Distance Education: Is It Any Longer a Paradigm of Choice? The University of Jordan; A Case Study

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Abstract Traditionally, lecture-based learning has prevailed for centuries resulting in a conventional academic system that has become the paradigm for education adopted in various countries around the world. Over the years, however, especially with advancements in science and technology, this paradigm has gradually started to fade in the wake of a need to accommodate the role of the primary constituent of such an educational paradigm, paving the way for a newer paradigm that allows for a more pronounced role, with improved learning outcomes, for its constituents. Hence, a new system of learning, a student-centric paradigm, otherwise known as an outcome-based paradigm of education, started to emerge to allow recipients to have a more active role in the educational lifecycle. Here, although this new system became more appealing to many, it was only adopted by academic institutions that were seeking to stand out in delivering to the job market a product with more-pronounced and well-defined roles for learners. In the interim, the providers of all existing paradigms were also keen to make their learning material available to recipients well beyond the boundaries of the classroom and the hosting institution/s involved. In this, many academic institutions of higher learning had already started to leverage the ubiquity of the World Wide Web and the underlying digital solutions that were evolving to produce teaching material in electronic format and make it readily available to the recipients anywhere and anytime. Soon after, the revolution that had impacted all ongoing developments to the internet and the evolving speeds in data

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transfer were inherently the primary drivers for software developers and technology-fostering companies to initiate more far-reaching advancements in the educational arena. As a result, these market players started to develop a multitude of platforms that enabled various recipients of the learning paradigms not only to have access to the learning materials, rendered in electronic format, from across the web, but also to avail themselves of synchronous interactive learning paradigms that brought classroom activities to places convenient to learners irrespective of their physical localities. In this chapter, we analyze the differences between conventional learning paradigms, on the one hand, and those that were being supported by the evolution of the internet and the underlying electronic infrastructure, on the other. The latter systems made distance learning a more appealing option towards the end of the twentieth century and they then assumed a more concrete role in the early twenty-first century as a new era of pandemics started to evolve. The role of each learning paradigm under consideration, and how it evolved, is assessed, including opportunities and challenges for digital transformation at academic institutions in general, but more specifically those pertaining at the University of Jordan as a model example, and the impacts that were fostered along the way. Furthermore, a rundown of the various educational paradigms involved in this case study is presented, outlining the ensuing levels of associated governance that went into play at the University, reaching ultimately to one that is setting the stage for the University to transform its educational infrastructure and academic offerings into a system that is fully digitized, smartly presented, readily available to its various constituents, and commensurate with the 4th industrial revolution in the twenty-first century.

Keywords E-learning · Educational technology · Learning management systems · Online learning · Hybrid learning · Higher education

1 Introduction

The origins of online learning can be traced back to the 1900s, where the universities of Pennsylvania and Chicago in the United States were the first to utilize the U.S. postal service to introduce universal free delivery of educational resources to their beneficiaries [1]. However, today's online paradigms of education, as most people view them, have evolved to encompass any form of distance or non-centralized education, including but not limited to, independent study, computer-based instruction, computer-assisted instruction, video courses, videoconferencing, web-based instruction, and online learning [2].

Thus, with the advent of the World Wide Web and web-based learning, higher education institutions have come to experience unprecedented growth in online learning during the past two decades. Over the past two years, this growth has increased exponentially due to the COVID-19 pandemic to around 1.3 billion online learners world-wide [3], causing a global shift towards working from home and a bonus for online education. Accordingly, most higher education institutions around

the world primarily catered for online learning provisions in lieu of the prevailing traditional in-person (in-class) educational paradigms. It also appears that educators in all types of institution recognized that a structural shift was forthcoming, and that online information delivery and learning will, to a high degree, be the mainstay of higher education in the future [4]. Therefore, it was necessary for educational institutions to adopt new methods of delivering courses and assessments to students. An example of such a standardized approach is the Learning Management System (LMS) [5]. This was described by Alias and Zainuddin [6] as a web-based technology developed to enhance the learning process at educational institutions through proper preparation, implementation, and evaluation. The use of an LMS in the learning process aids the e-learning process by providing instructional content without regard to time or location [7], allowing students and teachers to connect via the internet, and facilitating the sharing of course-related knowledge and resources [5].

In the days following the outbreak of the COVID-19 pandemic, the imminent adoption of technology for classroom use, as the primary source to disseminate teaching material to students remotely, became an opportunity that could not possibly be overlooked. Since the COVID-19 outbreak in late 2019, and into the early months of 2020, governments around the world, at the recommendation of the WHO, found themselves compelled to stage various levels of lockdown to curb the spread of the disease. Schools and institutions of higher learning had no option but to yield to government directives in staging these imperatives. Various businesses and government offices found themselves in a position where employees could no longer report to the office and were immediately instructed to work from home. At this point, students at all levels, like employees and other workers, found themselves having to cope with a suddenly changing environment and, as such, had to seek other ways to make substitutions for the workplace environment. Luckily, the technology industry had already been working on systems that were primarily meant for teleconferencing and tele-class applications. Indeed, technology giants like Microsoft, Google, and Cisco had programs already in place that were being updated to stage team and group work meetings across the internet, while participants remained in the convenience of their living rooms, home offices, and their official workplaces, traversing geopolitical boundaries with ease. With a little tweaking of existing technologies, these technology giants were soon ready to help the rest of the world surmount the consequences of the global lockdowns. In the months and immediate years that followed, governments, businesses, and the educational sectors involved were able to gradually cope with the evolving situation. Despite the reduced efficiency compared with the original workplace and actual classroom environments within universities and school systems, people across the globe were readily coping with the situation while, at the same time, exploring every other possible alternative to achieve best practices under the prevailing pandemic circumstances.

In the wake of the COVID-19 pandemic and the three years that followed, the University of Jordan, being a leading academic institution in Jordan and a renowned academic institution region-wide, found itself in a dire situation which required immediate attention from its upper administration. The University of Jordan, having been hit by the handicap of the COVID-19 pandemic, compounded by existing dire

economic hardship, was forced to explore various viable options to cope with the situation, keeping in mind existing constraints when it came to the networking infrastructure that would be needed to deliver a suitable remote-learning course. Moreover, save for a few buildings that were established during the past two decades, these problems were exacerbated by the structural constraints imposed by existing buildings and by financial constraints to the campus-wide academic building regime.

2 The Evolution of Remote Learning Paradigms over the Past Five Decades

Following the mid-1970s and early 1980s, several universities in the developed world already had preliminary plans to target students across other communities, particularly in places where academic institutions possessed more than just a single campus across large geographical stretches. This aimed to leverage existing forms of crude technologies to disseminate the teaching materials across larger geographical areas. As they did that, they realized that they needed to find ways to replicate another classroom environment set at some remote location. In so doing, academic institutions with sufficient financial means were able to replicate the classroom that existed at the primary location (original) and establish the copied classroom at a secondary location, using the same class instructor to lecture across two classrooms at totally different geographical locations. Furthermore, these universities had also to leverage very early forms of TV broadcast technologies to transfer the teaching material from one place to another and make it available to the beneficiaries who might be spaced out across hundreds or thousands of miles. With the use of such teleconferencing capabilities, people across various organizations (public and private) now had the means to have daily meetings without the burdens and expenses of long-haul travel. Towards the late 1980s and into the early 1990s, various institutions (both industrial and academic) started to have at their disposal enhanced legacy broadcast systems, some newly introduced technologies, and the very early versions of packet switched networks (PSNs), like the integrated service digital network (ISDN). That is when academic institutions started to see the benefits of the new era that carried with it great potential for the dissemination of teaching materials across distant geographical areas. Nonetheless, the content of such paradigms was still being targeted at groups of assembled people as opposed to targeting individual clients.

Around the middle to late 1990s, people started looking into empowering the instructor by providing additional classroom capabilities. The trend was primarily focused on broadcasting the taught material to spatially separated remote groups of beneficiaries that could be assembled virtually under the umbrella of powerful software, together with the supporting networking protocols, but from the educator's viewpoint taking the form of a single client. This placed more emphasis on what enablers could be harnessed by an educator to bolster effectiveness and impact in delivering teaching material to the recipients in the same classroom and beyond.

With this new focus, people started exploring ways of introducing viable forms of technology that would make it possible for individuals to reach out to academic institutions and to acquire knowledge from the convenience of their living rooms or workplaces, or from a disk space within a proper office operating environment [8]. In the mid-1990s, the term e-learning began to spread across the world of education [9] by bringing together evolutions in the fields of learning and technology, a process that inherently culminated in the birth of the distance-learning concept [10]. Distance-learning paradigms that entailed the use of computers, internet, and data shows, together with various electronic resources, also offered asynchronous and synchronous tools such as e-mails, forums, chats, and video conferencing [11, 12], thus facilitating better communication between students and lecturers, and altogether enhancing the learning process for students [13].

By the early days of the 3rd millennium, many types of e-learning system had evolved with various online platforms beginning to emerge, giving rise to robust information and communication technology (ICT) infrastructures, such as Skype, Moodle, and Blackboard. These had to be supported by the availability of high-end communication technologies that, in turn, relied on the internet and upscale wireless technologies for their operation [8]. With an ongoing effort to advance the state-of-the-art in communications gear, supported by a more reliable and capable internet, the trend again was shifting to a new regime of distance learning, all culminating in what has become known as Online Learning. This included synchronous lecture broadcasts, sturdy electronic resources, more user-friendly interfaces, as well as readily accessed recordings of lecture materials made available to recipients at their convenience. Here, the COVID-19 pandemic inherently played its part in bringing about further developments to this education regime when various technology-developing companies, including Microsoft Teams, Google Classroom, Zoom Meetings, Cisco's Webex, Go-to-Webinar and Go-to-Meeting, among others, started to introduce more enablers to the scene [8]. The most important functions of these innovative platforms were to allow effective synchronous student–lecturer communication and to render an alternative mode of collaboration asynchronously, while assisting lecturers in managing lectures and courses, evaluating and monitoring student progress, and keeping records of grades and student attendance/interactions.

3 Learning Paradigms for Holistic Development

Various learning paradigms had emerged to bolster the efforts of an educator, both in the classroom and beyond the set boundaries of a traditional classroom. For instance, educational resources that leveraged learning, teaching, and research materials to render the taught materials and stage them to recipients were constantly coming through. Many of these were in the public domain or were under open licenses that allowed users to have free access, re-use, re-purpose, and make them amenable to adaptation, and redistribution. Such educational resources can be deployed in the service of distance learning, online learning, as well as in-person learning scenarios.

In this context, we are addressing distance learning or educational paradigms that entail acquisition of information by non-conventional means to gain knowledge from attending institutions. Under such paradigms, advanced technological regimes are deployed throughout the development of the taught material, which is then delivered across vast geographical stretches to the student recipients. The paradigms included recorded videos, electronic class notes, etc., all of which can be accessed at the convenience of the learners, and at their own pace. The material offered is also augmented with various assessment methodologies which often harness artificial intelligence to ensure that students are exposed to adequate levels of the curricular offerings and can be adapted to various levels of difficulty commensurate with the student's learning capabilities. The online learning paradigm in which a taught material leverages a synchronous mode of faculty lecturing (in real time), in addition to information from other sources, has proven to be rather effective in the case of shy, easily intimidated, and slow-learning students who usually are not confident enough to speak-up freely in a regular classroom setting [14]. There are no space and time limitations under such a flexible educational paradigm, which allows access to a wide range of information whereby students can learn at their own rhythm, interact in peer discussions, and easily exchange points of view and ideas [15].

In contrast, under the conventional in-person learning scenario, a student receives the lecture material in a traditional classroom setting. Through the injection of contemporary technological enhancements, this mode of learning is commonly supplemented with technology-in-the-classroom enablers that an educator can use to enrich the learning experiences of the students. A hybrid learning paradigm allows students to have the benefit of both worlds, a combination of online and in-person classes. This mode of education also fosters instruction in which the classroom time is augmented by offline internet-based student–faculty interactions allowing students to network with one another. This is, in fact, the de facto norm at many higher education institutions. In the online learning paradigm, teaching is always online but student learning can be augmented by the availability of other educational resources in an electronic form.

Distance education and e-learning depend heavily on ubiquitous forms of technology, including computers, which students may, at times, not have access to, and the internet, which may suffer interruptions and/or other associated system errors during course deliveries. Nonetheless, there are important support aspects that constitute the basis for distance education and e-learning, including the proper design and management of the supporting network infrastructure to help avoid interruptions, especially during video-conferencing; the availability of user-friendly tools that help students assimilate and understand transmitted information; the provisioning of reliable, interactive and diverse electronic gear to shore up compatibility of deployed resources; a reliable leverage of social networks to build online communities for students to reduce incidents of feelings of isolation; the use of various effective educational techniques such as a leverage of debates and, where possible, learning based on experience; and the provision of services that help students and lecturers be aware of the latest policies adopted by universities and the government, while encouraging collaboration between the various institutions involved [16]. The effectiveness of

distance education and e-learning is determined by three primary elements, namely, awareness of how to use the tools and enhance the learning process, the ability to proficiently interact with students and create a comfortable learning environment, and the ability to creatively capture students' attention and bring them ever closer to a productive learning environment [17].

Nowadays, higher education systems throughout the world are in a continuous process of change associated with rapid advances in information and communication technologies; this presents challenges for the institutions to keep pace with the needs, desires, and requirements of students, and to expand students' access to technology and improve their academic experiences. Information technologies are continuing to advance at an accelerating rate and e-learning systems are seen as essential factors in carrying out the various activities of academic institutions. These institutions are therefore investing more and more in online systems and devices [18]. However, in the technology era, one of the main challenges for universities is the integration of innovative e-learning systems to reinforce and support both teaching and learning [19]. Due to its complexity, multiple definitions are proposed for the concept of e-learning. Put simply, e-learning uses information and computer technologies and systems to build and design learning strategies [20]. In short, e-learning refers to transferring knowledge and education by utilizing various electronic devices [21], and the concept can be better understood when it is integrated into a context in which technology is used to meet people's needs to learn and evolve [22]. Jordan was one of the first countries in the region to respond to the COVID-19 pandemic by enforcing a lockdown and national closure of higher education institutions. To date, the University of Jordan has successfully shown progress—and admirable ingenuity given its resource constraints—in sustaining learning during the pandemic and making the move to online learning possible. Transforming the educational system by harnessing a paradigm shift is ongoing and comprises a core component of the educational cycle at the University of Jordan. This shift helps sustain educational continuity and supports crucial interactions by scaling-up quality instruction, fostering outstanding instruction, while expanding opportunities for student practice and increasing student engagement in the educational process.

4 The Right Choice for Technology Deployment in the Classroom: the University of Jordan Case

The University of Jordan was established in 1962 as the first public university in the country and was a milestone in the socio-economic development of Jordan. The impressive rapid expansion in establishing diverse colleges and schools, deanships, scientific centers, units and service departments and the establishment of educational programs within the University of Jordan were essential contributions to the economic development of the country. Now, the University has around 50,000 students (graduates and undergraduates) from all over the world; 24 colleges and

schools offer more than 250 academic programs in various natural and social sciences and scientific disciplines including, engineering, medical, agricultural, and health sciences. There are also 38 PhD programs, 111 MSc and MA programs, and 16 academic programs related to higher specializations in medicine and dentistry. The University of Jordan, through its strategic and action plans, continues to lead the higher education sector in Jordan, the provision of high-quality education being at the forefront of its priorities.

The educational system in the first decade of the University of Jordan was based on the annual (British) system of education. In 1970, with the exception of medical schools, the University of Jordan switched to the American credit-hour system, which was seen as the first structural change at the University. In the late 1990s and early 2000s, there was great interest in e-learning and distance education and the University administration was eager to embed these programs in the educational cycle within the University of Jordan, but this process was largely vague and undefined.

Meanwhile, blended learning at the University of Jordan had been in place since 2016. Against the evolving backdrop of the COVID-19 pandemic, the University of Jordan, as a leading academic institution in Jordan, and a renowned academic institution in the region, found itself in a dire situation that required immediate attention from its upper administration, which took it upon itself to implement an educational cycle commensurate with present-day learning regimes. Here, the University placed student learning at the forefront of the process where it ensured that the various relevant components were assembled including the workforce (academic and supporting staff), management at all levels, and assessment procedures, together with the supporting technological and information infrastructures, all closely coordinated (Fig. 1). The technical teams presented the University administration with several viable technological options that would help the University cope better with the evolving COVID-19 situation. The options provided were diverse enough to give the administration the required flexibility to arrive at one or more solutions to suite the varying needs of an academic institution and the size of the University of Jordan, with a faculty body of 2,000 people.

In delivering these viable options (Table 1), limitations in the financial resources of the University were considered, as were the varying needs of the academic faculty in receiving some acceptable level of training to cope with a new teaching regime and to deliver the various courses remotely. With each option, the local technical experts also presented the administration with the necessary technical details to help the different faculties pick the option that would be most suitable for the level of academic operation/s required by each college.

Moreover, the local University experts also gave their opinion of various technical features to help decision makers in various colleges and schools pick the right option for their academic needs. To allow the various academic entities to make viable comparisons of the suitable options, the relevant technical details were summarized as shown in Table 2. In the last line of Table 2, the local experts also offered recommendations of their own to help the administrative staff and non-technical teams arrive at a suitable choice from amongst the options. These recommendations were

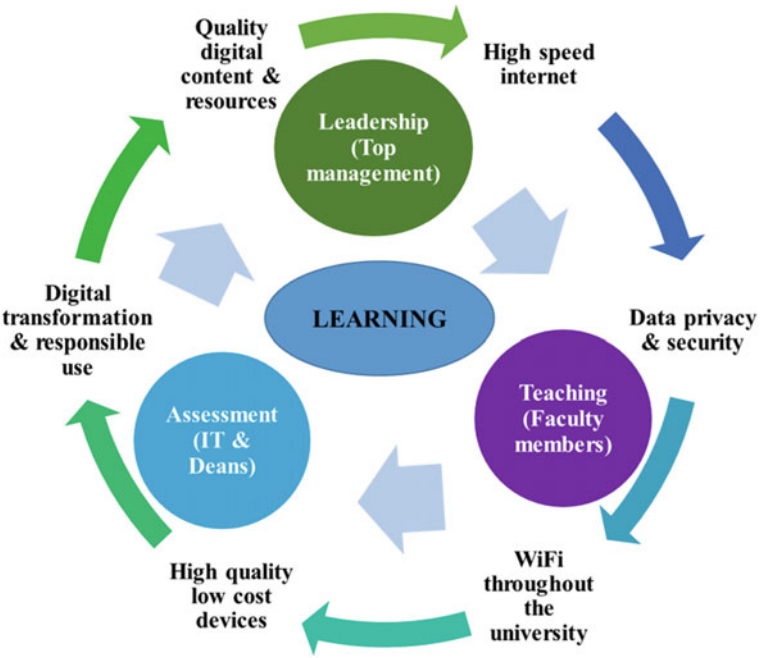

Fig. 1 Infrastructure to support transformative learning and to fulfill the needs of students for their holistic development within the University of Jordan

Table 1 Explanation of viable options for technology deployment in the classroom at the University of Jordan

Option number	Option description
Option 0	Entails a standard computer + writing pad (dull) + standard type overhead projector
Option 1	Entails a standard computer + smart writing pad (graphics screen) + standard type overhead project
Option 2	Entails a good computer + smart board + suitable overhead projector + audio accessories
Option 3	A good computer + smart board + suitable overhead projector + audio accessories + TV type screen
Option 4	Good-specifications computer + smart TV type screen + audio system
Option 5	Two good-specifications computers + smart TV type screen + tracking camera/s + audio system
Option 6	Two good-specifications computers + smart TV type screen + tracking cameras (2) + audio system + mixing system

made after consideration of factors such as complexity, price range, technical capabilities, and performance, as measured against budgeting constraints experienced by the University. All things considered, options 2, 3, and 4 were the most likely to be chosen given the cost ranges and the advantages offered, but resorting to options 5 and 6, when needed, was not totally ruled out. In fact colleges and schools planning to produce their own educational materials for classroom or commercial purposes in the future were advised to ensure that they had the facilities to do so, which would mean purchasing some equipment listed in options 5 or 6.

Deans of colleges and schools at the University of Jordan inherently have a good understanding about the existing educational technologies, infrastructure and the project needs of each college. However, without a broadly shared vision of transforming the education system, any attempt at such transformation will have a dim chance of success. Therefore, to help the deans of various colleges and schools arrive at the most suitable option for their colleges, the technical team also prepared two different questionnaires to be completed by the colleges and schools to help the technical team come forward with further recommendations. The questionnaires involved information that was solicited on the existing educational technologies and infrastructure for each college or school. Overall, the first questionnaire, regarding existing educational technologies, focused on: the number of classrooms; the percentages of theoretical and practical teaching; the number of college laboratories; the need for educational technologies in the classrooms and laboratories and whether any were already suitably equipped; the most appropriate option and additional options for deans from the previous report; the types of equipment available to colleges and schools; the nature of existing network support and the internet speeds at which classrooms are served; the need for technical support; and the number of classrooms that needed to be equipped with educational technologies in the short, medium and long terms. Commensurate with the option list (Table 1), action plans were put together in accordance with options 5 and 6 for future educational provision, particularly addressing the number of classrooms that needed to be prepared for this purpose.

The second questionnaire was designed and circulated to the college deans to solicit further information on the compatibility and readiness of the existing building infrastructures campus-wide, to enable the administration to determine imminent structural needs and any associated upgrades that were necessary. This questionnaire focused on the prevailing general situation of classrooms and the construction work needed to renovate any deteriorating infrastructure, including the placement of contemporary seating arrangements in the classrooms and the need to repair or replace existing student seats; the condition of floors, walls and ceilings in the classrooms; the status of windows, curtains and doors; the placement of luminaires; the status of fans, air conditioning and heating units; any issues related to moisture or water leakage in the classrooms; and what was direly needed or immediately required to fix the situation. Analysis of the second round of questionnaires readily pointed to the extent of the need for maintenance work in the classrooms, and the appropriate time frame to meet college and school needs.

These two different questionnaires were circulated to the various colleges and school deans who were asked to furnish any information that the technical teams

Table 2 Comparative assessment of the various options under consideration

Option number	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Features							
Ease of use	Least convenient	Mildly convenient	Convenient	More convenient	Convenient +	Convenient ++	Most convenient
Adaptability	Poor	Low to moderate	Good	Pretty good	Very good	Extremely good	Superior
Scalability	Poor	Low	Good	Good	Pretty good	Moderate to high	Very high
Productivity	Poor	Low	Moderate to good	Good	Pretty good	Very good	Superior
Performability	Poor	Low	Moderate to good	Good	Pretty good	Very good	Superior
Bandwidth requirement	Low to moderate	Low to moderate	Moderate	Moderate	Moderate +	High	High
Investment level	Low	Low to moderate	Acceptable	Moderate +	Moderate to high	Pretty high	Very high
Recommendations for selections	Low to mild price range Not recommended or for worst-case scenario		Moderate to lower-high price range Recommended range choice			High to more expensive Recommended for future or for limited use for present needs	

may have missed, thereby providing an overall indication of educational technologies already in use campus-wide, and infrastructure conditions at the University of Jordan. Each college dean, in turn, responded by completing the questionnaire and returning it to the technical team presiding over the subject matter. The notion behind this was that the University of Jordan wanted to take the time to exchange meaningful ideas, views, and information with diverse deans about the implementation of an appropriate online learning system. By so doing, the University paved the way for an all-out successful transformation of the educational system at the University.

As the outcomes commensurate with the questionnaires began to surface, great disparities in the needs of the various programs fostered by the University of Jordan started to emerge. Such disparities would readily have imposed huge budgetary burdens on earmarked programs brought forward by the University's upper administration. Further, as things unfolded, this would also have imposed huge overheads when it came to maintainability and serviceability. As a result, it was mutually agreed between the University administration, on the one hand, and the team overlooking the technical undertakings, on the other, to put forward some common options that would by necessity attend to the divergent requirements ensuing from the needs of the different colleges and schools.

Working together with the University administration, the technical teams were able to bring forward two possible options for colleges and schools to choose from. Under the first common option, shown in Table 3, colleges and schools would uniformly make their choices commensurate with possibly a mix of options 2 and 3, as presented in Table 2, which would yield a more economically viable option for most of the lecturing needs campus-wide.

Under the second mutually agreeable option, a limited number of colleges and schools would be looking at an option that would be more compatible with a mix of the choices encompassing options 5 and 6 (see Table 2). Under this second option, the costs involved in equipping most lecture rooms would be prohibitively large

Table 3 Standard common lecturing equipment for model classrooms

Internet (wired and wireless)
Desktop computer (all-in-one touch screen with controlled access using UJ username, password, and hardware security key or automated ID swipe option)
Computer desk with lockable drawers/cabinet
Professional audio system (speakers and wireless microphone)
Writing pad
Data show ($\geq$ 3500 lm brightness for regular size rooms and $\geq$ 5000 lm for large rooms)
Presentation remotes (PPT clicker + laser pointer)
Projection screen
HD livestreaming camera (non-tracking, wide-angle capable of capturing lectures including writing on white board)
White board (already available in majority of classrooms but can be replaced with permanently painted wall board)

Table 4 Lecturing equipment encompassing production gear; distinguished lecture rooms only

Internet (wired and wireless)
Desktop computer (all-in-one touch screen with controlled access using UJ username, password, and hardware security key or automated ID swipe option)
Computer desk with lockable drawers/cabinet
Professional audio system (speakers and wireless microphone)
Writing pad
Data show–smart board integrated system or Interactive LCD display (with spotlight presentation remote)
Presentation remotes (PPT clicker + laser pointer)
White board (already available in majority of classrooms but can be replaced with permanently painted wall board)
FHD tracking livestreaming camera (could be more than one)
Possibility of mixing system (only for high quality lecture capturing needs)

for a university with limited overall budgetary allocations. Therefore, it was agreed between the parties that most academic colleges and schools would get a set of equipment as shown in Table 3 for most lecture classrooms. However, there were colleges and schools that needed special equipment to allow for the possibility of producing academic materials for local institutional consumption and/or for commercial distribution. For those colleges and schools, the University administration gave permission for a small percentage of lecture rooms to be equipped with special equipment to fulfill specific academic requirements, as shown in Table 4.

5 Induction of Academic Governance to Legislate Online Learning at the University of Jordan

In 2020, the Higher Education Council at the Ministry of Higher Education in Jordan formed a national committee headed by the Vice President of the University of Jordan to contrive a plan for embedding online learning in the higher education system. In 2021, with major contributions from all higher education institutions, the proposed plan was approved, and later that year an official bill was passed into law, via a royal decree, which constituted a milestone development in the higher education system in Jordan. Accordingly, the Higher Education Council issued its bylaws for embedding online learning in the higher education system. In 2022, the relevant criteria for embedding online learning were, in turn, issued by the Accreditation and Quality Assurance Commission for Higher Education Institutions. Recently, the University of Jordan ratified its own local bylaws and procedures for online learning and distance education.

Following the choices to which the University of Jordan had committed, the deans' council instated sets of bylaws commensurate with the learning paradigms

currently in place at many academic institutions around the world. In doing that, the upper administration adopted governance that fosters distance-education paradigms commensurate with:

i) *In-person learning*; here the University adopted a paradigm of education whereby all academic activities are executed via in-person learning, fostering the presence of both the instructor and students in a classroom environment. In this option, no mix with other educational paradigms was allowed.
ii) *Online learning;* here the University fostered a paradigm of learning wherein students and instructors would commit to a 2:1 ratio of synchronous to asynchronous learning. This meant that, out of three weekly lectures of a given course, students would attend synchronously administered lectures twice a week but the third lecture would be delivered in recorded unattended electronic form, so that students would subscribe to such lectures in a manner that would be commensurate with their own pace and time allowance.
iii) *Hybrid-mode learning;* under this learning paradigm, half the students registered to any course would attend class activity in-person, while the other half would simultaneously subscribe to the online mode of learning; students would then alternate their learning modes from one class to the next throughout the course.

The University bylaws regarded technically oriented (scientific, engineering, medical colleges) programs and humanities-oriented (all other colleges) programs rather differently. In the former, the various colleges were allowed to deliver their course syllabi, as spread across a student's duration of study, according to the following schedule: of the entire curricular offering under a given specialty 10% would be delivered electronically (online), 30% would be delivered under the hybrid mode of learning, and the remaining 60% would be administered in-class. The deans' council left the choice of the courses offered by each college, under the three categories, to be undertaken by the academic departments concerned in coordination with the deans of the colleges and schools involved. However, in the humanities-oriented programs, the University administration (deans' council) recommended the following schedule of the entire curricular offering under a given specialty, as spread across a student's duration of study, 10% would be delivered electronically (online), 40% would be delivered under the hybrid mode of learning, and the remaining 50% would be administered in-class.

6 Infrastructure Considerations in Support of Online Learning at the University of Jordan

Just prior to COVID-19, the University of Jordan, like many other academic institutions, had been ill-prepared for, and lacked a proper infrastructure that would stand in support of, any form of distance education. Such a situation readily placed academic institutions at a disadvantage and immediate measures were needed to mitigate the ensuing effects. Regular operations of many academic institutions around the world

were disrupted, if not halted altogether. Exceptions did exist, of course, especially in academic institutions that were originally partially geared towards some level of online delivery of academic programs as part of their regular standard procedures; even here, academic institutions that were deemed to be ahead of the crowd in their preparedness still had to reorient their programs to offer total distance education. In the wake of COVID-19, the University of Jordan was awakened by the realities of:

- A lack of proper institutional network infrastructure in terms of adequate access to the world wide web;
- A lack of internet speeds that were sufficient to support the imminent needs of the situation, even when network access was supported;
- A lack of the ability of faculty members to deliver the teaching materials from their homes, during lockdown times, due to lack of infrastructure, readiness, and preparedness;
- A lack of infrastructure preparedness on the part of the University;
- Issues associated with securely administering course assessments remotely.

6.1 Measures Undertaken by the University of Jordan to Remedy the Situation

As the world was recovering from COVID-19 and the world population was preparing to resume activities, academic institutions that had fallen behind during the lockdown years started, despite future uncertainty, to develop their strategic plans. Universities that had been ill-prepared at the times of COVID-19 made serious efforts to undertake multiple upgrades to their building, technical, and connectivity infrastructures; this included the University of Jordan and also came at a time when it was undergoing change in the upper administration. The incoming top management of the University assumed its leadership at a time of economic hardship that was not particularly associated with the COVID-19 era but was also predominant pre-pandemic. The processes that were followed to induce the much-needed measures are illustrated in Fig. 2.

Following ample discussions at the University Administration and Deans' Council levels, and to meet the needs of in-person, online, blended and hybrid (concurrent) learning and teaching paradigms, and in support of the University's endeavors to be part of the movement of global open educational resources, it was concluded that long-term investment into the future of e-learning at the University of Jordan was inevitable despite financial challenges. Therefore, it was decided to equip all classrooms with state-of-the-art smart systems that allow lecture capturing and full interactivity between lecturers and students within the classroom realm or outside. Adopting the same smart systems for all classrooms, regardless of school type, inherently guarantees major advantages, including ease of maintenance and cost-effective procurement of spare parts, efficient training of teaching staff on the utilization of the systems, and hassle-free mobility for teaching staff in different classrooms across

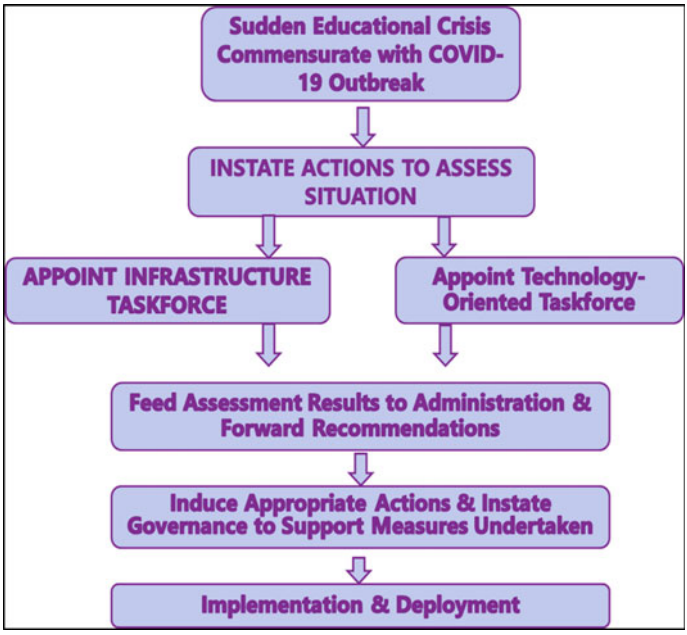

Fig. 2 Illustration of the sequence of events that was undertaken to induce the necessary changes in support of online learning at the University of Jordan

different buildings. Furthermore, this would also allow a minimum level of system compatibility for teaching staff irrespective of the physical teaching spaces they are assigned to teach in. The smart classroom system to be adopted was consequently based on a digital podium with a touch-sensitive display; a regular or an interactive projector, depending on the classroom size; an external non-tracking FHD camera for livestreaming and lecture capturing; an audio system with wireless microphones for lecturers and students; and an audio–video mixer. Furthermore, it was agreed that each school would be provided with at least one smart multi-purpose venue that can accommodate virtual meetings, seminars, workshops, and some graduate level courses. In addition to the features mentioned previously, these venues would be equipped with tracking cameras and interactive displays.

In the process, the University of Jordan found itself having, as a result, to cope with:

- Revamping an already deteriorating building infrastructure campus-wide,
- Retooling and retraining of the faculty body on distance education,
- Reassessing and revising University accessibility to the internet,
- Gearing the classroom space with the needed educational technologies in support of the educators involved.

To commit itself to such strategies, the University of Jordan entrusted the tasks involved to two taskforces:

1. A taskforce charged with feeding in recommendations pertaining to:
    a. Overall building infrastructure of the academic buildings,
    b. Classroom furniture infrastructure,
    c. Surveying imminent needs for academic undertakings.
2. A taskforce charged with feeding in recommendations on technology-related matters in the academic process, which included:
    a. Assessing the various technology-related requirements of the colleges and schools,
    b. Reviewing the various options available to equip the classroom with the needed educational technologies.

The first task force included experts from the colleges and schools of engineering and fine arts and design, together with employees representing the physical plant and the engineering and maintenance departments. The second task force involved experts from several colleges and schools and a high-level representation from the Computer Center and School of Information and Technology. In brief, the University of Jordan committed to restructuring academic programs and course plans in line with the requirements of distance education and e-learning, taking into consideration the requirements of existing diversities in its program offerings. The University incorporated blended learning materials with a percentage not exceeding 60% but not less than 40% for humanities and social fields, while this percentage did not exceed 50% and did not fall below 30% for scientific, health and medical fields for the entirety of any program as compared to the conventional face-to-face (in-person) programs.

7 Conclusions

Prior to the outbreak of COVID-19, several universities from around the world were already in the business of delivering their academic programs in the distance-education mode, either as a fully fledged business model or as a part-time undertaking. Many universities that had adopted distance education as their sole mode of operation were not fully recognized by official accreditation organizations nor were they receiving the same attention and ranking amongst more renowned academic institutions. In fact, many countries in the third world refrained from recognizing such institutions for lack of conviction, the opposite of their impact on the audiences involved, or due to the prevailing attitudes dealing with the quality of delivered product to the relevant job markets. Nonetheless, a number of world-class, well established academic institutions in the United States and Europe had already partially adopted distance education, which was primarily intended to serving the

imminent needs of recipients that resided in widely spaced geographical stretches but genuinely wanted to attend such distinguished academic institutions, and also those private sector employees who were in pursuit of graduate studies but did not want to quit their already rewarding job careers.

When the COVID-19 pandemic broke out, the large bulk of academic institutions who never were in the business of delivering teaching material from a distance readily found it in their best interest to start considering suitable options to cope with the imminent needs of their constituents. In this sense, the academic world suddenly woke up to a new reality! Many universities found themselves handicapped by being unable to cope with the prevailing lockdown times. The University of Jordan was one such institution that found it incumbent upon itself to promptly venture into the new realm of distance education. The University was obliged to design and approve educational contents appropriate for interactive e-learning materials with regard to intellectual property rights (copyrights) and the use of modern learning methods consistent with e-learning. It was emphasized that digital tools could only complement, and not offer an alternative, to the effectiveness of face-to-face learning. Nonetheless, the University of Jordan is continuing its efforts to promote the use of electronic alternatives for teaching, assessment, examinations, breaking out of stereotypes, and developing teaching dossiers and course curricula in accordance with modern concepts, as well as digitizing all academic, administrative and financial procedures and making provisions for the multitude of infrastructural changes involved.

Distance education and online learning provide an opportunity to reduce certain overheads and reach out to larger audiences, especially for those who are unable to attend academic activities on campus. This also may become a new source of income for the University by attracting students from outside the country and for students who are unable to enroll on a full-time basis. The University of Jordan is committing itself to providing an integrated learning management system, security, protection, and a capable information technology environment, as well as to qualifying the academic, administrative staff and students through professional training environments. Such commitment is rapidly helping the University venture into the new realm of distance education and e-learning via the processes and remedial actions fully delineated in this chapter. In the meantime, the question: "**Distance Education: Is it any Longer a Paradigm of Choice?**" will still be foremost in the thinking of any academic institution.

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