

## Exploring digitalisation and its impact on Higher Educational Institutes in a contemporary setting: A Study of the Higher Educational Institutes in Sri Lanka

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### Abstract

Globally, higher education institutions are increasingly digitising their operations. A bustling and expanding ecosystem of digital platforms in higher education includes online teaching and research, decision-making using learning and business analytics, and building "smart" campuses. Universities do not digitalise on their own but depend on proprietary digital platforms. This study focuses on how digitalisation impacts higher education institutes in Sri Lanka. This study used a methodology based on a qualitative survey, and the research used personal interviews to collect the required data. The research findings disclosed that although all stakeholders within the higher education institutes had to adapt to forced digitalisation, most were not ready to accept it as the main element defining current-day higher education. Higher education institutes, students, and teachers are the mainly affected parties in the forced digitalisation because of Covid-19. The main factors influencing these parties were inadequate digital literacy, poor financial capabilities, and lack of basic requirements for a digitalised learning environment. However, even with minimum resources, learning is underway in almost all higher education institutes, but it resulted in a digital divide, primarily impacting students and their learning abilities.

**Keywords:** Digitalisation; Digital Divide Online Learning; Higher Educational Institutes.

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### INTRODUCTION

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Universities across the globe are increasingly digitising every aspect of their businesses. Online delivery of instruction and conduct of research, the use of learning and business analytics in decision-making, and the transformation of campuses into "smart" campuses are some instances of a highly active and growing ecosystem of digital platforms in higher education (HE). Universities do not digitalise independently but instead rely on proprietary digital platforms for their day-to-day activities.

The scope of the present paper is to map and discuss digitalisation in teaching and learning in higher education institutions, understood as external and internal processes and as top-down and bottom-up initiatives in Sri Lankan Government Universities/HEI (Vivek & Nanthagopan, 2022). This study aims to determine how digitalisation affects public universities in Sri Lanka and how digitalisation is viewed by those who utilise them. Two essential aspects of the functioning of a higher education institution are that the teaching mechanism is centred on the teacher-student relationship and that the curriculums are intensely concentrated on a particular

subject, leading to specialisation in specific areas. The growing number of students and the requirement for interdisciplinary methods to address global issues put these two unique operating styles under strain.

The expansion of information technology has affected the operations of higher education institutions, with universities using Learning Management Systems (LMS). A learning management system (LMS) is an online platform that combines different technologies to provide access to academics, students, and administrators. Students can gain access to lecture notes, assignments, virtual classrooms, exam results, and the submission of assignments, while academics can manage course content, submit student assessment marks, and track students' progress and attendance through the services provided by the university (Vivek & Nanthagopan, 2021).

Students may access material from any location using a virtual classroom and at any time while participating in interactive activities such as group discussions, presentations, contact with lecturers, and communication with fellow students. Moodle and Blackboard are two of the most widely used learning management systems (LMS). Moodle is a free open source programme that requires no licencing, while Blackboard is licenced software that requires an annual subscription. In a side-by-side comparison of Blackboard and Moodle, the following elements are available in Blackboard but missing in Moodle: a syllabus, a safe assignment, and virtual classroom resources. Higher education institutions are also required to undertake research, both theoretical and practical, as part of their mission. Universities often use research systems such as ORCID, which assigns a unique identity to each researcher and offers a worldwide platform for researchers to exchange information.

The role of higher education institutions regarding conventional teacher-student connection is shifting as it moves from face-to-face to digital interaction. Because of the enormous amount of knowledge available on the Internet, the conventional definition of a teacher, educator, academic, or professor is being called into question. The adoption of Industry 4.0 also alters people's education and skills need as tasks and responsibilities change, requiring the transformation of higher education institutions. Another problem that must be addressed is the absence of mentioning climate change and mitigation in the course material, especially considering the worldwide emphasis on mitigating the effects of climate change (Agostini & Nosella, 2019). Environmental, financial, and social problems put pressure on higher education institutions' operational practises and curricular content, forcing them to rethink how they do business. Higher education institutions may benefit from the techniques and technology of the Fourth Industrial Revolution to confront today's difficulties.

## **Research Aim**

This research study aims to explore how digitalisation impacts the operation of higher educational institutes because the influence of digitalisation on the HEI sector is not explored, especially in the current context, where almost all HEIs are being forced to adopt digitalisation to survive in the market.

### **Higher Education Institutions**

Describing the architecture of conventional higher education institutions involves three levels that may be divided into three categories: strategic, operational, and control. The strategic activities define the objectives of the key functionalities of the institution to achieve the set objectives of teaching and learning and research and innovation. The strategic activities are divided into two categories: teaching and learning and research and innovation. Strategic roles include human resource management, research and innovation, teaching and learning, financial management, institutional planning and resource management, marketing management, information technology, quality management, and student services (Tømte et al., 2019).

The operational functions are the actions carried out to accomplish the goals of the strategic functions. Student programme surveys, external programme audits, student counselling, maintenance of ICT infrastructure, policy development, and examination preparation are a few of the operational functions performed by the institutions' faculties (engineering and the built environment, business and economics, education, health science, law, natural science, arts and humanities), among others. It is mainly the software that performs specific tasks such as leave management, salary payment, and online registration that constitute the control-level resources needed to execute operational duties. Each layer is connected to the others via software; the enterprise and operational layers are connected through enterprise management software such as SAP and Oracle, while the operational and control levels are connected through operational software such as LMS and ITS. This combination of levels allows information to flow in both directions, from top to bottom and bottom to top. However, the integration is insufficient and fragmented in execution (Toader et al., 2021).

### **Digitalisation**

Digitalisation has arrived, and it will remain here for a long time. Mobile devices, social media, new cloud computing capabilities, and geolocation sensors, among many other examples, demonstrate how digitalisation is thriving and affecting society at large (Haase & Buus, 2020). Similarly, this worldwide shift influences higher education, driving the field toward developing a more digital learning institution.

Students in the twenty-first century, who have higher expectations of their institutions, have deliberately adopted digitalisation as a motivator to be more outspoken and better connected (Henderson et al., 2017). The student experience and expectation of future employment after completing a university degree are becoming more critical, altering the value proposition for institutions.

Even though MOOCs (Massive Open Online Courses) are still in the early stages of acceptance (Bulfin et al., 2014), novel teaching approaches have come, and academics aided by digital technology are investigating new teaching methods. The new generation, which is more technologically savvy, expects to study and be taught using techniques tailored to their own tastes. In the present digital age, consumer voices are more prominent than ever (Edelman, 2010), providing a strong marketing tool for higher education institutions to advocate for their campuses.

## **Digital learning perspectives**

Digital technologies are considered a critical component of student education. They connect to significant changes in how students learn and perceive the world (Henderson et al., 2017). Traditionally-based education methods are becoming less relevant in the modern digital era, and learning on demand is increasingly widely available (Dabbagh & Kitsantas, 2012).

Many empirical studies have analysed students' technology usage in recent years. In Australian research, Kennedy et al. (2008) polled 2120 undergraduate students from various faculties. This research aimed to determine the degree to which students could access and utilise existing and new technology for learning purposes. By concentrating on students' access to and usage of existing and new learning technologies, the researchers determined the tools they utilised and how often they used them.

The results indicated a lack of consistency in the technology adoption patterns, particularly when including technological advances in the learning process. However, the results of this research should not be taken as gospel since technological trends may have changed since data gathering in 2006. Bullen et al. (2008) investigated whether students match the 'millennial' profile in research conducted in Canada. Students should "employ a restricted toolset", according to the findings of an informal semi-structured focus group interview conducted with 69 students (p.8). Furthermore, the research asserted that adopting these technologies was influenced by factors such as awareness, immediate availability, and cost concerns.

The results revealed that "although there was little evidence to indicate that kids had a 'deep' understanding of technology, students utilise technology in highly context-sensitive ways". For universities, teaching high-level meta-skills such as self-regulation of learning, creativity, knowledge creation and synthesis, information management, flexibility, and digital competencies needed for the twenty-first century is a difficult task (Plomp, 2013).

Jones and Cross (2009) researched in the United Kingdom to determine undergraduate students' access to hardware and the Internet and how they utilise these digital technologies in their study and leisure activities. Most respondents ranked activities such as obtaining information as the most important, and they prefer to use the Internet to communicate rather than produce and distribute content as their preferred method of Internet utilisation.

## **Digitalisation driven by policy**

Federal and state governments may impact how higher education institutions deal with technology in many ways, including financing, quality standards, and encouraging the creation of sufficient technical infrastructure. Higher education institutions can meet these broader policy-driven objectives via initiatives, curriculum changes, and organisational reorganisations, among other measures (Bates, 2015). Previous study findings prove that overall methods to address digitalisation in the context of teaching and learning are still lacking, insufficient, or inadequate in higher education institutions (Selwyn, 2016). One example is the widespread use of online learning at higher learning institutions, which has become more popular.

According to the results, most higher education institutions have policies and plans for online courses. Still, the vast majority need policies for assistance, course creation,

and evaluation (Siemens et al., 2015). Furthermore, the development of overall strategies for online learning and development within higher education institutions is still a relatively new field when compared to e-learning/online learning activities driven by individual departments and individual academics, the latter of which are more widespread in higher education institutions (Alvarez et al., 2009; Gaebel et al., 2014).

Research has contributed to the field by diagnosing the "digital status" of higher education institutions and providing recommendations on how to continue with the digitalisation of institutions. Such recommendations are handled predominantly as top-down efforts that do not address discipline-specific problems (Grajek, 2016). Furthermore, efforts on digitalisation have been mainly originated and implemented by administrators, with little or no participation from academic personnel (Rienties et al., 2013). Regarding examination administration systems, communication systems, media and library services, and learning management platforms, administration personnel and their leaders have often been the ones to start the digitisation of these systems. This differs from internal procedures that tackle the educational use of technology, which appear to be motivated by supporters among academic staff inside the disciplines, as was the case with the use of technology in the classroom (Gaebel et al., 2014; Fosslund, 2015). A possible explanation for why only a few higher education institutions claim transformation of teaching and learning with the assistance of technology is the need for more academic staff to create new strategies, plans, or initiatives to improve teaching and learning (Bates & Sangra, 2011). As has been shown, many studies support the notion that efforts to improve digitalisation result from top-down methods partially linked to disciplines and topics.

### **Digitalisation driven by leadership and staff development**

A systematic strategy is necessary to improve teaching and learning in higher education institutions, including online learning environments. This method includes improving current practices and leaders in staff development programmes (Gibbs et al., 2008). Austin (2006) argued that the growing use and expectations of information and communications technology (ICT) to assist student learning at conventional institutions leads to a greater demand for various team-based methods to help learners. As a result, more active educational leadership is required to help grow educational institutions. According to Noble and Russell (2012), including leadership principles in staff development programmes may help enhance the online learning environment.

The participation and engagement of online academic administrators also provide the chance to put the practice into action and enhance the entire online academic experience for all students. Most higher education institutions have a department, agency, or unit that provides technical assistance for academic staff members in teaching and learning. In addition to managing the instructional technology in which the institutions have invested, these divisions are responsible for directing the use of technology for academic personnel (Nworie et al., 2012). Furthermore, staff members who operate in these units are more likely to possess a broad range of competencies, such as pedagogical and technological knowledge.

Rienties et al. (2013) claimed that the stimuli for the professional development of academics in higher education had been administration-led rather than teacher-driven (Hanson, 2009), resulting in 'programmes that reflect institutional goals rather than

actually enhancing teachers' competencies in HEIs [higher education institutions]' (Rienties et al., 2013). Despite this, as Rienties and colleagues pointed out, even if these units are important as they may assist and train academics on how to incorporate technology into their pedagogical work, they are more likely to provide generic abilities rather than technical abilities relevant to specific disciplines (Rienties et al., 2013).

Damsa et al. (2015) stated that understanding technology-rich environments and their potential impact on learning is necessary regarding the actual model of higher education being studied and the academic and pedagogic goals in each individual course design. Bates and Sangrá (2011) supported this, whose findings revealed that few administrators and instructors had a clear view of the potential of technology for teaching and learning while developing study programmes. As a result, technological views have not been considered when choosing content, instructional methods, and delivery modes (online, on-campus, hybrid).

### **Emerging technologies and digital campus**

Advanced new technologies are altering company operating patterns across all industries worldwide. The higher education industry has also changed during the past decade. These developing technologies include smartphones, cloud-based IT, wearable devices, and sophisticated analytics (Kirkwood & Price, 2013). Universities discovered new possibilities via these technologies to enhance the on-campus teaching and learning experiences.

What does a 'Digital Campus' implies, and what it characterises? A digital campus detects when students, instructors, and staff are on campus, obtaining pertinent interactive information and appries on their digital devices to augment performance and outputs (Margaryan et al., 2011). A digital campus may give prospective students a greater digital experience to explore various school settings. Besides, the digitalisation of the campus virtual reality technology and artificial intelligence may offer more accurate and fast answers to the questions that are accustomed to arriving through the phone or via the web.

Advanced analytics is expanding and changing the capacity of HEIs to perform more brilliantly for students, instructors, and the institution itself. Universities are increasingly gathering a plethora of data from different internal systems and sources connected with external activities, which allows them to gain a significant advantage by harnessing the data potential by evaluating it wisely (Bose, 2009). Finally, the findings may be utilised to increase academic achievement, student retention, or employability rates.

Lastly, cloud-based IT is changing and providing an innovative shift to the business meant to take a modular approach to IT. Vaquero et al. (2008) described cloud technology as "clouds are a vast pool of readily useable and accessible virtualised resources (such as hardware, development platforms, and/or services)". With more accessibility, less financial expenditure, and improved security, the cloud-based IT offer promises to streamline business operations for HEIs to make a difference from the conventional organisational structures. Thus, current trends in developing technology and the capacity to harness its potential to achieve desired results rapidly will become a significant separator within the Higher Education sector.

## **Barriers towards digitalisation**

Digitalisation is not without difficulties and obstacles. Universities, without a clear perspective on digitalisation, cannot effectively react to the needs and problems of the 21st century. Some of the primary reasons for this mediocrity include a lack of confidence in digital tools and techniques, unfamiliarity with the new competitive global environment, an incapability to evolve existing process settings while simultaneously incorporating new techniques and capabilities, and a culture that is resistant to modern technologies and development (Loebbecke & Picot, 2015).

A lack of digital literacy is another barrier to adopting digitalisation. Digital literacy implies the ability, knowledge, and confidence to utilise modern technologies. Digitalisation has allowed many new teaching methods, for instance, deeper distant learning, flipped classrooms, and hybrid teaching models. Yet, academics do not always exhibit enthusiasm to acknowledge these advances.

Furthermore, IT departments at HEIs, the main managers of digital projects, are not constantly well-equipped to embrace technological progress (Lea, 2013). Social media is a dynamic platform to raise voices and react quickly; they are up-to-date with industry trends to obtain and interact with consumers. Many universities are not taking genuine advantage of these communication channels owing to an overcomplicated procedure for social media posts approval or by not providing an opportunity for all academics to be active members by expressing their thoughts and perspectives.

## **Assessment of prior digital models / frameworks**

Technology in educational contexts has gone through three distinct generations of growth, and now a fourth is emerging:

Generation 1 – Basic technology use: Computer-based Training (CBT) and webpages,

Generation 2 – Enterprise systems: learning management systems (LMS) and content management systems (CMS) (CMS),

Generation 3 – Fragmentation & diversification: social media, e-portfolio software and MOOC providers, integrated vendor/publishers, and

Generation 4 – Distributed & digitally moulded technologies: adaptive learning, distributed infrastructures, and competence models.

Several models have been projected recently to explain a university's digitalisation and technology learning process. Coccoli et al. (2014) proposed a concept of a smarter university that reflected a common vision among the different stakeholders. However, this approach primarily emphasises acquiring technical skills among students and teachers. Besides this, the concept of a smarter university presupposes the presence of a well-organised university administration receptive to constant technological advances. Lei et al. (2013) proposed Cyber-Physical Systems (CPSs) for smart learning environments (SLE). However, they recognised some difficulties in deploying CPSs; among them, electricity consumption was the main technological issue. They also agreed that CPS requires a longer operating time.

Scholars have proposed several alternative approaches for e-learning or technology improvement in the academic environment (Bridgstock et al., 2017). Notwithstanding its suitability, their appeal has been restricted. One common issue with all such

approaches is the absence of appropriate developing policies for the entire academic infrastructure and human dimension. A more profound knowledge of the connection between digital infrastructure and a human component is moving the emphasis towards a dynamic framework suitable for everyone (Eyring & Christensen, 2011).

### **A multidimensional digital framework for HEIs**

A digital framework is a design for an organisation that allows it to maintain its systems and procedures up to date in response to the rapidly changing business environment. While implementing technical change, it serves as a roadmap for all divisions within the organisation and external stakeholders, ensuring that no aspect of the company is overlooked (Khalid et al., 2018).

The academic environment provides institutions with digital strategies and a roadmap enabling them to adapt and succeed in the constantly changing global educational market. Universities must react to digitalisation in a timely and effective manner to enjoy the advantages of technology and create strategies to overcome the difficulties posed by new technological developments (Saykili, 2019).

One of the most critical responsibilities of academic institutions is to update and improve their management and learning processes constantly. Universities that effectively adhere to a digital framework are more prepared to promote innovation and disruptive methods than their counterparts (Tapscott & Williams, 2010). These methods enable them to compete in a rapidly changing market while meeting the expectations of all parties involved in the process.

The ability to strike the appropriate balance and maintain connections among students, faculty, and departments is essential for long-term survival in the digital age. University students' expectations of what they may anticipate from their education are shifting significantly in the contemporary day. The digital era creates new problems and possibilities for faculty and staff because teaching methods, learning styles, and research methodologies are evolving rapidly (Saykili, 2019).

The present research suggested a digital framework for higher education institutions to implement digitalisation across the whole institution. The framework presents several important elements consistently enforced by the best higher education institutions in the digital enactment field. According to the framework, various institutional variables, such as control among students, teachers, and the institution, as well as facilitation between organised and unstructured learning methods, should be represented in terms of their connection with one another. Additionally, a digital departmental strategy is required to foster a culture of digitalisation and innovation across the organisation. We aim to implement digital agenda support and help specific departments in their efforts to accomplish the goals connected with the university's overarching vision on time (Daniels, 2019).

Figure 1 provides an example of the multidimensional digital framework demonstrating different practices and methods for technological transformation in an academic institution. A comprehensive transformation strategy is offered, particularly emphasising the digital growth of the university structure, student and faculty learning, and the technological expansion of all departments. All framework components guarantee prospective users can take advantage of relevant digital possibilities to stay abreast of technological advancements (Durek et al., 2018).



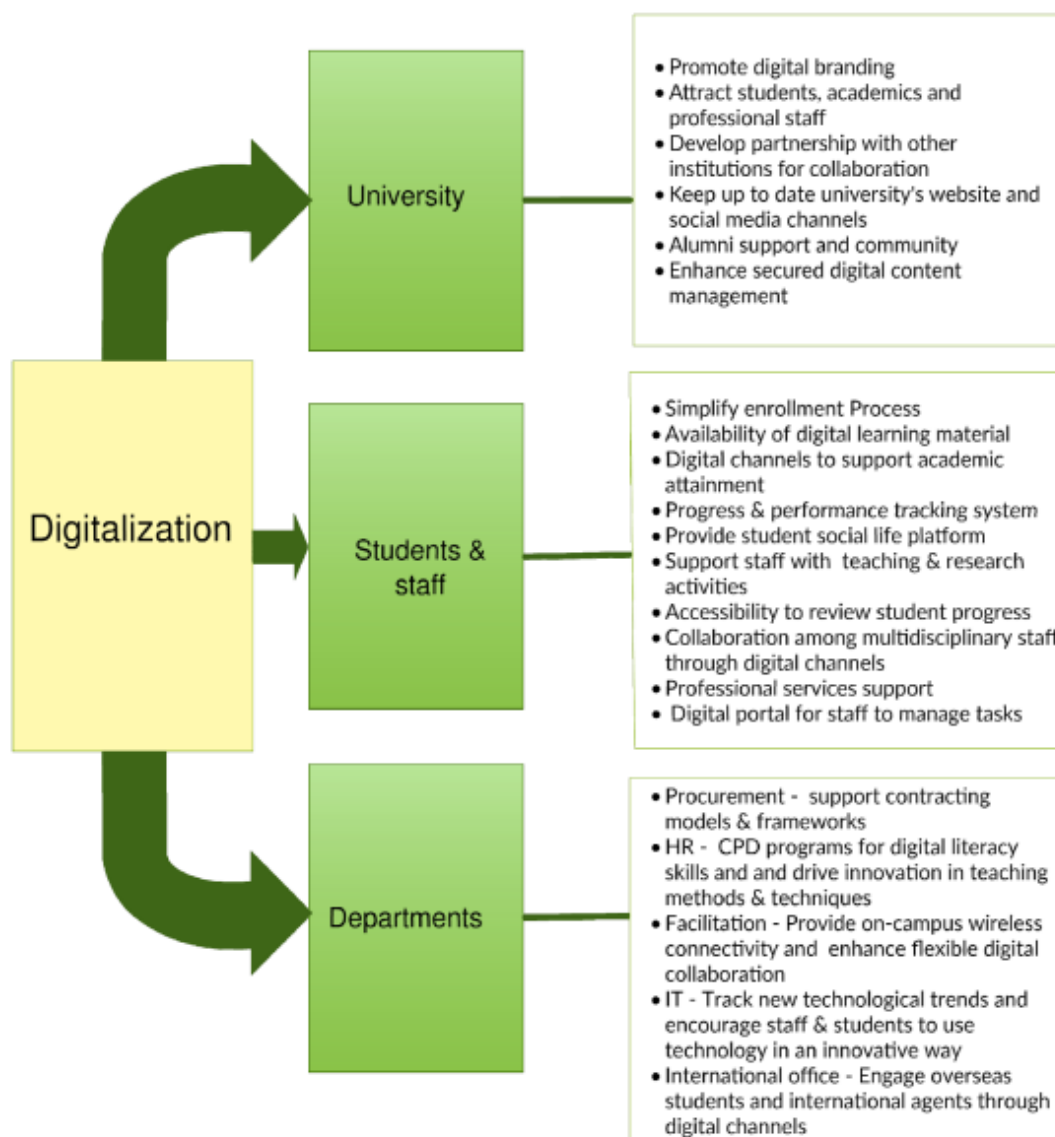


Figure 1. **Multidimensional digital framework for HEIs**  
Source: (Anderson, 2020)

It is essential to instil a high degree of digital awareness among university students to execute this shift successfully. Universities may create their digital vision and decide how to acquire the required digital skills based on the framework given to them. Colleges must reconsider how they should conduct themselves in the rapidly changing digital age to not slip behind the competition (Weller & Anderson, 2013).

## **METHODOLOGY**

The government universities may serve as use cases since they have similar political and cultural traditions and higher education systems but differ in steering and reform implementation.

The research design for this study is developed following the researcher's strategy for addressing research issues, and the researcher has used qualitative data gathering for this study. Therefore, the researcher asked the questions to get an in-depth

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perspective of the phenomena and accomplished it using both organised and unstructured interviews (Vivek & Nanthagopan, 2021). This study will use an inductive research method, which means that the researcher will start with existing ideas, models, and concepts and work his/her way out. Next, the researcher will perform an in-depth investigation from Sri Lankan universities' viewpoint.

Sampling chooses components from the population mentioned above to perform the research because interaction with each community component is not feasible. The feature in the sample must have characteristics comparable to those in the entire population (Saunders et al., 2013). The sampling methodology describes the method the researcher will use to choose sample components for the study. This research study was conducted using purposive sampling, which determines components to gather qualitative data for the researcher. The survey research would include a sample size where respondents comprise individuals (Lecturers, Senior Lecturers, and Professors) who work at public universities in Sri Lanka, according to the survey protocol. Those representing various parts of their respective institutions to collect more information about the issue will aid in completing an in-depth study.

## **ANALYSIS**

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The in-depth interviews revealed the following insights into the digitalisation effort of Sri Lankan universities to adjust to the current requirements that arose due to the Covid-19 pandemic and health guidelines, which resulted in movement restrictions and cancellation of large gatherings. The key areas raised by the interviewees are listed below:

### **The technological resources**

Universities have undergone a large-scale shift to online learning as a direct result of the social distancing measures enforced by the Covid-19 pandemic to sustain service during times of emergency. Academics throughout the country's university sector have had to adapt materials and techniques quickly to a format appropriate for online distribution to remain competitive. A respondent said,

*"At the beginning, we didn't think whether we could conduct all these lectures and practical sessions online. But anyhow, we have managed, and everybody is used to it. The main change is online teaching, and still, we are going through how to conduct all these practical sessions; the only challenge is there".*

*"IT contributes in every sector in the academics, not only in the IT Departments and Faculties but also in other faculties as well".*

This change was hurried and forced by the conditions of the situation. Because of the epidemic, a period of experimenting with remote instruction was required. The term "emergency online education" has been used by several responders to describe this new approach.

The system creates new difficulties for students who need technical help. However, it also presented unprecedented hurdles for staff and university administrators, who were forced to reinvent themselves in record time to keep campus operations functioning. The process of digital transformation in higher education started years ago. However, the epidemic has expedited it, resulting in significant changes in weeks rather than months. As most higher education institutions realise, the technological

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revolution of education entails significant changes in teaching techniques, necessary skills, and evaluation systems. A respondent went on to say,

*"...when we revert to Zoom meetings, zoom system is overloaded. So, that kind of problem was there. The connectivity problem and even the financial problem also there".*

In a virtual environment, colleges must transition away from a primarily "lecture-based learning" approach and toward "problem-based learning" methods that involve students in more active learning. This shift from "in-person" to "virtual" education will have significant ramifications for the entire learning process, requiring not only a rethinking of methods for assessing learning outcomes but also a rethinking of the skills and competencies students are expected to possess in this new environment.

A respondent said,

*"In other ways, used to virtual lectures too. It is 50-50. We have given up some certain aspects and students used to so with virtual lectures".*

Educational institutions must completely restructure their services to adapt to the new environment because present social distancing measures will continue for some time. Universities should develop digital learning methods and offer digital learning settings, resources, and support systems to provide a well-designed online learning experience. Digital education necessitates appropriate infrastructure and technological platforms (e.g., Blackboard, Moodle, Microsoft teams), and reliable servers that can handle the virtual workload. It also demands the training of professors and students in online delivery methods that take advantage of all available technical and educational resources. A respondent said,

*"The main thing is, as an IT lecturer, it's very much hard to conduct practical sessions online. If we are in the university, all necessary software's are installed in the machines, so we can easily conduct practical sessions physically. These days we have stopped the practical sessions at our university, and we are conducting only the theory lectures. After the university's recommencement, we are planning to do all the practical sessions physically".*

Faculty may benefit from many webinars and guides, and most institutions have agreements with businesses such as Microsoft, which offer Office or Teams resources and technology platforms to help them improve their virtual collaboration. Considering the Covid-19 situation on a broader scale discloses a vast range of online communication platforms and solutions that may assist in digitalising the entire teaching-learning process.

The university web platform, instant messaging tools (WhatsApp, Telegram), videoconferencing tools (Zoom, Skype, Google Hangouts, Google Meet), and educational apps (Google Classroom) were the technologies most frequently used to facilitate learning during the lockdown period and these technologies were merged with email and telephone discussions to maintain an individualised contact with students during the lockdown period. Other technologies were also found to be generally beneficial (Cisco WebEx, GoToMeeting, Microsoft Teams, Monosnap, Loom, and OBS). Giving lectures via videoconference, sharing materials (e.g., slides, videos, presentations), interacting through chats, creating debate forums or workgroups, monitoring practical activities, evaluating and tutoring students, and recording explanations and making them available to students are just a few of the teaching options available thanks to the technological resources available. Also of note is that

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these tools may be utilised simultaneously or asynchronously and combined. All these materials, however, must be supported by an instructional approach to retain students' attention and involvement throughout the course.

A respondent said,

*"IT is the most prominent part of every degree program. Simply one example is lecturers conducting lectures by PowerPoint presentation slides using the projector. We are sharing lecture notes through google groups, google classrooms, and the LMS, whatever platform that is also another example of IT. We search research papers, write articles and everything through the Internet, that is again IT, and we are using some equipment, like practical equipment and automated equipment in other disciplines, also kind of IT applicable there".*

Respondents stated that instructors should design audio-visual materials, plan students' work time, and use the appropriate tools for each activity—for example, tutoring, videoconferencing activities, and student assessment—to ensure the communication of the educational objective of each activity to students. It is critical to make sessions lively by including collaborative and formative tools in the discussion. As a result, it seems necessary to offer active methods for interaction between students and instructors and techniques that encourage students to collaborate with their peers. It was reported that various online teaching and assessment methods have been developed and proved effective in the present epidemic.

A respondent said,

*"Everybody has changed to an online platform, especially in conducting lectures, which is the major change. So the government has provided a lot of things, for example, Learn, Zoom. Learn has been provided as free, so data-free Zoom links have been provided for most lecturers, so students do not worry too much, they only need an internet connection to participate in lectures. Currently, according to my knowledge, most universities are also practising online exams for the semesters. PGIS also using them. This is a tremendous improvement in the IT sector these days. The practical sessions have also been conducted via the online platform".*

### **Emerging obstacles and challenges**

The disruptive effect of Covid-19 resulted in a fast change in educational activities. As previously stated, the unforeseen termination of face-to-face instruction required students and professors to adjust to a fundamental shift in the teaching-learning process. This transition was not without difficulties; certain obstacles and problems arose throughout the process. Colleges must be aware of these possible roadblocks and devise suitable solutions to overcome them to ensure a smooth transition and a successful transformation. We explain these obstacles from the viewpoint of the principal actors engaged in the learning process: students, professors, and institutions based on particular research (universities).

A Respondent said,

*"I feel better with the face-to-face mechanism. It's necessary if it comes to a situation like this, but I may...I may... go with this mechanism, but I don't prefer this blended learning mode in future. I prefer to conduct lectures offline".*

According to respondents, the students' viewpoint was that technological difficulties were the most challenging aspect of adjusting to online instructions. Some have pointed out how online schooling may exacerbate the digital divide. To overcome

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this obstacle, schools should mobilise resources to guarantee that all students have access to a suitable IT infrastructure, a broadband connection, and specialised technical assistance.

One respondent said,

*“The very first issue is a connection problem. As they are at their home, most of them say there are coverage or network issues in their area. Sometimes there could be power failure as well. So they could not participate in some lectures. Moreover, I think sitting in the same place for much time and seeing the laptop/smartphone’s screen is not good for them as well”.*

Another said,

*“Frankly speaking, I’m not happier about that. The reason is now what’s happening is those who have good connectivity and required devices like laptops and tablets like things are on the better side. But there are a set of students; the maximum they have is smartphones. But even if smartphones are there, they may face two main problems. One problem is sometimes, the mobile coverage in their living areas is very weak, and bandwidth is not sufficient. The other is that even though the signal strength is good, they need additional data. That is a costly factor. There are sets of students who cannot afford that situation”.*

Universities must ensure that students from less fortunate socio-economic backgrounds are not disadvantaged in this new situation to provide an equal student experience. Students also found it challenging to retain attention in a solely online environment, citing, among other things, boredom, a feeling of isolation, a lack of time to follow the many topics, and a lack of self-organising skills as major obstacles. A respondent said,

*“Another problem is, due to poverty, some families cannot afford even simple electronic devices. So those students may have some issues joining the lectures and learning”.*

Professors also highlighted that isolation was a major issue in course design, suggesting the need to establish the optimal mix of individual student-centred learning and collaborative learning and create virtual communities of practice to improve student peer involvement and cooperation. This forced transition was particularly difficult for academics, who had to adjust rapidly to new online methods, with little or no training in some instances and in record time. The abrupt shift from face-to-face to remote teaching necessitated a teaching team with varying degrees of preparedness to use various pedagogies with particular skills. One respondent said,

*“Actually, now it is the student-centred teaching and learning. So, this university system is changing from the teacher-centred to student-centred”.*

It was stated that academics, too, were not immune to the digital divide. Not all faculty members are at ease in an online environment, and a generational gap may exist between those who have depended on traditional techniques and have never utilised technological tools and those who are more comfortable with modern technologies.

Professors identified the most significant challenges are the high demand for specialised skills such as proficient computer knowledge, specialised communication abilities for an online setting, proper use of various teaching-learning tools, and the need to resolve specific issues quickly during instructional sessions. However, scholars

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highlighted several intriguing insights for overcoming obstacles after an initial phase of adaptation-experimentation to convert rapidly to remote instruction.

*“Mainly in the case of lecturers, the lecturers attached to the computer science, computer engineering like departments are well aware of the current technologies, they are well experienced. Even if they are not experienced, they can easily learn and adapt to the coming technologies, requirements, and so on. But the others need to be trained; that is a huge challenge. Most of the senior lecturers, say old, around more than 45 years, it is difficult for them to become familiar with these new technologies and use them within the time given. Therefore, we have to provide training for them for teaching, online exams, and all those things. And therefore, the lecturers are facing difficulties adapting to the required technologies”.*

Teachers should establish a suitable physical environment for online instructions, including lighting and acoustics. The particular content of class sessions should be carefully revised to accommodate online distribution and include group activities to inspire and engage students while encouraging collaborative learning. The need for universities to focus on infrastructure development to facilitate facing these changes is another prominent obstacle. As most institutions transition to a hybrid system that mixes small face-to-face groups with online sessions in the near future, the challenge for academics will be to guarantee that students in both circumstances get high-quality learning.

*“I am expecting multimedia laboratories and also a conference room, which is a kind of a smart lecture hall, where it is possible to conduct both online and offline lectures like a blended learning model, where the lecture content should be automatically recorded and uploaded to the repository. And more and importantly, every university should have its own servers and repositories where they can upload everything. And kind of an education network expansion that could be connected when login in with the students' and staff's credentials. I mean free network”.*

The transition to emergency remote teaching during the Covid-19 epidemic resulted in a complete interruption of business as normal at the institutional level. To develop a sustainable model of online learning, universities should leverage technology to reimagine teaching processes, transform assessment activities, reimagine the use and roles of traditional Faculties and Schools (by providing specialised training), and refocus on value creation through service model reinvention and self-renewal. Promoting this digital transition necessitates the development of a participation culture, and students, professors, and administrators must collaborate to promote and evaluate the changes made. Universities confront extra challenges in this transition, such as budgetary restrictions and the limitations imposed by existing IT infrastructure. Public HEI will face shrinking budgets due to decreased government funding, while institutions will experience a drop in student enrolment as a result of the current uncertain economic environment.

A respondent elaborated on this issue:

*“...in government universities, what I expect is, now the universities, UGC, as well as the higher education ministry, are talking about this online learning and teaching, ‘That should be the future; we are living in the digital world all these kinds of stuff’. That is true, but in order to make it happen, they should first develop the ICT infrastructure facilities at schools as well as universities. If you take any state university as an example, if there are two faculties and ten departments, I can tell you that at least two*

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*departments are not having proper Internet connectivity. That is the situation. Without proper Internet connectivity, even if the lecturers are well-trained and willing to go for online teaching, how can they do it?*

*On the other hand, they are even teaching at home using their own ICT facilities, network bandwidth and so on. They don't complain that they spend their money to teach students. But if the government want these things to happen in the future, I think the government should take the initiative to develop the ICT infrastructure facilities within the state universities system and schools".*

The IT infrastructure available to universities will also restrict their ability to embrace complete digital transformation, and improving these technological skills may need some investment. Despite these difficulties, universities remain optimistic about the transition. According to a survey, most institutions have indicated that they are willing to investigate innovative teaching methods and improve digital capability once the crisis has passed. A respondent said,

*"We are conducting our lectures and discussions through Zoom and other Video Conferencing platforms. But still, we have problems in conducting exams as well as practical sessions. These are very difficult. Especially, I'm conducting Engineering courses, and it is very hard for us to conduct the practical sessions online".*

It was stated that institutions must enhance their technology infrastructures while guaranteeing all students have equitable access to the necessary technological resources. This phase requires a financial commitment to allow true digital transformation. A Respondent said,

*"We need more advanced computer laboratories for our undergraduate and postgraduate students for doing their advanced research study and for improving their technical knowledge".*

The human element is another significant impediment to technological change. There is an urgent need for institutional leadership and assistance in engaging all stakeholders (faculty, students, and technical staff) in the transformation process. Successful higher education reform requires faculty development and particular policies to enhance crisis management preparedness and institutional resilience in the face of new problems shortly. Finally, the increased digitisation and availability of information raises new ethical concerns about internet security and data privacy rights. Universities must address these problems by establishing codes of behaviour to guarantee transparency and to provide a secure, trustworthy environment for online learning. A respondent said,

*"That is the thing.... A couple of years back, there was a scheme introduced by the higher education ministry / UGC where students could obtain a long loan to purchase a computer. Not only 1st-year students, even most of the 2nd, 3rd, and 4th-year students also do not have computers. Not only computers but also Internet connectivity as well. Internet connectivity is not available/very poor in some areas. Government should negotiate with corresponding service providers and try to provide those services on a loan basis or even the cost of the government or something like that if they want to continue this education system reliably and effectively. Otherwise, as I said, it is beneficial for some groups of students, not for others".*

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## CONCLUSION

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Digitalisation is at the heart of progress for higher education institutions in this era. They must be digitally well-equipped to ensure the effective execution of modern technology across all institutions, leading to a successful digital transformation. Universities must develop a business strategy to enrich digital technologies within each department to engage students, staff, and academics to host new exciting opportunities. There is no sole way to deliver desired outcomes through digitalisation; however, by receiving opinions from end-users, valued insights can be obtained to develop a best practice model. Besides, through empowering individuals to bring innovation in their ways of working with the help of digital tools and techniques and support from senior management, an institution can transform into a vibrant institution from a faceless organisation. Hence, opportunities are knocking on doors and encouraging HEIs to intervene to attain the substantial benefits of digital change.

Higher education institutes could use Transformation Through Upskilling and Training, Digitisation Through Diffusion, and Reinvention Through Strategy Approaches to enhance the digitalisation effort. These institutes must have digital-savvy leadership for the digitalisation effort to be a long-term success.

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