



# From Online Learning to Digital Transformation

## *The New University Normal*

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### Abstract

The advent of the worldwide web and progress in the information and communication technologies in the 1990s have boosted online learning and the use of digital platforms. The transformation of the web from a repository of hypertext documents to a highly interactive communication medium, accompanied by a shift in learning theory from the traditional educational theory of behaviourism to that of cognitivism and constructivism supported by technology and tools such as digital libraries, has immensely contributed to the effectiveness of online learning, the benefits of which are now unchallenged. The adoption of online learning requires a well-structured approach and continuous adaptation to a fast-changing environment. This chapter expands on the University of Mauritius' experience in moving from distance education to online delivery through the training of staff and investment in infrastructure, in particular stressing the role played by the Centre for Innovative and Lifelong Learning, the Centre for Information Technology and Systems, and the digital library in that transformation, in addition to the quality assurance mechanisms which are put in place.

In these early days of the Fourth Industrial Revolution, with fast progress in artificial intelligence and data science, it becomes imperative for universities to now move a step further by embracing digital transformation as a series of deep and coordinated cultural, workforce, and technological shifts for enhanced operations and strategic directions, and valuing propositions. Libraries have a key role to play in supporting universities in this transformation phase. The e-library is no longer the endpoint, as librarians should move from the knowledge of collection to the knowledge of the users.

**Keywords:** Online learning; e-library; online delivery; digital transformation; University of Mauritius

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### Introduction

The COVID-19 pandemic and the confinements imposed by countries all over the world as from March 2020, constrained schools, colleges, and universities to shift to online learning to mitigate school disruption. This fast move to the use of digital platforms, video conference tools, and online learning software was made possible thanks to the relative maturity of the education technology sector which reached global investments of US\$18.66 billion in 2019 (Markets Insider 2020). However, we should go back to the past three decades when online learning experienced a boost with the advent of the worldwide web and progress in the information and communication technologies in the 1990s. Even after 30 years, important disparities exist in the adoption of e-learning across regions in the developed and developing worlds because of a lack of equipment and training, inadequate infrastructure, poor internet due to insufficient bandwidth, and unreliable electricity provision. This non-uniform distribution of e-learning is also explained by the fact that many educators raised doubts about the quality and benefits of this delivery mode. The challenge to use online learning in the experimental and medical sciences has also been a deterrent to its widespread application. With universities in most countries still affected by the pandemic and even those who allege to be COVID-19 safe having started the new academic year 2020–2021 on online and blended learning modes, it appears that e-learning is set to last and could facilitate operations in the new university normal. Is the pandemic a blessing in disguise for the education sector and can it bring about that paradigm shift from traditional education based solely on knowledge to one imparting both knowledge and skills in line with the requirements of our 21<sup>st</sup>-century society? Can this digital transformation go beyond processes, technology, and tools, and embrace people? Already in 2006, experts were referring to the perfect e-storm where online learning environments were facing the fact of involving pedagogy, technology, and learner needs (Bonk 2004; Kim, Bonk, & Zeng 2005; Kim & Bonk 2006).

This chapter will review the evolution of e-learning and educational technologies over the past 30 years, the benefits of online-learning, the impact on students, and the challenges and opportunities ahead. It will also provide an overview of the progress made at the University of Mauritius (UoM), moving from distance education in the 1990s to online and blended learning and the adoption of the learner-centred credit system in 2019. Reference will be made to the required staff training and infrastructure developments, including the development of the e-library. Information on how these developments set the pillars for a robust, modern university, enabling UoM's transition into the 'new normal,' will be shared.

## Evolution of Online Learning since the 1990s

The advent of the worldwide web in 1991 triggered the expansion and growth of online teaching and learning (Kentnor 2015:21-34). Indeed, online learning is the application of information and communication technologies (ICT) and electronic media in education in its various forms, like multimedia learning, technology-enhanced learning, computer-aided instruction, web-based training, and m-learning, to enhance and/or support learning. It can be divided into different types: Web-supplemented courses focussed on classroom-based teaching that include elements such as putting a course outline and lecture notes online, the use of e-mail, and links to online resources. Web-dependent courses require students to use the internet for online discussions, assessment, or online project/collaborative work (OECD 2005).

Online education can be categorised as 1) university-based online education targeting university students enrolled for a degree programme; and 2) massive open online courses (MOOCs), whose users are self-motivated individuals and whose programmes are based on their learning goals, prior knowledge and skills, and similar interests (Sun & Chen 2016:161).

Beyond the mere application of technology, two major landmarks in the evolution of e-learning can be noted. The first is the transformation of the web from a repository of hypertext documents to a highly interactive communication medium, and the second is a shift in learning theory from the traditional educational theory of behaviourism to that of cognitivism and constructivism (Chukwunonso, Ibrahim, Selamat, Idama, & Gadzama 2013:7). Face-to-face teaching and learning have been criticised for encouraging passive learning, ignoring individual differences and needs of the learners, and not paying attention to problem solving and critical thinking (Appana 2008:6).

In the 2000s, online-learning experienced a boost as businesses invested in the training of their employees to enhance their skill sets. Online learning platforms that have emerged in the market are Udemy, Coursera, Lynda, Skillshare, and Udacity. Coursera provides access to university courses. Learning how to learn, critical thinking, and communication are amongst the most popular online courses as they fulfil the need for developing the skills of today and tomorrow (Coursera 2020).

## Benefits of Online Learning

In the early phases, online learning suffered a plethora of criticism such as the difficulty to extend it to all courses and to solve difficult teaching and learning problems (Conlon 1997:36-37), the limited understanding of how many students and instructors need to know how to successfully participate,

using information and communication technology (Brandt 1996), the changing nature of technology, the complexity of networked systems, reduced standards, and even devaluated university degrees (Gallick 1998).

However, over the years the benefits of online learning from the perspectives of the students, the instructors, and the organisation have been acknowledged (OECD 2005; Appana 2008; Hitz & Turnoff 2005:60-62; Van Popta, Kral, Camp, Martens, & Simons 2017:24-34). From a student's perspective, several key benefits can be given: 1) Wider access to education; 2) enhanced flexibility to reconcile learning with the demands of work and family; 3) greater student-student and student-educator interaction and collaboration; 4) self-paced learning and independent problem solving by learners; 5) the possibility to acquire ICT knowledge and simultaneously develop ICT skills; 6) online or blended courses resulting in better learning effectiveness than face-to-face courses; and 7) students who can now enrol on international courses and develop collaborative work. The value to the instructors is that they are now able to treat all students equally, and to prepare and deliver the material of the course as a single entity.

To Säljö (2010:53), technology goes beyond merely supporting learning: Technology alters 'how we learn and how we come to interpret learning' where there is interdependency between what we learn and through what medium we learn. However, a word of caution is warranted here as other variables also come into play for successful learning such as the commitment and engagement of students, how the group is participating in the class, and interaction with educators/mentors (Sternberg & Preiss 2005:xiii-xxi; Toyama 2011).

In addition to those benefits, the organisations can engage in partnerships with other international institutions, benefitting both from educational and economic perspectives. Through the development of joint programmes, costs can be shared and strategic as well as financial risks reduced (Appana 2008:18).

### Improving Online Education Effectiveness

For the past two decades, educational researchers from diverse disciplines have been trying to identify the success factors of learning with digital media in higher education (Mothibi 2015; Stepanyan, Littlejohn, & Margaryan 2013; Volery & Lord 2000). Studies have shown that effective online learning is dependent on three major factors (Sun & Chen 2016:161-169; Roddy, Amiet, Chung, Holt, Shaw, McKenzie, Garivaldis, Lodge, & Mundy 2017:2-3; Means, Toyama, Murphy, Bakia, & Jones 2009:3-6):

- The competencies of the instructor, including communication skills, technological competencies, the provision of informative feedback,

administrative skills, responsiveness, monitoring learning, providing student support in line with the Technological Pedagogical Content Knowledge model which promotes the integration of technology, content knowledge, and pedagogy (Mishra & Koehler 2006:61-64).

- Types and quality of student engagement: In asynchronous modes of communication, learner-to-content, learner-to-instructor, and learner-to-learner interactions are crucial (Bolliger & Martindale 2004:62). This has also been classified as social presence (Kehrwald 2008:91; Swan, Garrison, & Richardson 2009:47). Proactiveness, a self-directed approach on the part of students, and self-regulated learning (Khiat 2015; Kirmizi 2015:133-134) lead to better performance. Active engagement in academic material with instructors and peers has proved to be very effective for students (Dixson 2012:7-9). Providing effective communication and interaction is a key element in online learning. To enhance active learning, it is important to incorporate meaningful and multiple ways of interacting with students and encouraging/requiring students to interact with each other. A variety of formats are available for online interaction, but they may have to be adapted to the particular pedagogy used by instructors to enhance critical thinking (Roddy *et al.* 2017:3).
- Institutional support to the students is also crucial: Orientation services, library resources, technological requirements, and access to online tools (Roddy *et al.* 2017:5-7; Means *et al.* 2009; Mishra & Koehler 2006:62; Bolliger & Martindale 2004:65; Kehrwald 2008:99; Khiat 2015; Ludwig-Hardman & Dunlap 2003). The digital library as opposed to the traditional library is not only a provider of information but also ensures a conducive learning environment and resources network for e-learning (Sharifabadi 2006). The Bibliotheca Alexandrina in Egypt is a vivid example of the wide range of support that digital libraries can provide to enhance online learning (Abumandour 2020:184-185).

Well-designed course content and the creation of a sense of an online learning community also promote online learning (Tallent-Runnels, Thomas, Lan, Cooper, Ahern, Shaw, & Liu 2006:116; Yuan & Kim 2014:221-222). Assessing the use of digital learning environments in higher education with regards to learning outcomes is important to evaluate learning success (Kümmel, Moskaliuk, Cress, & Kimmerle 2020:5). Over and above the advantages of offering courses online rather than a traditional face-to-face delivery, the enhanced effectiveness of the blended approach is more and more acknowledged by the educational community as it promotes learner satisfaction while it also helps to better achieve learning outcomes (Lim, Morris, & Kupritz 2007:815). Other advantages of blended instruction include improved pedagogy, easy access to knowledge, more interaction among learners, personal presence,

cost effectiveness, and ease of revision of learning content (Osguthorpe & Graham 2003:231).

### From Distance Education to Online Delivery: The UoM Experience

Founded in 1965, the UoM is the oldest university in Mauritius, with seven faculties and a student population of 10,000 at undergraduate and postgraduate levels. Since 2017, the vision of the UoM is to develop into a research engaged and entrepreneurial university.

The UoM started exploring alternative modes of educational delivery in the early 1990s, just after the setting up of the office of Distance Education and Curriculum Development (UoM 1994:23-24). The Centre for Extra Mural Studies (CEMS) was created, and its immediate objective was to identify modules that were being offered through different faculties, including large cohort year 1 modules such as IT, Communication Skills, and Mathematics, offering it in distance education (DE) mode. The mode of delivery was mostly print-based where students were learning on their own and met into smaller groups for tutorials to work on activities and to discuss relevant issues (UoM 1997:50). This was an early model of the flipped classroom. In the early 1990s, this represented a major milestone for the UoM and the academic community.

Since 1993, the UoM never looked back again in terms of DE and online learning. A number of initiatives and reforms, initiated over the following 25 years, have changed the culture of teaching and learning at the UoM.

In 1996, the name of CEMS was changed to Centre for Distance Learning (CDL) (UoM 1997:50), and the first instructional designer of the UoM was recruited. In 2001, the VCILT (Virtual Centre for Innovative Learning Technologies) was set up, specialising in online learning (UoM 2001:73). In 2003, to optimise resources of CDL and the VCILT, the Lifelong Learning Cluster (LLC) was created to act as a virtual structure that gave the centres the same powers as a faculty to offer programmes through an academic board (UoM 2004:83). Through the LLC, both centres would start designing full-fledged programmes on DE/online and blended learning modes, as opposed to just offering modules as a service to other faculties.

Through these modes of delivery, the market for lifelong learning/lifelong learners and commissioned courses for the industry could then be explored. In 2005, CDL was again renamed, this time to CPDL (Centre for Professional Development and Lifelong Learning) to reflect the new direction (UoM 2005:71). Programmes for civil servants, cadres in the port sector, and police officers were launched. Through these programmes, the centres started to have spill-over effects which influenced the faculties. These programmes were developed by faculty members in different faculties who were accompanied by an instructional designer, and they would thus be groomed in DE and

online learning. With time, the faculty members became autonomous content developers of self-instructional material. The VCILT projects with the Virtual University for Small States of the Commonwealth and the Commonwealth of Learning (UoM 2007:3), were also trying to bring about the open educational resources mindset and the use of open educational resources.

In 2014, VCILT and CPDL merged to become the Centre for Innovative and Lifelong Learning (CILL) which acts as a one-stop shop for the design and development of modules and programmes for lifelong learners, using innovative modes of teaching and learning. CILL is now aggressively launching online/blended learning programmes and has as clients the Mauritius Police Force, Mauritius Export Association (representing import and export companies in Mauritius), the Mauritius Ports Authority, and insurance companies.

With these different programmes, CILL continues to recruit researchers from the different faculties as content experts and hence immersing more and more academic staff into the online/blended learning philosophy (learner centredness, flipped classroom, innovative modes of assessment, use of learning management systems [LMSs], and accreditation of prior learning).

The acceptance and adoption of technology also required a more direct approach, including the training of academic staff over the past 20 years as discussed below. According to Toyama (2011), technology does 'not cure unhealthy educational systems; at best, it only augments healthy ones.' Hence, merely focusing on technology is not adequate unless there is a change in mindset and adequate training in pedagogy to tap the potential of online learning.

### *Training of Staff*

As far back as the early 1990s, there was a realisation that the academic community, apart from its training in its respective disciplines, also needed training in the field of teaching and learning and quality assurance. Therefore, the UoM started investing seriously in the training of its academic community. There were schemes to encourage them to pursue higher degrees (Masters and PhD) and in addition, a number of workshops and training sessions were organised on quality assurance (QA), distance and online learning, designing effective modes of assessment, and the integration of technology in teaching and learning. The training involved short-term, non-award courses as well as award-/credit-bearing modules and full-fledged programmes. Partnerships with both English- and French-speaking organisations have been instrumental in the capacity building for distance/online learning at the UoM.

In the 1990s, through funding from the Canadian Government, a number of training programmes were specifically geared to train staff in distance and online learning:

- The Canadian International Development Agency funded a project that led to the creation of CEMS, where key personnel were trained on DE administration and instructional design (UoM 1998:62).
- PRIMTAF 1996-1997 (Programme de Renforcement Interinstitutionnel en Matière Technologique en Afrique Francophone) was a project where academic staff from different faculties were trained on how to develop learning material where they had to actually develop modules that would be used in existing UoM programmes (UoM 1997:53).
- A project of the Agence Canadienne pour le Développement International, called CAERENAD (Centre d'Apprentissage et d'Etude et de Ressources en Formation à Distance) was launched, where more academic staff were trained and, with key personnel from CILL, received their more formal training on distance and online learning. With this project, more emphasis was laid on the integration of technology (UoM 1998:63).

These training programmes and exposure to international projects have contributed to bring about a new teaching and learning culture among the academic community. The solid pedagogical grounding and maturity, hence achieved, ensured that during the COVID-19 confinement, academic staff members were able to tap from their own repertoire of knowledge, skills, and experience, and experiment with different pedagogical and technological models that would work for their students and their disciplines.

One ongoing initiative in the field of teaching and learning that was launched in 2002 (UoM 2003:73-74) is the Postgraduate Certificate/Diploma/MSc in Teaching and Learning in Education. Since its launch, this programme has involved academic staff from all the faculties. The first module of the programme, 'Academic Induction' is still a compulsory module for all new academic recruits who are only confirmed on the establishment of the UoM after they have successfully completed this module. Although this training is about teaching and learning theories in general, it provides academics with a solid foundation in pedagogy (e.g., writing learning outcomes, constructive alignment, designing assessment, and rubrics) that would facilitate the transition to online/blended learning and also provide them with the pedagogical agility to adapt to unplanned disruptions such as the COVID-19 lockdown.

### *Infrastructure Development*

To facilitate the evolvment towards digital transformation, UoM developed the infrastructure discussed below.

### **Modernising the UoM Library**

Over the past 30 years, the UoM library has modernised its services to provide better services to the academic and student communities on campus as well as to serve other researchers/members of the public. The computerisation of the UoM library started in 1995 and since 2007, the UoM library switched journal subscriptions from printed to electronic journals to reduce the cost of subscriptions, while providing access to a wider range of e-journals (UoM 2007:79; 2008:71). With this move, students and academic staff could access research materials anytime and anywhere.

In 2018, the UoM launched its e-library (UoM 2018a; 2019) in order to improve the delivery of adequate library services to the increasing number of registered users of the library as well as to satisfy the multiple requests received from individuals who are not registered members of the university, but still wish to have access to its valuable and often unique library resources. The e-library aims to transform the UoM library into an institutional repository of the institution's books, papers, dissertations/theses, and other works which can be digitised, or which were 'born digital.' The setting up of the e-library was immediately followed by the opening of access to its electronic resources that do not fall under the Digital Rights Management restrictions to members of the general public against payment and under certain specific terms and conditions. In 2019/2020, the e-collection was open to all public ethical institutes and the public (UoM 2020a:262).

On 31 July 2020, the UoM e-library collection consisted of around 100,000 e-books, 14,200 dissertations/theses, 25,000 journals, 3,600 lectures, seminar style talks and case studies, and 700,000 law cases, as well as a wide range of legislation, legal commentaries, and handbooks, journals, and bulletins. Additionally, the UoM e-library was further developed and consolidated with the contents of EbscoHost, Emerald Insight, ScienceDirect, Henry Stewart Talks, and also the LexisNexis and Dalloz law databases, as well as the UpToDate collection of medical journals and the Datastream collection of Financial and Economic Research Data. Free access was also available to the electronic journals in JSTOR (Scholarly Journal Archive) and the Directory of Open Access Journals. UoM dissertations/theses that were 'born digital' are already being stored in their origin format on the library server and they can be accessed via the UoM intranet. Other parts of the library print collection are being digitised within the parameters and without any infringement of the existing copyright legislation (UoM 2019:294-295).

The introduction of the e-library has led to a more optimal use of resources in terms of costs, physical space, and time. More library open floor space is now available as study area for students, thus alleviating the pressure by students on its print collection. At the same time, the UoM library has

become accessible to a greater number of users who may not be traditional patrons of a library, and to the general public for a wider and more optimal use of the resources and services. In addition, the time between the ordering of e-material and their availability in the collection has drastically been reduced. The e-library has also contributed towards the preservation of print material by providing access to copies of documents that otherwise fall to degradation from repeated use. Digitisation definitely enhances legibility and removes visible flaws such as stains and discoloration. Additionally, the pressure on limited space in the library building has been relieved as users can now access this material online on a 24/7 basis. Information retrieval has been enhanced through the adoption of innovations in technology to provide users with online access to the library catalogue as well as multiple search terms (author, title, subject, keywords, and phrases) to the entire electronic collection.

Noteworthy is that apart from the UoM library, library patrons also have a parallel system of accessing databases and the internet. As far back as 1993, SYFED (System Francophone d'Édition et de Diffusion) was set up to provide resources to researchers through an online database and CDROM. The AUPELF/UREF project eventually equipped the SYFED with REFER (Réseau Electronique Francophone pour l'Éducation et la Recherche – which was basically the Francophone internet) (UoM 1996:4). These facilities allowed researchers to access numerous international journals, especially francophone material. Now known as the AUF (Agence Universitaire Francophone), it has a unit, CAI (Centre d'Accès à l'Information, renamed to Campus Numérique Francophone in 2006) that continues to offer access to a vast collection of resources. The setting-up of the e-library at the UoM has been instrumental in supporting the learner-centred credit system and online delivery at the university, hence contributing to its digital transformation. The ease of access to e-resources – electronic books and scholarly journals, web-based catalogues, as well as bibliographic and full-text databases – was particularly beneficial to academics and students during the confinement period. In addition, free access to the library's e-resources was made available to the public as a means to support knowledge building and innovation.

#### **The Setting-up of the Centre for Information Technology and Systems (CITS)**

CITS was set up in 1998, after a restructuring of the former computer centre of the faculty of Engineering (UoM 1998:65). The core contribution of CITS over the following years would be to develop the student information systems, the management information systems, and other services that would help to modernise the university. CITS represents the IT backbone of the UoM around which all the activities of the UoM transit through.

Since 2004/2005, all the UoM services are online, from application to graduation: Students apply online, while they have access to a toolkit, launched

in 2008 (UoM 2008) that facilitates the choice/selection of programmes based on results and combinations of subjects. Students are notified via e-mail about the outcome of their application and until they graduate, results, transcripts, and all UoM correspondence are done via e-mail. Therefore, during lockdown, students had a line of communication with the UoM. Hence, despite the fact that the national lockdown coincided with the peak application period for fresh university students, the Admissions and Student Records office was able to function fully and process fresh applications for the new academic year.

In 2012, the UoM was equipped with free Wi-Fi and was considered as having 'one of the largest Wi-Fi networks in the island and that there are currently about 12,000 users subscribed on the UoM Wi-Fi Network' (UoM 2013:135). This facilitated access to the valuable resources and services to enhance online learning.

As from 2014, the UoM has been implementing its University Integrated Information System with modules like Oracle Financials, Payroll, iProcurement, Core HR, Employee self-service, and procurement contracts (UoM 2014:200). Hence, during national lockdown, management, as well as administrative and technical staff were able to work from home in a seamless manner.

Apart from providing the IT infrastructure for the administration and management of UoM, CITS has also been contributing to enhance the teaching and learning experiences of the academic and student community (UoM 2020a:285-290; UoM 2020b). Academics at the UoM are encouraged to embrace ICTs to support their teaching and student learning through the blended learning concept.

The two LMSs that are currently used by the UoM community are Moodle and Google Classroom. The university also uses the Canvas platform to deliver an MBA degree in collaboration with DUCERE Global Business School. While fully online programmes are delivered via Moodle, Google Classroom is primarily utilised for blended learning for individual modules where lecture material, assignments, as well as quiz and discussion forums are structured on the platform for asynchronous access by the students (based on the flipped classroom model). The synchronous online virtual lectures and discussions are conducted using Google Meet or Zoom.

The university has implemented the Moodle platform on premise and is contemplating the implementation of Moodle on the cloud to improve the accessibility and feature availability.

Prior to the lockdown period, CITS had been testing a number of tools and developing guidelines that would be deployed once the lockdown was imposed: These guidelines/quick reference guides were helpful to ensure that lecturers could mount their own courses on Google Classroom and tap other tools from the G-Suite such as Google Meet (UoM 2020b). These apps can

be easily downloaded on end user devices for anytime/anywhere access. The lecturers and students have a single platform with a similar interface which they utilise for communication, real-time collaboration and online teaching and learning. Zoom has also been adopted by the UoM community as a whole – the academic and administrative staff and students. Recently, the university has launched iLearn, an online platform to promote continuous professional development in different areas. The platform promotes the concept of MOOCs and microcredentials.

Given the dynamic nature of the services offered by CITS to UoM users, be it students or staff (academic, technical, and administrative), training is ongoing to ensure that they are well conversant with the upgrades and changes. CITS provided training to academics on the use of Google Classroom and Google Meet in 2019 and 2020. After the national lockdown and confinement from March to May 2020, additional training was provided to consolidate the skills of the academics and administrative staff to enhance their levels of preparedness (UoM 2020b).

Since the beginning of the academic year 2020/2021, 353 online classes have been created on Google Classroom. It can be said that though the transformation of the UoM with regards the adoption of ICT started 20 years ago, the lockdown acted as a catalyst to accelerate the acceptance of technology in the ‘classroom’ and hence to contribute to the digital transformation of the university.

### *Quality Assurance Mechanisms*

A milestone for the establishment of QA mechanisms in order to transform UoM into a modern university was the creation of the office of distance education and curriculum development in 1993. The main contribution of this office was:

- Modularisation of courses.
- Semesterisation.
- Credit system.

In 1999, the university established a QA team. According to the UoM Annual Report of 1999/2000, that was the year when QA became a ‘guiding principle’ (UoM 2000:11). A series of workshops were organised and student feedback questionnaires as well as module information sheets were introduced. These invitations acted as a ‘paradigm shift’ at the time because it brought about accountability and transparency in the way teaching was being carried out. Teaching and learning would henceforth no longer be happening behind closed doors but would be open for public scrutiny and hence for rigorous quality control. Moreover, rules and regulations that were *ad hoc* and not available

in a consolidated manner would henceforth be available online by means of a compendium.

By 2005, the university was the first public tertiary educational institution to go through an independent QA audit with two more audits being carried out in 2012 and 2018, conducted by the former Tertiary Education Commission, now Higher Education Commission (Mauritius).

In 2018, the Learner-Centred Credit System (LCCS), in the same vein as the European Credit Transfer System was introduced. While the initial credit system, introduced in the early 1990s aimed to rationalise the content of the modules, the LCCS had a more pedagogical concern in line with emerging trends in the field of education and also the landscape of learning, largely dominated by the extensive use of the internet and prevalence of technologically induced teaching methods. The previous system was only computing the number of hours of lectures and practical sessions. The LCCS is based on the workload prescribed for students in order to achieve expected learning outcomes, i.e., the time typically needed to complete all learning activities such as lectures, seminars, projects, practical work, self-study, and examinations.

Table 1 below summarises the main characteristics of the previous and current credit systems of the UoM. In addition to its outcome-based focus, the LCCS lays emphasis on the enhanced use of technology in teaching.

Table 1: Previous and Current Credit System of the UoM

UoM Previous Credit System	UoM Current LCCS
Teacher-centred approach (1.0 CR).	Student-centred learning rather than the conventional one.
Limited time to develop critical/analytical skills.	Active rather than passive learning.
Limited time for independent study/learning.	Focuses on learning outcomes and the enhanced use of technology in teaching.
Over-reliance on lecture notes.	Helps to develop critical and analytical skills and assists students to strengthen their competence in their field of study.
Leads to cramming.	
Overloaded modules and terminal degree syndrome.	Promotes independent learning and self-study.
Difficulty in appreciating the material delivered for a module.	Enhances search and research skills.
Does not encourage innovative learning.	Focuses on reflective and interactive approaches.
Learning hours get out of control.	
No proviso or guidance regarding self-learning by students.	

Source: UoM 2018b.

By converting its modules to LCCS, modules are delivered through the blended learning mode, while technology is mainstreamed in the delivery of programmes.

#### *Status of Online Learning Post COVID-19*

Though the mode of teaching is primarily face-to-face, the university has increasingly been moving towards a blended learning approach for its programmes, with some modules already completely online and with innovative modes of assessment such as project-based assessment and portfolios.

The complete lockdown of the country during the period March to June 2020, almost on the eve of the wrapping up of the academic year, with final exams initially scheduled in May 2020, was a challenge to the UoM management, the lecturers, and the students. At primary and secondary school levels, the government of Mauritius had put in place some form of remote teaching through the national television and online teaching. At the UoM, the challenge was to use the university's own resources to find alternatives. The management of the university had to reschedule all its activities and set the machine rolling to cope with the disruption that was sudden and unplanned.

With hindsight, it can be argued that the UoM successfully transitioned into the 'new normal.' As the academic calendar was expanded by two months, the university was able to reinvent itself within a short time span and explore alternative ways of teaching, learning, and doing other business. Unlike the primary and secondary school levels where government intervention was warranted at the national level, the university pooled its resources to mitigate the impact of the lockdown on the students, the academic community, and administration in general. With several robust pillars and mechanisms already in place, the level of preparedness of the university was high. These pillars and mechanisms, mentioned earlier, which represent the foundation of the UoM, were not set up overnight. They have been introduced and tested, and are now part and parcel of the DNA of the institution.

#### Digital Transformation

There is now ample evidence of the considerable progress made by online learning since the early 1990s through the development of new technological devices, tools, and the internet (Tallent-Runnels *et al.* 2006:93-94). The time has now come for higher education institutions to probably move a step further and embrace the digital transformation which some argue is not a novel phenomenon or a paradigm shift, as it has accompanied higher education institutions for some years now (Kopp, Gröblinger, & Adams 2019:1448; Leszczyński, Charuta, Łaziuk, Gałązkowski, Wejnarski, Roszak,

& Kołodziejczak 2018:151–152). Digital transformation is ‘a series of deep and coordinated culture, workforce, and technology shifts that enable new educational and operating models and transform an institution’s operations, strategic directions, and value proposition’ (Brooks & McCormack 2020). This definition goes far beyond digitisation (of analogue information) and digitalisation (of processes) (Brooks & McCormack 2020).

Digital transformation transcends the mere use of technology, in encompassing how it transforms people, infrastructure, and processes. Similarly, in the higher education sector it permeates teaching, infrastructure, curriculum, administration, research, business process, human resource, extension, digital transformation governance, information, and marketing (Castro Benavides, Tamayo Arias, Arango Serna, Branch Bedoya, & Burgos 2020). The experience gained from online delivery and the development of educational tools should enable universities to fully embrace digital transformation.

The latter is thus not only the adoption of new digital teaching methods and tools, but encompasses new digital processes, helping students in achieving the skills and competencies needed to act in digitalised societies and economies (OECD & EU 2019; Bond, Marín, Dolch, Bendenlier, & Zawacki-Richter 2018:49–50; Sandkuhl & Lehmann 2017:53). Higher education institutions can thus play an important role in helping the industry in skilling/reskilling its workforce as well as adopting emerging technologies. As discussed in the previous sections, e-libraries have a prominent role to play in this transformation, which is key to supporting innovation in universities, enabling them to better impact on society.

Such a transformation is not a purely linear process, but the result of four components acting simultaneously: 1) Realigning higher education with the information age; 2) redesigning higher education to achieve this realigned vision; 3) redefining the roles and responsibilities within realigned, redesigned higher education; and 4) reengineering organisational processes to achieve dramatically higher productivity and quality (Dolence & Norris 1995).

The digital transformation process involves an adequate strategic preparation, trust establishment, thinking in processes, amalgamation and reinforcement of all parties involved, as well as separate, collaborative, and organisational knowledge (Adedoyin & Soykan 2020:2).

## Conclusion

Online delivery of lectures, the development of educational technologies, and digital libraries all date back to the 1990s. However, it is a fact that universities in the less developed and developing worlds have been lagging behind, the consequences of which have been felt during the COVID-19 pandemic,

especially on the African continent. Preparedness and proactiveness are very important to face adversity. At the University of Mauritius, the shift to the learner-centred credit system in August 2019 not only aimed to develop outcome-based and independent learning, but also to encourage the use of EdTech in the delivery of lectures. The transformation of the UoM library into a digital library was completed in 2018 and all this helped us to change smoothly through the pandemic and lockdown.

To fully implement digital transformation, a cultural change is necessary to overcome the fear of uncertainty and insecurity (Singapore Management University 2018). This cultural change is necessary as the workforce of the future will have to be fully equipped with critical digital skills, namely information, media, and technology skills; learning and innovation skills; and life and career skills. Public policy will have a key role to play to train the next generation workforce. Universities have to set priorities and overcome a cultural shift resistance; governments have to support and mobilise resources; regional and international institutions should lend their financial support and review their priorities; university networks and associations will have to shoulder their members through adequate training; while industry will have to join hands in the development of a concerted strategy for digital transformation, retraining, and re-skilling of employees. It is a matter of collective effort and partnership as clearly stipulated by Sustainable Development Goal 17 of the UN (UN 2015; Stibbe & Prescott 2020).

## References

- Abumandour, EST. 2020. Public libraries' role in supporting e-learning and spreading lifelong education: A case study. *Journal of Research in Innovative Teaching & Learning* 14(2):178-217. <https://doi.org/10.1108/JRIT-06-2019-0063>
- Adedoyin, OB. & Soykan, E. 2020. Covid-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments* 1-13. Advance online publication. <https://doi.org/10.1080/10494820.2020.1813180>
- Appana, S. 2008. A review of benefits and limitations of online learning in the context of the student, the instructor and the tenured faculty. *International Journal on E-learning* 7(1):5-22.
- Bolliger, DU. & Martindale, T. 2004. Key factors for determining student satisfaction in online courses. *International Journal on E-learning* 3(1):61-67.
- Bond, M., Marín, VI., Dolch, C., Bendenlier, S., & Zawacki-Richter, O. 2018. Digital transformation in German higher education: Student and teacher perceptions and usage of digital media. *International Journal of Educational Technology in Higher Education* 15, 48. <https://doi.org/10.1186/s41239-018-0130-1>
- Bonk, CJ. 2004. The perfect e-storm: Emerging technology, enormous learner demand, enhanced pedagogy, and erased budgets. *The Observatory on Borderless Higher Education* 15(2):1-33.

- Brandt, DS. 1996. Teaching the net: Innovative techniques in internet training. *ERIC Document Reproduction Service*, 1-5. URL: <https://files.eric.ed.gov/fulltext/ED412975.pdf>.
- Brooks, DC. & McCormack, M. 2020. Driving digital transformation in higher education. *Educause*. Available at: <https://www.educause.edu/ecar/research-publications/driving-digital-transformation-in-higher-education/2020/defining-digital-transformation>. (Accessed on 12 November 2020.)
- Castro Benavides, LM., Tamayo Arias, JA., Arango Serna, MD., Branch Bedoya, JW., & Burgos, D. 2020. Digital transformation in higher education institutions: A systematic literature review. *Sensors* 20(11):3291. <https://doi.org/10.3390/s20113291>
- Chukwunonso, F., Ibrahim, RB., Selamat, AB., Idama, A., & Gadzama, WA. 2013. The impact of the internet and world wide web on distance and collaborative learning. *International Multi-Conference on Computing in the Global Information Technology*, 7-15. Available at: [https://www.academia.edu/48380572/The\\_Impact\\_of\\_the\\_Internet\\_and\\_the\\_World\\_Wide\\_Web\\_On\\_Distance\\_and\\_Collaborative\\_Learning](https://www.academia.edu/48380572/The_Impact_of_the_Internet_and_the_World_Wide_Web_On_Distance_and_Collaborative_Learning). (Accessed on 30 November 2020.)
- Conlon, T. 1997. The internet is not a panacea. *Scottish Educational Review* 29(1):30-38.
- Coursera. 2020. Global skills index. Available at: [https://pages.coursera-for-business.org/rs/748-MIV-116/images/gsi2020\\_final.pdf](https://pages.coursera-for-business.org/rs/748-MIV-116/images/gsi2020_final.pdf). (Accessed on 15 November 2020.)
- Dixson, MD. 2012. Creating effective student engagement in online courses: What do students find engaging? *Journal of the Scholarship of Teaching and Learning* 10(2):1-13. URL: <https://scholarworks.iu.edu/journals/index.php/josotl/article/view/1744>.
- Dolence, MG. & Norris, DM. 1995. *Transforming higher education: A vision for learning in the 21<sup>st</sup> century*. Ann Arbor, MI: Society for College and University Planning. URL: [https://www.researchgate.net/publication/31655851\\_Transforming\\_higher\\_education\\_a\\_vision\\_for\\_learning\\_in\\_the\\_21st\\_century\\_MG\\_Dolence\\_Donald\\_M\\_Norris](https://www.researchgate.net/publication/31655851_Transforming_higher_education_a_vision_for_learning_in_the_21st_century_MG_Dolence_Donald_M_Norris).
- Gallick, S. 1998. Technology in higher education: Opportunities and threats. *ERIC Document Reproduction Service*. URL: <https://eric.ed.gov/?q=Gallick+ED415929&id=ED415929>.
- Hitz, S. & Turnoff, M. 2005. Education goes digital: The evolution of online learning and the revolution in higher education. Association for Computing Machinery. *Communication of the ACM* 48:59-64. <https://doi.org/10.1145/1089107.1089139>
- Kehrwald, B. 2008. Understanding social presence in text-based online learning environments. *Distance Education* 29(1):89-106. <https://doi.org/10.1080/01587910802004860>
- Kentnor, HE. 2015. Distance education and the evolution of online learning in the United States. *Curriculum and Teaching Dialogue* 17(1):21-34.
- Khiat, H. 2015. Measuring self-directed learning: A diagnostic tool for adult learners. *Journal of University Teaching & Learning Practice* 12(2). 17 pages. <https://doi.org/10.53761/1.12.2.2>
- Kim, KJ. & Bonk, CJ. 2006. The future of online teaching and learning in higher education. *Educause Quarterly* 29(4):22-30.

- Kim, KJ., Bonk, CJ., & Zeng, T. 2005. Surveying the future of workplace e-learning: The rise of blending, interactivity, and authentic learning. *eLearn Magazine* 6. <https://doi.org/10.1145/1073198.1073202>
- Kirmizi, Ö. 2015. The influence of learner readiness on student satisfaction and academic achievement in an online program at higher education. *Turkish Online Journal of Educational Technology – TOJET* 14(1):133-142.
- Kopp, M., Gröblinger, O., & Adams, S. 2019. Five common assumptions that prevent digital transformation at higher education institutions. *INTED2019 Proceedings*, 1448-1457. <https://doi.org/10.21125/inted.2019>
- Kümmel, E., Moskaliuk, J., Cress, U., & Kimmerle, J. 2020. Digital learning environments in higher education: A literature review of the role of individual vs. social settings for measuring learning outcomes. *Education Sciences* 10:78. 19 pages. <https://doi.org/10.3390/educsci10030078>
- Leszczyński, P., Charuta, A., Łaziuk, B., Gałązkowski, R., Wejnarski, A., Roszak, M., & Kołodziejczak, B. 2018. Multimedia and interactivity in distance learning of resuscitation guidelines: A randomised controlled trial. *Interactive Learning Environments* 26(2):151-162. <https://doi.org/10.1080/10494820.2017.1337035>
- Lim, DH., Morris, ML., & Kupritz, VW. 2007. Online vs. blended learning: Differences in instructional outcomes and learner satisfaction. *Journal of Asynchronous Learning Networks* 11(2):27-42. <https://doi.org/10.24059/olj.v11i2.1725>
- Ludwig-Hardman, S. & Dunlap, JC. 2003. Learner support services for online students: Scaffolding for success. *The International Review of Research in Open and Distributed Learning* 4(1). <https://doi.org/10.19173/irrodl.v4i1.131>
- Markets Insider. 2020. 2019 global Edtech investments reach a staggering \$18.66 billion. Available at: <https://markets.businessinsider.com/news/stocks/2019-global-edtech-investments-reach-a-staggering-18-66-billion-1028800669>. (Accessed on 15 October 2020.)
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. 2009. *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. US Department of Education: Washington, D.C. URL: <https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf>.
- Mishra, P. & Koehler, MJ. 2006. Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record* 108(6):1017-1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Mothibi, G. 2015. A meta-analysis of the relationship between e-learning and students' academic achievement in higher education. *Journal of Education and Practice* 6(9):6-9.
- OECD (Organisation for Economic Co-operation and Development). 2005. E-learning in tertiary education: Where do we stand? *Policy Brief*. December 2005. Available at: <https://www.oecd.org/education/cei/35991871.pdf>. (Accessed on 23 October 2020.)
- OECD (Organisation for Economic Co-operation and Development) & EU (European Union). 2019. *Supporting entrepreneurship and innovation in higher education in Italy*. Paris: OECD Publishing. URL: <https://www.oecd-ilibrary.org/docserver/43e88f48-en>.

- Osguthorpe, TR. & Graham, RC. 2003. Blended learning environments. *Quarterly Review of Distance Education* 4(3):227-233.
- Roddy, C., Amiet, DL., Chung, J., Holt, C., Shaw, L., McKenzie, S., Garivaldis, F., Lodge, JM., & Mundy, ME. 2017. Applying best practice online learning, teaching, and support to intensive online environments: An integrative review. *Frontiers in Education* 2:59. <https://doi.org/10.3389/educ.2017.00059>
- Säljö, R. 2010. Digital tools and challenges to institutional traditions of learning: Technologies, social memory and the performative nature of learning. *Journal of Computer Assisted Learning* 26(1):53-64. <https://doi.org/10.1111/j.1365-2729.2009.00341.x>
- Sandkuhl, K. & Lehmann, H. 2017. Digital transformation in higher education – the role of enterprise architectures and portals. In Rossmann, A. & Zimmermann, A. (Eds.): *Digital enterprise computing (DEC 2017)*, 49-60. Bonn: Gesellschaft für Informatik.
- Sharifabadi, SR. 2006. How digital libraries can support e-learning. *The Electronic Library* 24(3):389-401. <https://doi.org/10.1108/02640470610671231>
- Singapore Management University. 2018. Cultural transformation in the digital world. Research collection of office of executive education. Available at: <https://ink.library.smu.edu.sg/exd/1>. (Accessed on 21 November 2020.)
- Stepanyan, K., Littlejohn, A., & Margaryan, A. 2013. Sustainable e-learning: Toward a coherent body of knowledge. *Journal of Educational Technology & Society* 16(2):91-102.
- Sternberg, RJ. & Preiss, DD. 2005. Preface. In Sternberg, RJ. & Preiss, DD. (Eds.): *Intelligence and technology: The impact of tools on the nature and development of human abilities*, xxii-xviv. New York: Routledge.
- Stibbe, D. & Prescott, D. 2020. The SDG partnership guidebook: A practical guide to building high impact multi-stakeholder partnerships for the sustainable development goals. Available at: [https://sustainabledevelopment.un.org/content/documents/2698SDG\\_Partnership\\_Guidebook\\_1.01\\_web.pdf](https://sustainabledevelopment.un.org/content/documents/2698SDG_Partnership_Guidebook_1.01_web.pdf). (Accessed on 23 February 2021.)
- Sun, A. & Chen, X. 2016. Online education and its effective practice: A research review. *Journal of Information Technology Education: Research* 15:157-190. <https://doi.org/10.28945/3502>
- Swan, K., Garrison, DR., & Richardson, JC. 2009. A constructivist approach to online learning: The community of inquiry framework. In Payne, CR. (Ed.): *Information technology and constructivism in higher education: Progressive learning frameworks*, 43-57. New York: Information Science Reference. <https://doi.org/10.4018/978-1-60566-654-9.ch004>
- Tallent-Runnels, MK., Thomas, JA., Lan, WY., Cooper, S., Ahern, TC., Shaw, SM., & Liu, X. 2006. Teaching courses online: A review of the research. *Review of Educational Research* 76(1):93-135. <https://doi.org/10.3102/00346543076001093>
- Toyama, K. 2011. There are no technology shortcuts to good education. *Educational Technology Debate*, 8. January 2011. Available at: <https://edutechdebate.org/ict-in-schools/there-are-no-technology-shortcuts-to-good-education/>. (Accessed on 23 January 2021.)

- UN (United Nations). 2015. Goal 17: Revitalize the global partnership for sustainable development. *Sustainable development goals*. Available at: <https://www.un.org/sustainabledevelopment/globalpartnerships/>. (Accessed on 31 January 2021.)
- UoM (University of Mauritius). 1994. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 1996. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 1997. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 1998. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2000. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2001. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2003. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2004. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2005. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2007. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2008. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2013. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2014. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2018a. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2018b. 657<sup>th</sup> (spe.) Meeting of senate, proposal to adopt a learner-centred credit system (LCCS) at the University of Mauritius in line with the European Credit Transfer System (ECTS). Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2019. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2020a. *Annual Report*. Réduit, Mauritius: UoM.
- UoM (University of Mauritius). 2020b. 690<sup>th</sup> (spe.) meeting of senate, digital learning and transformation strategy. Réduit, Mauritius: UoM.
- Van Popta, E., Kral, M., Camp, G., Martens, RL., & Simons, PRJ. 2017. Exploring the value of peer feedback in online learning for the provider. *Educational Research Review* 20:24-34. <https://doi.org/10.1016/j.edurev.2016.10.003>
- Volery, T. & Lord, D. 2000. Critical success factors in online education. *International Journal of Educational Management* 14(5): 216-223. <https://doi.org/10.1108/09513540010344731>
- Yuan, J. & Kim, C. 2014. Guidelines for facilitating the development of learning communities in online courses. *Journal of Computer Assisted Learning* 30(3):220-232. <https://doi.org/10.1111/jcal.12042>

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