Indeed, distance learning requires self-control skills what is lacking in Moroccan students who have never been empowered to be autonomous and to self-learn. To a lesser extent, some students have experienced depression and boredom triggered by the constraints of social distancing and limitation of transport. Among the barrier to remote learning some students have mentioned, the family income problems due to covid-19 and that home is not a favorable environment for studying.

Of course, teachers' engagement is decisive in students' involvement. There is a divergence in teachers' involvement regarding the delivery of online courses. 37.4% of surveyed students reported having benefited from more than 10 online courses, i.e. practically all the curricula courses. Only 4.4% of students did not report having any course remotely during the HEIs closure.

Furthermore, 78.7% of teachers have tried to involve students by asking them homework, presentations, etc. Likewise, they have ensured tutorials as usual. However, that were complicated to manage mainly for some disciplines that need experience and practice with instruments in laboratories. 70% of students concerned by tutorials have benefited.

63% of surveyed students reported having interacted with their teachers, unlike 19% of students. The rest of student have not really benefited from an interaction with their teachers. Indeed, the lack of interaction and commitment of students as well as teachers surveyed might limited significantly the learning operation. Thus, these actors could not project themselves in the learning operation to the point of considering virtual space as a real space. Therefore, the theory of the learning community (Rourke, Anderson, Garrison et al., 2001; Swan, 2019) is not applicable to the context studied, just as the connectivism theory. This latter advocates that interactivity and community engagement allow knowledge-generating interactions (Jung, 2001). Indeed, the learning did not come from the collective effort of the community, the teacher was to a larger extent the only producer and transmitter of knowledge. Students can only interact by the chat during videoconferencing, mainly in open access establishments characterized by massification, which was of course insufficient and far from being considered a real interaction. Consequently, 29.1% of surveyed students are not satisfied from the involvement of their teachers in the period of HEIs closure, while 27% are satisfied, and 43.9% are not really satisfied.

19.4.3 Assessment Remote Education Experience

The assessment of the remote education experience in time of covid-19 will be made from the perspective of the students and possibly supplemented by the teachers' point of view.

Roughly 40% of surveyed students are not satisfied and also not really satisfied, while only one student out of four is satisfied (Table 19.5).

HEIs Management Assessment

Table 19.6 shows that the majority of surveyed students (73%) found the management of the continuity of distance education by their institution unsatisfactory or not at all satisfactory. Only a quarter of surveyed students ranked it satisfactory to very satisfactory.

Indeed, Moroccan HEIs especially those with open access characterized by the massification did not set up any measure to help deprived students to get access to the connectivity in order to keep up their learning right remotely and keep in touch

Table 19.5 Students' satisfaction about the remote learning experience

	Frequency	%
Not satisfied	407	39,5
Satisfied	195	18,9
Not really	428	41,6
Total	1030	100,0

Source Survey Data

Table 19.6 Students' satisfaction with the management of their institution during the distance learning continuity period

	Frequency	%
Not at all satisfied	296	28.7
Unsatisfied	452	43.9
Satisfied	242	23.5
Very satisfied	40	3.9
Total	1030	100.0

Source Survey Data

with their teachers. They have felt left out. In some countries, among other Canada, Luxembourg and Mexico (OECD, 2020) mentoring services have been offered to students. In Morocco, some business schools and engineering schools have heard to the deprived students the internet connection costs (an internet package of 200 MAD (20 USD) per month) that have allowed them to pursue their study and exams remotely. Unfortunately, students from rural isolated areas did not benefit from this support because of the lack of internet network coverage and digital device. Consequently, they did not continue their learning remotely with their teachers.

At the start of the school year, a special exam session was scheduled for these students. In addition, for the sake of fairness, some HEIs have planned two tests for each subject, one covering the entire program and the other only the part carried out before HEIs closure. We can wonder about the relevance of this measure and to what extent it contributes to reinforce the learning deficit. Moreover, at the start of the school year, some HEIs have also created online learning platforms to guaranty free internet access to their students and that after signing an agreement with the National Telecommunications Regulatory Agency (ANRT).

However, we can note a lack of communication from HEIs regarding the e-learning platform (www.mun.ma) set up before COVID-19 (only 11.5% of surveyed students are informed) and the IMIST e-resources platform.

Teachers Engagement

Table 19.7 reports that student satisfaction with the experience of remote education depends largely on the student's appreciation of teacher involvement.

Thus, 57% of dissatisfied students are also dissatisfied with the involvement of their teachers, and 74% of those who are satisfied are also satisfied with the involvement of their teachers.

Table 19.7 Students satisfaction with the teacher involvement during the distance learning continuity period

		Satisfaction of your remote learning experience		
		No (%)	Yes (%)	Not really (%)
Satisfaction degree of teacher involvement	No	57	7	13
	Yes	11	74	21
	Not really	32	19	66
Total		100	100	100

Source Survey Data

Table 19.8 Relationship between the use of the digital education tool and quality of learning and motivation according to the own experience of surveyed students during the remote learning

	Effect on	
	learning quality (%)	Motivation (%)
I do not know	4.4	4.2
No	26.6	35.1
Yes	24.8	27.1
Not really	44.3	33.6
Total	100.0	100.0

Source Survey Data

Feedback about the Use of Digital Educational Tools

According to the experience of distance learning, $\frac{1}{4}$ of our sample believes that the digital tool improves the quality of learning, and 27% think that its use has a positive effect on the student's motivation to learn (Table 19.8).

Surveyed students appreciate the digital education tool mainly for the ease of access to teaching, flexibility and more autonomy, the possibility of working in parallel or saving transportation money. This last reason is shared by 21% of students, and a priori by 22%.

Just over half of the students believe that distance learning provides lower performance compared to face-to-face teaching. For the 34.9% of the sample, comparison between the two teaching methods is not possible (Table 19.9).

Therefore, 43.3% of the students surveyed are for the integration of digital teaching tools in their courses, while 38% are against and 18.7% are undecided. However, 64.9% of surveyed teachers are convinced that digital education tools can contribute to the learning performance of students. Moreover, 85.6% are ready to use digital educational tools starting from the next academic year (2020–2021).

This position of the students can be understood regarding the pandemic context when actors were not prepared for a remote learning besides, the lack of interaction between learners and teachers, since the majority of courses were distributed in PDF, PPT or Word format.

Table 19.9 Face-to-face teaching and distance-learning comparison based on learning performance

	Frequency	%
Equal	84	8.2
Lower	525	51.0
Comparison is not possible	359	34.9
Superior	62	6.0
Total	1030	100.0

Source Survey Data

Table 19.10 Face-to-face teaching and distance-learning comparison based on a learning performance

	Frequency	%
Equal	84	8.2
Lower	525	51.0
Comparison is not possible	359	34.9
Superior	62	6.0
Total	1030	100.0

Source Survey Data

Future of Education 4.0 in Moroccan University

Just over half of the students believe that distance learning provides lower learning performance compared to face-to-face teaching. For the 34.9% of the sample, comparison between the two teaching methods is not possible (Table 19.10).

Despite the possibilities of interaction that can be ensured by videoconferences and chats, more than half of the sample (53%) considers that distance learning can in no way replace face-to-face teaching, while 19.1% of students think the opposite, and 27.9% are not quite convinced.

The students surveyed do not see distance learning as a solution to learning the mass (only one out of three students was “for”). Moreover, they do not consider it to be reserved for selected students (only one student out of five was “for”) or a substitute for face-to-face teaching (only 5.5% of the sample was “for”). However, 49.6% of surveyed students are favorable to face-to-face learning supplemented by remote learning, and 17.7% a remote learning supplemented by face-to-face learning while, only 27.8% prefer the face-to-face learning exclusively.

According to the teachers’ survey, 88.60% of them consider that distance learning can only be a complement to face-to-face teaching and cannot in any case replace face-to-face teaching. A minority that does not exceed 2.5% considers that distance learning can be an alternative to face-to-face education. And 85.6% of teachers are ready to use digital teaching tools at the next academic year (2020–2021). According to Sosin et al. (2004), hybrid education combining the two modes of teaching strengthens the involvement and learning performance of students. However, technological innovation taken alone is not the guarantee of student learning performance according to Talley (2005). It must be accompanied by educational innovation.

This dual technological and educational innovation requires according to Navarro (2000), the commitment of the faculty to carry out these time-consuming investments, compared to a traditional course, and a change in habits and routines.

In addition, the benefits of the digital learning mode should be qualified by taking into account several parameters, among others, teaching methods, student profiles and their previous courses (Hoskins and Van Hooff (2005)), Navarro (2000), Dutton et al. (2002), etc.).

The positive attitude of teachers towards the use of digital teaching tools, expressed before the confinement, is largely explained by the fact that 55% of teachers had benefited from training in these tools. Consequently, the prior knowledge of these teachers is responsible in large extent for their involvement in distance education.

19.5 Conclusion

It is true that the sudden shift to online teaching and learning were very challenging to occur for all educative stakeholders. Nevertheless, it was compulsory to ensure learning continuity when the lockdown became effective. This transition is well managed and has a low disruption impact first, if technical tools and accessibility are available for teachers and students as well. Second, if competences in distance pedagogies for teachers and distance learning for students are well mastered, because they have benefited from prior training or experience. However, remote learning is not very suitable for some fields that depends on practice either in laboratories or on instruments.

Surveyed students have pursued their learning remotely primarily by the mean of videoconferences. Despite, the efforts undertaken by the ministry in charge of education, the HEIs and teachers, only one student out of four are satisfied from the experience of remote learning. The unsatisfactory of 40% students is mainly due to the lack of support to get access to remote learning and the lack of interaction with teachers and classmates. It is true that the majority of teachers and students surveyed accept the idea of distance education, but not to the extent of replacing face-to-face teaching. They rather prefer blended learning and are convinced of the utility to use the digital educational tools.

Overall, the main educational stakeholders seem to be ready to implement education 4.0 revolution, at least in its digital part. It remains to accompany the digital shift with the educational reform based on skills learning approach and problem-based learning to simulate at best the work conditions and prepare workforce to the industry 4.0 needs. Indeed, this is what advocates the reform of Bachelor scheduled to come into force at the start of the academic year 2021–2022. To make this reform a successful one, policymakers should ensure training for teachers and the right of connectivity for all students to make this education inclusive. Henceforth, the trivialized use of distance education tools makes lifelong learning possible. Moreover, the ministry of education is ambitious to set up a digital university.

References

- Andreas, S. (2020). The impact of COVID-19 on education: Insights from education at a glance 2020. *OECD*. Retrieved from <https://www.oecd.org/education/the-impact-of-covid-19-on-education-insights-education-at-a-glance-2020.pdf>.
- Boudjelloul, S. (2021). Les essentiels de l'enseignement supérieur. Paxter. PAXTER. Retrieved June 4th, 2021. Retrieved from <https://www.paxter.eu/docs/ressources/RM2SyntheseMonde.pdf>.
- International Labor Organization. (2021). ILO Monitor: COVID-19 and the world of work, 7th edition. Retrieved from http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/briefingnote/wcms_767028.pdf.
- International Telecommunication Union. (2021). Digital Development Dashboard. Retrieved from <https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx>.
- Marinoni, G., Land, H. v., & Jensen, T. (2020). The impact of COVID-19 on higher education around the world: IAU Global Survey Report. *International Association of Universities*. Paris: UNESCO House. Retrieved from https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf.
- World Economic Forum. (2020a). The future of jobs report. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf.
- World Economic Forum. (2020b). Schools of the future: Defining new models of education for the fourth industrial revolution. Retrieved from http://www3.weforum.org/docs/WEF_Schools_of_the_Future_Report_2019.pdf.

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