

Education as a Service: Implications and Challenges to Rethink the University of the Future after Covid-19

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Abstract

This paper highlights that social distancing is prompting educational institutions to rethink how they are connecting with their student bodies. Spatial interaction is becoming the new norm, and the blurring of physical and virtual communication is likely to continue until the pandemic is overcome. Globally, the higher education system will undergo a decade of radical technology-led transformation shifting the paradigm from the traditional linear formulation of education to the "University as a Service". The AI-enabled tools will provide customized learning experiences, and continuing education will become the norm. The university of the future will learn from personalization – e.g., students' expectations and data assessment - to support a diversity of learning pathways to study the same content. The "Education as a Service" will be able to pinpoint each student's learning needs, re-design the service-education system, and provide a personalized experience. This research aims to understand how universities need to be transformed based on the challenges faced by professors and students during COVID-19. Using qualitative research methodology, 17 professors and 13 students from six countries were interviewed to explore the challenges of blended learning in higher education. Like other services, the education service will be reshaped and customized. Students are value co-creators of the learning process, and they need more active and collaborative methodologies. The most important factors to enable revolutionizing how we educate after COVID-19 are: technological tools, as they provide personal learning experiences on-demand, and communities of practice, where students will learn from each other. This paper provides several contributions to the University of the future, aiming to respond to "Education as a service" challenges.

Keywords: Higher Education, University of the Future, Education as a Service, Covid-19

1. INTRODUCTION

Universities are enduring institutions that have existed for a millennium, expanding the frontiers of knowledge, educating citizens, and driving societal change. Our evolution into "knowledge societies" has placed universities at the epicenter of human creativity and learning, critical to our planet surviving and thriving.

The COVID-19 pandemic has accelerated the change of the learning process leading to a rapid expansion in the digital provision and research capacity to solve major societal challenges. This is likely to have a long-lasting impact in the future.

Despite online learning (OL) being already adopted in some higher education institutions, for others, such adoption was a complete novelty that entailed many challenges. The uniqueness of OL during the pandemic relates to what Watermeyer et al. (2021) call 'afflictions' derived from the rapid and complete transition to online provision and early 'entry-level' use of digital pedagogies. However, "we are only at the earliest of beginnings of recognizing and understanding these impacts on the role of academics and the future of global higher education" (Watermeyer, 2021, p. 638).

This emergency transition brought many challenges, and research is already underway to analyse the impacts of the COVID-19 pandemic in educational institutions, mainly regarding the challenges and opportunities that arose from this emergency (Adedoyin & Soykan, 2020; Dhawan, 2020; Lassoued et al., 2020). Namely, it is of critical importance to evaluate the experience with emergency remote education in higher education institutions to inform the design of future, well-planned, distance or OL efforts (Oliveira et al., 2021; Hodges et al., 2020; Bower, 2019)

Furthermore, the COVID-19 outbreak has shown that markets are dynamic and can move rapidly (Jaworski et al., 2000). This poses a unique opportunity to study how markets are created and can disappear within a limited period (Donthu and Gustafsson, 2020). It would be interesting to explore whether the disappearance of one solution for a market may be replaced by another (e.g., physical teaching for online teaching). The forces acting on universities have grown in complexity and accelerated continuously. The actors that institutions serve and rely on to enable their success continuously expand in number and diversity and have more expectations. These networks of actors are referred to as dynamic ecosystems that exist to generate value (Vargo and Lusch, 2016). The increasing complex environmental pressures pose several challenges to the universities of the future.

Globally, it is expected that the higher education system will undergo a decade of radical technology-led transformation shifting the paradigm from the traditional linear formulation of education to the "University-as-a-Service". Straightforwardly, the current and future environment is too volatile to sustain this classical educational structure. Students will need to learn what they need when they need it. Personalized, continuing education will become the norm. Students will learn remotely rather than taking a traditional route and learning from a human professor in classrooms. The AI-enabled tools will provide customized learning experiences, and continuing education will become the norm (Krishnamurthy, 2020). As the author foresees, the university of the future will learn from personalization – e.g., students' expectations and data assessment - to support the diversity of learning pathways to study the same content. Therefore, it would also be interesting to explore how higher education "as a service" will be able to pinpoint the learning needs of each student, to re-design the service-education system, and provide a personalized experience.

This research contributes to understanding how universities need to change based on the challenges faced by professors and students during COVID-19. Furthermore, this research also contributes to the education "as-a-Service" context, capturing the inputs that are especially relevant to inform the service-education design of future blended learning efforts by higher education institutions. From this understanding, we reflect and discuss how higher education institutions can leverage the pandemic experience to prepare for future disruptions and tackle the challenges of the university of the future.

2. THEORETICAL BACKGROUND

2.1. CUSTOMIZED PERSONAL LEARNING

Krishnamurthy (2020) identified five trends that will revolutionize how we educate after COVID-19: (i) The Algorithm as Professor – rather than taking a traditional route and learning from a human professor in classrooms, students will learn remotely from an algorithm. The AI-enabled algorithm will provide customized personal learning experiences. Students will be able to quickly master rudimentary and routinized tasks. Then, the algorithm will prepare them for an in-person experience, where a "warm body" will engage them in Socratic dialogue; (ii) The University-as-a-Service – Traditionally, we have followed a linear formulation of society. Students go through K-12 education, some get an undergraduate degree, and some go on to further studies. However, the current and future environment is too volatile to sustain this educational structure. Students will need to learn what they need when they need it. Personalized, continuing education will become the norm; (iii) The University as Assessment Powerhouse – In a world characterized by AI and automation, learning can come from many sources. Students will learn from each other, algorithmic systems, and public information. However, universities will continue to have a powerful place as assessors of learning. Students will come to universities to gain objective credentials based on powerful assessments of learning; (iv) Learning Personalization to Support Diversity – Students of the future will have access to multiple pathways to learn the same content. For example, a course may be available through algorithmic engagement, animation/video/augmented reality, face-to-face instruction, or any mixture thereof. Using assessment data, the university of the future will be able to pinpoint the learning needs of each student and provide a personalized experience, and (v) Problem Solving Through Ethical Inquiry - As the influence of artificial intelligence and automation grow exponentially in our lives, there will be a great need for students to become problem solvers through ethical inquiry. The future will not simply be about the answers; it will be about which problems we wish to solve, given what we know. Students will need to become more comfortable with the need to evaluate AI algorithms based on their efficacy and their ethical foundation.

2.2. LEARNER CENTRIC

According Murphy and Crowfoot (2021), university learning and teaching will be learner-centered. It will be a collegial and collaborative process that involves the entire university community and external partners. Teaching will be a core part of academic practice, closely linked to research activities, and respected as scholarly and professional. Universities will provide a context for learning by integrating their different missions, and they will actively promote lifelong learning. While digitalization will continue to expand and digitally enhanced provision will be integrated into university education, physical presence on campus will remain a core feature at most institutions. Learners' goals and needs will be diversified; some will seek personal development and a degree after finishing secondary education, while others will enter at different stages in their lives and for different purposes. They will have access to various learning spaces and flexible, multi- and interdisciplinary paths that ensure that their learning is at the center of the process.

2.3. FLEXIBLE AND BLENDED APPROACHES

The nature and structure of universities are expected to be hybrid. They will be open as physical and virtual spaces and will work to cultivate both of these when engaging with society. In the future, this will entail that physical and digital learning and research environments must be designed in a holistic way to accommodate the different needs of a diverse university community and allow for flexible and blended approaches. The physical campus will continue to be crucial as a place for social interaction and dialogue: a place that will host encounters that challenge and inspire and offer quiet spaces for focused learning and research. The virtual campus will make the university ubiquitous. It will be developed to improve access for all to participate in research and learning, enhance cooperation, and explore new, innovative ways of pursuing university missions. While digitalization will continue to expand and digitally enhanced provision will be integrated into university education, physical presence on campus will remain a core feature at most institutions (Murphy and Crowfoot, 2021).

Bower's (2019) technology-mediated learning (TML) theory is an integrated and holistic theoretical framework that can be used for developing and analyzing situations where technology mediates learning. TML proposes seven premises to frame how technology mediates learning, emphasizing how technology is used to mediate interaction patterns and possibilities between networks of participants by enabling learners to contribute and share their ideas online; and the development of 'communities of practice' where participants mutually engage, jointly enterprise and share their repertoires within and beyond a course, resulting in a strong sense of presence and community, engagement or social connection.

2.4. SERVICE DESIGN AND CO-CREATION

A service design (SD) approach focuses on user-centricity, customer integration, and multidisciplinary collaboration and has recently become highly relevant in the service science, driven by the growing emphasis on customer orientation and service systems (Maglio and Spohrer, 2008). SD is involved in the Human-Centred Design, which captures insights and produces innovative solutions that reflect the needs of the consumers (Torres and Miranda, 2020). In terms of the advantages of SD for businesses, its iterative nature, collaboration with multidisciplinary teams and stakeholders in an ecosystem allows to achieve better results-driving, customized service innovation, and prevention of future service encounters failures (Vargo and Lusch, 2016). SD can be beneficial in identifying the competencies required by the business and how it could contribute to service-education value co-creation for both universities and customers.

3. METHODOLOGY

The study adopted a qualitative approach (Stake, 2004) to gain an in-depth understanding of the challenges faced by professors and students during the pandemic. Data was collected through semi-structured in-depth interviews with professors and college students that participated in online classes during the covid-19 pandemic. The sample includes thirty interviews, thirteen from students, and seventeen from professors from different universities located in USA, Brazil, Portugal, France, Spain, and Germany (see Table 1 for details). The respondents were from different fields, such as engineering, business, music, health sciences, education, and archaeology. Also, the platforms used for online learning were diverse, including Zoom, Google Meet, VLE, Moodle, Blackboard, E-Prof, and WhatsApp. The interviews were conducted from 1st March to 11th June and lasted around 15-20 minutes. In the interviews, the informants were asked to detail their online learning experience, namely the pandemic impact, challenges, positive and negative aspects, the support needed, and their emotional state.

Table 1. Sample characteristics

	Professors	Students
Country		
Brazil	11	1
USA		2
France		1
Germany		6
Portugal	2	4
Spain		2
Age		
25-30	2	14
31-40	4	3
40-50	5	
50-65	2	

Gender		
Female	5	8
Male	8	9
Total	13	17

All interviews were transcribed and analyzed using NVivo 12 software. Data were analyzed using the methodology recommended by Gioia et al. (2013). The first phase of data analysis started with an open coding process to deeply understand students' and professors' online teaching experience characteristics. Then, the codes were refined and categorized. Finally, drawing on existing literature (Bower et al., 2015; Rasheed et al., 2020) the education challenges were divided into three dimensions: technological, pedagogical, and environmental.

4. RESULTS

Results are organized around three major education challenges: technological, pedagogical, and environmental.

4.1. TECHNOLOGICAL CHALLENGES

Technological challenges are those related to teaching and learning problems and technological-based constraints. Data showed that both professors and students identified several technological difficulties and challenges. For example, a critical issue is the lack of technical competence for specific programs. Technology is continuously evolving, and, along with it, BL will present new challenges and will demand new digital skills (Maycock et al., 2018). As shown by the quote below, some miss these digital competencies:

"In the beginning, they had difficulty entering the environment and knowing how to interact, such as putting a question in the virtual room or screen sharing. It is a difficulty that persists. So, we can see that these digital natives that we used to mention do not exist. They are very good on Facebook, Instagram, and WhatsApp, but tinkering in a more robust environment, that is, technology with more functions. They are not the expected natives." (*Pedagogy professor, age 40, Brazil*)

Another point raised by the interviewees concerns how AI technologies are overcoming challenges posed by distance tools for student assessment and learning customization. Many interviewees mentioned this, mainly because AI technologies were already entering the campus. However, the challenges of distance services imposed by the pandemic increased the research and development of these processes and tools through AI solutions. Respondents identified aspects, such as, the use of machine learning for the development of assessment personalization, the learning process, and software that enhances the student experience, as expressed in the following example:

"I believe that we will have an increase in the impact of artificial intelligence on tools in a highly learning analytics logic, not only for metrics but for the whole learning experience process." (*Education professor, age 62, Portugal*)

Regarding tools accessibility, both professors and students mentioned how these features are difficult or not accessible in many e-learning tools they use. Not being able to access the platforms was a problem mentioned frequently. For example, activities such as sharing or login access become exhausting or difficult:

"There was a situation where the password recovery process took too long; I lost the class and some materials, which causes a certain discomfort as a user." (*Nurse student, age 29, Brazil*)

Respondents also felt the need for an integration tool, as they often need to migrate between many platforms, which causes delays, loss of attention, and loss of content. Furthermore, respondents felt that the usability was not very good because some tools have incomplete functionalities, and the navigation is not intuitive, which generates anxiety, delays, and breaks in reasoning:

"I had difficulties at first, it was a bit confusing because it opens all in modules, it has lots of squares, so at first I needed to open one tab and close another tab." (*IT student, age 29, France*)

4.2. PEDAGOGICAL CHALLENGES

Pedagogical challenges are directly related to the learning and teaching methodology actors use in the online learning model. The main challenge was the rapid change from a face-to-face (F2F) classroom to an online, which involved methodology adaptation, new equipment, and new pedagogic regulations, as expressed in the example below:

"I like the flexibility concerning classes and different active methodologies that are allowed through online learning, but in the beginning, the adaptation to a more flexible methodology was not easy." (*Engineer student, age 28, USA*)

To solve some of these online students' assessment challenges, professors reported that their higher education institutions (HEIs) use communities of practice to find the best pedagogical and technical solutions to address this challenge. These communities of practice provided advice from experts of the school academic community or other schools. Often, these communities involving other HEIs start through events or partnerships with a university wanting to improve its services.

"One of our actions was in the communities of practice where professors help other professors; we also have professors observing other professors' classes give a reflection and orientation, what to do and what to avoid. Our experts indicate that a more modular and continuous evaluation should be favoured and even concentrated in moments. A more careful organization, more distributed assessment, and considering students as partners in the evaluation models." (*Education professor, age 42, Portugal*)

Some respondents also mentioned difficulties in the communication process between professors and students. For example, sometimes professors are not well perceived by students, damaging the learning experience. Almost all respondents reported that one of the biggest challenges is not the platform used but the methodological approach for learning in BL environments. Some professors apply the same methodologies they used in F2F classrooms, which generates students' fatigue, discouragement, tiredness, and even ergonomic problems. Previous research has shown that when professors in BL use pedagogical strategies not adequate for the online environment, such as long lecture times and low engagement approaches failing to gain students' attention, the satisfaction and motivation for learning results tend not to be optimal (Broadbent, 2017; Bower et al., 2015).

"The biggest problem is not the tools, but the methodology students and professors use. The training of professors and students for online learning addresses more the tools, which needs to be changed." (*Education professor, age 62, Portugal*)

Professors and students describe the lack of interaction as frequently occurring in e-learning classrooms. For example, students usually turn off the cameras, and response time in online classes is slower than in F2F, which lowers the interaction.

4.3. ENVIRONMENTAL CHALLENGES

Environmental Challenges include challenges originating from the environment where the learning process occurs. One example is ergonomic problems due to sitting in the same position and looking at a screen for many hours:

"I found that three, four hours in front of a computer, giving it your full attention, can bring you problems like eye strain, and lower back pain, among other problems." (*Engineer professor, age 45, Brazil*)

Also, in online learning, multiple distractions can occur. For example, both students and professors referred to distractions either in the physical location or in the online environment, causing difficulties in online learning:

"So, we need interactive tools and methodological strategies so that we are constantly talking to this student so that he stays here and doesn't want to go to other spaces." (*Pedagogy professor, age 40, Brazil*)

And finally, the feeling of loneliness, a challenging characteristic for professors and students, is being alone and interacting with only one screen. Many of them describe that being in contact only with a system, which often does not have humanized characters, makes the feeling even more evident.

5. DISCUSSION

The main objective of this research is to understand how universities need to be transformed based on the challenges professors and students face during the COVID-19 pandemic. Transformation through a service science logic enhancing value co-creation creates a basis for systematic service innovation.

Regarding the main constraints in the technological sphere, the usability and accessibility of the software used by the interviewees is a much-debated issue. After the emergence of COVID-19, there has been a large-scale emergence of software for education. However, an improvement in usability is needed in most of these software's from a user-centered and service process perspective. Continuing in the technological sphere, the professors interviewed believe that, as is the case in other services, AI solutions will be developed and disseminated more widely in universities, such as personalizing education by analyzing prior learning in student assessment, making it more descriptive, i.e., enabling analysis in detail. Large companies in the service sector already carry out consultancies for universities, such as IBM Group and Pearson, developing platforms based on natural language processes and machine learning for the performance of digital classrooms. As in the AI field in universities, the communities of practice are important for the continuous enhancement and improvement of services in HEI, especially in these challenging times. However, if communities of practice do not encourage the participation of technological participants, such as AI professionals, and resources for projects, studies in human-centred AI methods may not be realized in practice.

Regarding pedagogical challenges, a major issue is using the appropriate methodology for e-learning classes. It is necessary to visualize professors and students as actors on the frontline of the service development and to carry out training in active methodologies and digital platforms for education. Thus, transforming the internal quality of the service and, consequently, customer satisfaction is a crucial challenge for universities "as a business". Research has shown that teaching methodologies and processes directly influence the students' perception of service quality and satisfaction (Pedro et al., 2018; Voss et al., 2007).

In terms of the flexibility of educational service, many universities still face the difficulty of very rigid internal and external regulations and systems, hindering innovation, and more personalized service. Previous studies conducted in the EU have shown that the main barriers to service innovation in universities at a macro strategic level are the rigid rules of administrative inflexibility (Murphy and Crowfoot, 2021). Flexible strategies and customer participation in service design influence customer and stakeholder satisfaction (Cardoso et al., 2015). The European University Association USA report shows the vision that European universities should have in the next ten years. One of these strategies is the flexibility of their courses and regulations, making universities more autonomous in making their organizational decisions (Murphy and Crowfoot, 2021). Still on the challenges related to the flexibility of services found in universities, one of the related points is the different forms of assessment that professors will have to design for the university of the future.

The creation and strengthening of communities of practice by universities to develop these solutions are one of the alternatives for the re-design of this service. The findings from this study are in line with other studies, especially the issues related to lack of interaction and professor skepticism about teaching online classes (Vicente et al., 2020; Hodges et al., 2020; Bower, 2019; Marshall, 2018).

Finally, the university's transformation as a service encompasses several ergonomic challenges regarding e-learning classroom design. Many interviewees reported physical discomfort during the continuous realization of e-learning classrooms. The concern about human factors and ergonomics (HFE) with techniques and methods of service realization needs to be discussed and extended to the education service. Consequently, providing better satisfaction to the actors of this service.

6. CONCLUSIONS

Frequently, services change when they are faced with challenges. Since 2020 Universities have been confronted with an external pandemic crisis disrupting the teaching and learning process, forcing HEIs to change and rethink its service model. This research identifies some of these challenges and aims to discuss how to improve this process through a service logic. These challenges are characterized into three groups.

Regarding the technological perspective, the results of this study indicate the impact of AI on the improvement of analytical processes, especially distance assessments. This development of AI solutions was already taking place in some university services. However, the pandemic and remote services challenge has made several AI developments to overcome the obstacles encountered in these new services. Still, usability improvements of educational software are needed. Thus, facilitating the co-creation of value by actors involved in the online learning process. Also, communities of practice are important to tackle pedagogical challenges and foster collaboration within the service ecosystem. Communities of practice are being strengthened in many HEIs by providing expert advice from academia and have a crucial role in bringing together the different actors in a collaborative service ecosystem of higher-education value co-creation. Importantly, it is essential to facilitate the development of methodological and digital competencies for all actors in BL environments. Given the crucial role of communities of practice in designing the future university "as a service" within a holistic and customer-centered view, further research using SD practices should be explored. The advantages of SD competencies for businesses (e.g., its iterative nature, collaboration with multidisciplinary teams and stakeholders) can contribute to universities achieving better results and driving customized service innovation. Also, it would be beneficial for both universities and customers to design future education services enhancing value co-creation.

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