

## Article

# Digital Learning Transformation in Higher Education: International Cases of University Efforts to Evaluate and Improve Blended Teaching Readiness

Charles R. Graham <sup>1,\*</sup>, Ganbat Danaa <sup>2</sup>, Tserenchimed Purevsuren <sup>2</sup>, Adriana Martínez <sup>3</sup>,  
Cinthia Bittencourt Spricigo <sup>4</sup>, Barbara Maria Camilotti <sup>4</sup> and Tserenkhand Batsukh <sup>2</sup>

<sup>1</sup> Instructional Psychology & Technology, Brigham Young University, Provo, UT 84602, USA

<sup>2</sup> Open Education Center, Mongolian University of Science and Technology, Ulaanbaatar 14191, Mongolia; ganbatda@must.edu.mn (G.D.); tserenchimed.p@must.edu.mn (T.P.); tsiigaa1220@must.edu.mn (T.B.)

<sup>3</sup> Learning and Faculty Affairs, Universidad Autónoma de Bucaramanga, Bucaramanga 680003, Colombia; amartinez18@unab.edu.co

<sup>4</sup> Vice Rectory of Educational Development, Pontifícia Universidade Católica do Paraná, Curitiba 80730-330, PR, Brazil; c.spricigo@pucpr.br (C.B.S.); barbara.camilotti@pucpr.br (B.M.C.)

\* Correspondence: charles.graham@byu.edu

**Abstract:** The global pandemic of 2019 brought heightened awareness to institutions of higher education of the need to engage in a digital transformation that extends beyond university business operations to the pedagogy of the classroom. This paper is a case study that explores three international cases of universities in Colombia, Brazil, and Mongolia that are at different stages along the path of a digital pedagogical transformation. This article tells each story, including (1) what is driving the local need to engage in digital transformation, (2) what the major challenges and barriers are to achieving a transformation, and (3) what efforts are being made to help each university to move along the path towards adoption and change. It concludes with discussing three major themes that emerged from the case studies: (1) the role of local policy in shaping digital transformation, (2) the importance of developing human capacity with technology, and (3) the potential for digital transformation to bring hope.

**Keywords:** digital transformation; blended learning; higher education; information & communication technology



**Citation:** Graham, C.R.; Danaa, G.; Purevsuren, T.; Martínez, A.; Spricigo, C.B.; Camilotti, B.M.; Batsukh, T. Digital Learning Transformation in Higher Education: International Cases of University Efforts to Evaluate and Improve Blended Teaching Readiness. *Educ. Sci.* **2023**, *13*, 1143. <https://doi.org/10.3390/educsci13111143>

Academic Editor: Anthony G. Picciano

Received: 20 October 2023

Revised: 8 November 2023

Accepted: 9 November 2023

Published: 15 November 2023



**Copyright:** © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

The last several years have introduced an unprecedented level of exploration with information and communication technology (ICT) in higher education around the world, particularly related to the implementation of blended and online learning [1]. The narratives around this digital transformation of higher education have been both positive and cautionary. Higher education (HE) leaders have observed the steady growth of online and blended modalities at their institutions and have recognized the potential for educational access to expand in significant ways. At the same time, the widespread expansion of ICT use during the COVID-19 pandemic uncovered significant issues related to equity and quality.

Prior to the global pandemic, online learning was already becoming mainstream in higher education within the U.S.; both undergraduate and graduate online learning were experiencing upward growth trends in both public and private institutions of higher education, with almost a third of graduate students enrolled in fully online courses [2]. In the U.S., blended learning, defined as the combination of in-person and online instruction [3], was also “on the rise at colleges and universities” [4] (p. 9) and was considered by some to be the “new normal” for higher education [5].

Worldwide conditions in early 2020 led to the closure of institutions of higher education (IHEs) in 185 countries, affecting over a billion and a half learners, according to a report of The United Nations Educational Scientific and Cultural Organization (UNESCO) [6]. This forced about two thirds of IHEs to move to remote teaching and learning, while the other third suspended or canceled most learning activities. One year into the pandemic, 89% of global IHEs had been able to transition to remote teaching [7]. Joosten et al. summarized it as follows:

“While many of us through the years have experienced and witnessed the potential of blended (or hybrid) learning in the future of postsecondary education, the promise has never been more realized than in the world’s response to a global pandemic and the urgency for academic continuity through emergency remote instruction that required online learning technologies to mix or replace students onsite experience with a new online experience” [8] (p. 5).

Although the transition to emergency remote teaching taught us about the possibilities for increasing access to quality higher education [9], it also raised an awareness of many challenges to providing excellent and equitable learning experiences in existing higher education systems [10]. Digital transformation in the educational context is frequently limited to the implementation of digital technologies without pedagogical and organizational changes [11]. In this way, Gkrimpizi et al. [12] classified the barriers related to digital transformation in education in six categories: environmental (legal issues and financial investments), strategic (institutional policy, strategic, and action plans), organizational (coordination between departments and agility), technological (IT infrastructure, security, and privacy risks, integration of digital technologies in educational systems), people-related (digital literacy, resistance to change and risk aversion, lack of time due to workload of academic staff), and cultural (attitudes, beliefs, and a conservative and bureaucratic culture). Petterson [11] conceptualized digitalization in the educational environment at four levels. At the first level, digitalization consists of new digital tools supporting previous practices; at the second level, there is the implementation of new digital tools without changes to teaching and learning practices. At the third level, the implementation of new digital tools occurs with the development of new teaching and learning practices, and on the fourth level, digitalization takes place by modifying the teaching and learning practices and the organization of the entire institution.

On the other hand, technology itself does not result in development in education practice [13,14], and students’ learning plays an important role in innovation in higher education [15]. In this regard, several studies have investigated factors related to the pedagogical aspects of digital transformation. For instance, Quaicoe et al. [16] articulate a model for digital transformation in primary and secondary schools that centralizes pedagogical learning, literacy, and life skills, among other factors. Additionally, Borup et al. [17] developed the Academic Communities of Engagement (ACE) framework, which consists of affective, behavioral, and cognitive engagement factors. The ACE framework also describes two types of communities of support for student engagement, the personal and the course communities that can span both digital and in-person learning environments. Another framework constructed to support computer-mediated communication, particularly in blended learning environments, is the Community of Inquiry that consists of a group of individuals who collaboratively engage to construct meaningful learning through three elements: social, cognitive, and teaching presence [18,19].

Considering the factors related to the implementation of digital technologies in higher education, this paper is a case study and shares the experiences of three international universities (in Mongolia, Colombia, and Brazil) that are experiencing a digital transformation and grappling with all of the related issues. A focus of this study is to “consider whether online technology can serve as a vehicle of hope for higher education to improve instruction” [20].

## 2. Methodology

In this study, three universities were invited to discuss their local experiences, considering cultural aspects and context related to the ongoing digital transformation underway in their institutions. A common link between each of these institutions is that they considered blended learning to be an important part of their future trajectory and reached out to the lead author to collaborate because of his past experience with blended learning.

The universities were asked to consider the following topics:

- (1) What is driving the local need to engage in digital transformation;
- (2) What the major challenges and barriers are to achieving a digital transformation;
- (3) What efforts are being made to help each university to move along the path toward adoption and change.

Below is a brief introduction of each of the institutions.

- Mongolian University of Science and Technology (MUST), Mongolia—MUST is a large public university in Mongolia with approximately 15,000 students. They are leaders in digital transformation in the region. They received a UNESCO-ICHEI pilot grant that enabled them to provide professional development in blended teaching for training 65 national master teachers, as well as cascading training at five other national universities.
- Universidad Autónoma de Bucaramanga (UNAB), Colombia—UNAB is a private university in Colombia with a student population of approximately 10,000. With the onset of the global pandemic, university leaders realized that the institution needed to increase its capacity to deliver quality digital learning. A collaboration with the lead author was begun to look at institutional support for student engagement in their online and blended course offerings [21,22]. Simultaneously, the university president was taking a leadership role in the International Association of University Presidents who were exploring issues of digital transformation. Findings from the institutional exploration of student engagement led to a Fulbright Specialist visit in 2022 and important leadership conversations that have resulted in positive changes at the university.
- Pontifícia Universidade Católica do Paraná (PUCPR), Brazil—PUCPR is a large private university in Brazil with a student population of approximately 40,000. Stakeholders at the university were particularly interested in strategies for improving the experiences of their fully online students. They reached out to the lead author to help with a university exploration of personal and institutional barriers to students being able to fully engage in their online learning experiences [23].

We understand that it would take volumes to document everything that is happening related to digital transformation at these institutions, so we have made our best efforts to organize our limited space around three important questions and the institutions' related experiences.

Finally, in the discussion, we asked the institutions to reflect on the primary question of this study: whether or not online technology is serving as a vehicle of hope for improved instruction at their institutions.

### 3. Case 1: Mongolian University of Science and Technology

This case study strives to exemplify the current status of digital and online learning, challenges and barriers, and future perspectives on educational digital transformation at the Mongolian University of Science and Technology (MUST), which is the largest national institution of higher education (IHE) in the engineering and technological field, with about 15,000 students and 800 faculty members (2020–2021 academic year statistics). MUST is also a leading institution in information communication technology (ICT); thus, it can be understood that the institution has a duty and responsibility to develop ICT-enabled education toward accelerated digital transformation in Mongolian HE [24]. Therefore, this

case study demonstrates not only institutional but also national status in transforming digital learning in the HE sector.

### *3.1. Drivers for Digital Transformation (MUST)*

Online and digital learning is a promising and inevitable cost-effective educational model for Mongolia with its vast territory and sparse population, where the main challenge for the Mongolian HE system is the provision of service in remote and rural areas. Therefore, digital transformation is very important and urgent in the post-COVID situation to ensure inclusive, equitable, and quality education in Mongolia [25]. From 2000 to 2010, the Mongolian government made significant efforts to establish ICT infrastructure for digital learning under the umbrella of the “Distance education national program 2002–2010” and the “E-Mongolia National Program 2005–2012”. Recent government initiatives such as “Vision 2050” and “Digital Nation” put more attention on the importance of developing digital educational content, open education resources (OERs), and MOOCs in order to fully transfer all levels of education into e-learning programs [26].

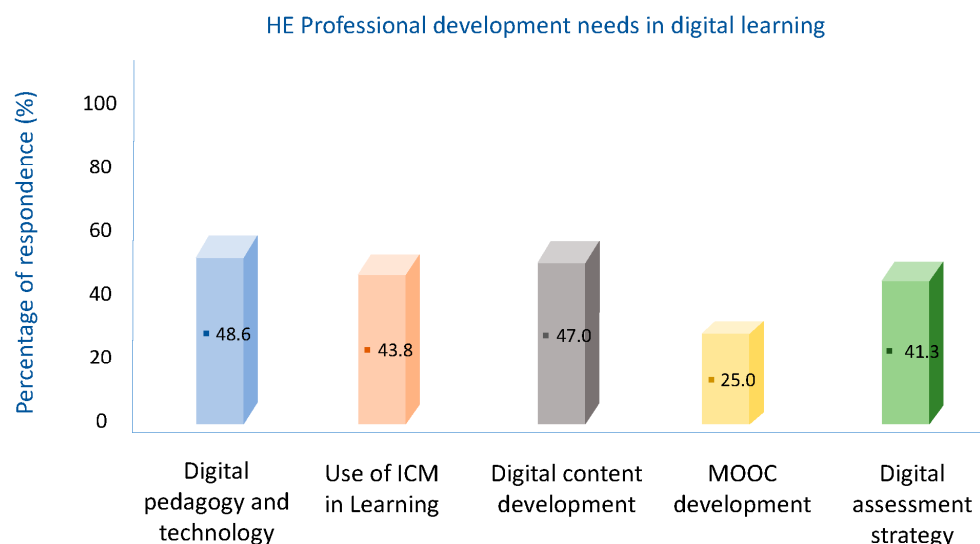
The use of digital technology in education has been highlighted as an opportunity to innovate and increase the quality of the educational systems. It is also promoting open education that can be defined as a learning experience that provides a great degree of flexibility in the choice of topic, place, speed, and method to the learner. Therefore, digital learning transformation removes entry barriers to education, increasing access to knowledge, promoting personalized and self-directed learning, and supporting lifelong learning. Also, the promotion of digital transformation in education is crucial to enhance the quality of Mongolian HE as well as an important strategy to achieve United Nations Sustainable Development Goal 4 (SDG4) [27].

There are several policy drivers of digital transformation in the Mongolian HE sector. The first phase (2021–2030) of the Vision 2050 long-term development policy was declared as a phase in which all citizens shall be provided equal opportunity to access quality education, reforming an inclusive education system [28]. To promote lifelong learning opportunities for all citizens afforded, regardless of time and location, it is also planned to strengthen lifelong education through the development of open education systems and a national-level integrated platform for online training. The Ministry of Education and Science of Mongolia approved the “Education sector mid-term plan 2021–2030” that outlined three main objectives in HE. Objective 5.2 (access) clearly sets to increase equal access to higher education through the promotion of flexible learning pathways and an open education system and it is expected that open, online, and distance learning modalities will have been expanded [29]. These policy guidelines, education sector objectives, and government initiatives are stimulating and requiring every IHE in Mongolia, including MUST, to accelerate digital transformation in their teaching and learning process.

### *3.2. Challenges and Barriers to Digital Transformation (MUST)*

For Mongolia as a developing country, we can identify a number of challenges and obstacles to educational digital transformation, such as ensuring the sustainability of ICT infrastructure [27], limited options for digital contents and OERs [30], the early development state of the MOOC concept [25,31], internet connection problems in rural areas, and many more. For HE, Mongolian students are fully aware of the advantage of online and blended learning (BL) and the opportunities provided by digital transformation, and students are confident about their ICT skills [32]. However, the main problem for digital learning was the lack of teachers’ digital competencies [33]. A recent policy review by UNESCO identified two main issues in Mongolian HE related to teachers’ professional development that hinders digital transformation. These are (1) the need to mainstream ICT competency standards for HE teachers and (2) the limited opportunities for teachers to find advanced professional development training [27]. Specific recommendations and the ICT training needs of HE teachers were also provided in the policy review. Just before the COVID-19 pandemic, we conducted a survey to identify professional development

needs in digital learning from 436 teachers at the top five national universities in Mongolia (Figure 1). The result clearly revealed that there is a significant need to strengthen teachers' use of ICT technology in education (43.8%), as well as enhance digital pedagogy (48.6%), digital content development knowledge (47%), and skills in digital assessment (41.3%). The data showed that teachers were less interested in MOOC development (25%).



**Figure 1.** Professional development needs in digital learning of top national universities in Mongolia.

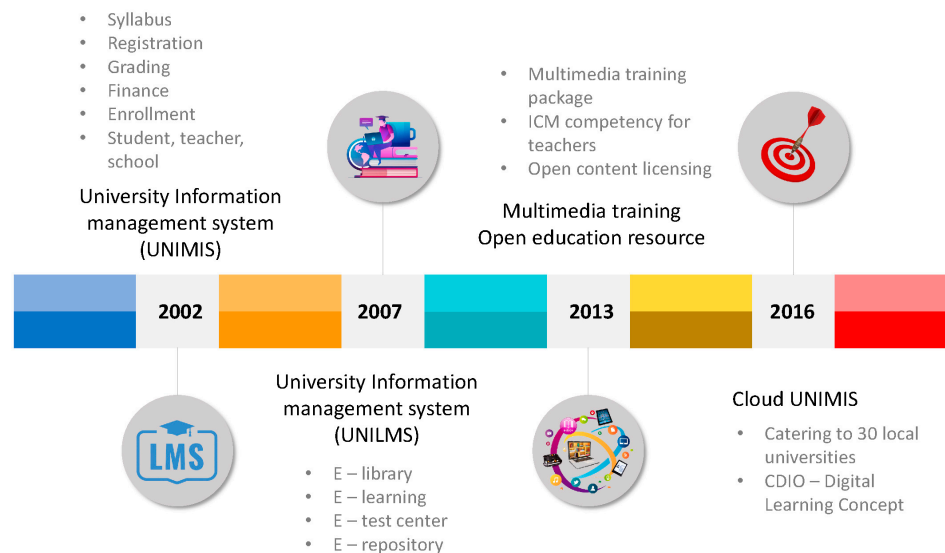
The learning management system (LMS) plays an important role in the quality of online learning and BL. MUST started to develop an ICT-driven learning platform in 2002, and its functionality has grown over the last 20 years (Figure 2). However, we learned that a locally developed LMS was not sufficient for quality online or digital learning when we faced the COVID-19 pandemic situations due to its (1) inability to provide interactions in a synchronous modality, (2) inadequate digital assessment and social annotation tools, and (3) absence of learner content as well as learner–teacher interaction functionality. Therefore, MUST started to use the Microsoft 365 software, especially the MS Teams program, as an online learning platform, and is still using it in post-COVID online learning. In the early adaptation stage of MS Teams, the software was challenging for students, required a high cost for data usage, and was difficult for teachers to manage online courses [33]. Since the local LMS was not sufficient for online learning and BL, and also because MS Teams alone could not fulfill the needed administrative or management functions, MUST needs to make a decision about whether to continue to upgrade its current LMS functionality or integrate it with already developed online learning platforms.

### 3.3. Efforts Moving towards Digital Transformation (Mongolia)

MUST established an Open Education Center (MUST-OEC) in 2019 that has acted as a trailblazing institution in the digital transformation of Mongolian HE. The MUST-OEC is a premier academic institute devoted to the academic study of education policy, educational technology, ICT-driven learning, open education through dialogue and exchange ideas, research and innovation, and engagement with national and international institutions, scholars, teachers, instructional designers, and practitioners [34]. During the pre-COVID period, the MUST-OEC efforts put more attention on increasing the awareness of digital transformation and the concept of open education in the Mongolian HE sector. The following five training modules were developed and conducted: Open Education, Open Educational Resource, Instructional Design, Heutagogy, and Massive Open Online Course. The MUST-OEC was the first institution in Mongolia to introduce the concept of “Education 4.0”, which describes the future of education as using advanced technologies and automation. About 300 representatives from the Ministry of Education and Science, the



Institution of teacher professional development, and more than 15 universities located in Ulaanbaatar participated in all five series of training in a face-to-face format. These training series were further organized in an online format to the Mongolian National University of Education, which is the biggest university for educating K-12 teachers [25].



**Figure 2.** Development of a learning management system (LMS) at MUST, Mongolia.

The MUST-OEC could develop several benchmark MOOCs for all stakeholders in the HE sector based on the funding sources of Asian Development Bank and the Ministry of Education and Science. The “Open Education” MOOC was developed based on the previous face-to-face and online training materials. For instance, the “Higher Education Governance and Management” MOOC together with motivational webinar training could have delivered state-of-the-art knowledge to the decision makers at the Ministry of Education and Science and the management-level people at every IHE in Mongolia. The MUST-OEC developed and implemented a MOOC entitled “Teacher Professional Skill Development” during COVID-19 school closures, which provided a notable impact addressing the pandemic situation [33].

To accelerate digital transformation as well as to overcome the pandemic successfully, the MUST-OEC proposed an “Online Professional Development Program” and implemented nationwide online training for HE teachers in collaboration with the Institution of teacher professional development of Mongolia. More than 1500 higher education teachers (which is about 20% of HE teachers in Mongolia) were directly trained through an online professional development program. For MUST, more than 700 teachers participated in the training program. More detailed information about the implementation success and lessons learned in the online professional development program for mass university teachers during COVID-19 can be found elsewhere [33]. Now, the online professional development program is being used in pre-service teacher training at MUST.

Recently, the MUST-OEC focused on international outreach and networking to accelerate digital transformation in HE. MUST is now a member of international communities and networks, including J-WEL led by MIT [35], the Global MOOC and Online Education Alliance (GMA) led by Tsinghua University, and the International Institution of Online Education (IIOE) led by UNESCO-ICHEI. MUST could have established the IIOE national center in Mongolia. Being a member of these specific communities brings a number of benefits, including the collaborative development of online professional development platforms (<https://www.iioe.org/>, accessed on 18 October 2023), the opportunity to engage in continuous teacher training programs, knowledge sharing, online learning infrastructure development [36], and project funding. For instance, funded by UNESCO-ICHEI, the MUST-OEC successfully implemented the “Blended Learning Capacity Building for STEM

Teachers” pilot project in Mongolia [33]. The pilot project aims to empower Mongolian HE teachers with competency and skills in blended learning (BL) and support development for related policies by carrying out a training program on BL for master teachers, conducting university-wide BL practices, and developing a BL assessment tool and guidelines for BL course development. The BL master teacher training was implemented in the form of a blended format for selected outstanding teachers from six national universities. During the training, an international expert delivered five modules related to BL concepts with live interpretation. Overall, 65 national-level master teachers were prepared and certified. After the BL master teacher training, six national universities also organized cascading training in their respective institutions and involved 257 teachers in total [33].

#### 4. Case 2: Universidad Autónoma de Bucaramanga, Colombia

Universidad Autónoma de Bucaramanga (UNAB) is a private, not-for-profit higher education institution located in northeastern Colombia. It has an academic offering of 109 programs at the undergraduate and graduate levels, organized into six colleges: Economics, Administrative, and Accounting Sciences; Social Sciences, Humanities and Arts; Legal and Political Sciences; Health Sciences; Engineering; and Technical and Technological Studies. Although it delivers most academic programs in person, the university has a strong tradition of online programs, as well as cross-curricular activities aimed at fostering creativity, entrepreneurship, and leadership in its alumni. With a population of 10,039 students and 452 full- and part-time teachers, UNAB seeks to transform its offer toward blended learning, building on the good practices acquired during and after the COVID-19 pandemic. The goal is to have flexible and adaptable academic environments enhanced by technology and to provide learning experiences that strengthen students’ engagement and success, particularly for those with a lower socioeconomic status.

##### 4.1. Drivers for Digital Transformation (UNAB)

Currently, UNAB’s student population is composed of 5860 women and 4179 men. Regarding trends in the last five years, the online enrollment has increased from 2439 in 2018 to 2571 students in 2023, while the in-person enrollment has decreased from 9190 to 7468. Of the total of 109 programs, the online academic offer is represented by 16 programs, seven at the undergraduate level and nine at the graduate level. The online modality currently accounts for 14.6% of the programs at UNAB, which in turn serves 25.6% of the total student population. Like many other universities at the global level, UNAB went through a post-COVID strategic readjustment. This readjustment can be summed up in a new value proposal comprising five elements, shown in Figure 3.

This new strategy and value proposal has defined several transformational challenges, including one entitled the “UNAB Hybrid Campus”, which refers to flexibility and a combination of modalities, skill upgrades, and technological and infrastructure development. Therefore, it is expected that the institution will concentrate its efforts on digital transformation in 2024 and the years to come.

An external driving force prior to this institutional reflection process was the coordinated actions that the Ministry of Education of Colombia started during the pandemic through the “Plan Padrino” program, which evolved into the Educational Innovation Lab for Higher Education (CoLab). “Plan Padrino” was a mentoring program where experienced universities helped small-sized institutions to navigate the challenges that emerged with remote teaching during the mandatory lockdown of COVID-19. UNAB actively participated in this program, assisting colleges in northeastern Colombia. For its part, in 2022, CoLab launched an “Instrument to Measure Variables of Educational Innovation and Digital Transformation in Higher Education”, inviting UNAB to be amongst the first institutions to apply such a methodology.



**Figure 3.** UNAB's post-COVID strategic readjustment: value proposal elements.

The instrument induced a self-critical reflection on the following dimensions: (1) Strategic Management for Educational Innovation and Digital Transformation; (2) the Planning and Management of Academic Digital Ecosystems; (3) the Management of Innovation in Teaching; and (4) the Management of Comprehensive Student Accompaniment. On a percentage scale, the average score obtained was 69.5%, with the highest score being the Management of Innovation in Teaching (78%) and the lowest score corresponding to the Management of Comprehensive Student Accompaniment (53%).

In conclusion, the external drivers for UNAB's digital transformation are global trends, government's public policies, a national education ecosystem, and the increasing competitiveness in higher education. The internal drivers are the commitment to strategic redefinition, quality assurance, and accreditation, as well as an institutional ecosystem devoted to innovation and represented by divisions such as UNAB Creative, UNAB Virtual, and information and communication technology, among others.

#### 4.2. Challenges and Barriers to Digital Transformation (UNAB)

The main barrier and challenge for digital transformation at UNAB has been inadequate planning and the implementation of different efforts and initiatives throughout the years. Even if the macro-institutional strategy is revised and updated according to trends, any digital transformation requires meticulous planning and continuous follow-up to navigate the inherent challenges effectively. In the case of UNAB, planning and implementation has not been consistent, sometimes resulting in ill-defined strategies and an incomplete understanding of the university's unique needs. Therefore, certain compatibility and communication issues among various systems have arisen, resulting in duplicated efforts and difficulties in accessing and sharing crucial data.

The main information systems currently used at UNAB are Ellucian Banner ERP (enterprise resource planning), SARA human resources manager, the Canva and Moodle LMSs (learning management systems), Simplicity CRM (Simplicity customer relationship management), Alfabet Document Management, Pure RIMS (Research Information Management System), and, more recently, Ufaculty (Faculty Information System).

Planning and implementation are also influenced by a complex decision-making process, since data management and analysis are still precarious at UNAB. Although some advancements have been made regarding the use of control panels and other tools such as Power Bi, there is very little use of large-scale data analysis that shows the evolution and



impact of digital transformation and how it can be quantified. The challenge is to focus on the right processes and put the data into action to appreciate their value and determine their quality.

Another barrier present is the resistance to change. Although UNAB has had a long tradition of commitment towards innovation, insufficient training might have negatively impacted user adoption. A large portion of faculty and staff members still exhibit resistance due to concerns about the potential disruption of established routines and teaching methodologies. Other factors contributing to a resistance to change are the fear of an increased workload or a perceived loss of autonomy and independence. To a lesser extent, another challenge is financial, since investment in technology is expensive and, as a private university, it must be covered exclusively by revenue from tuition payments.

In conclusion, and in order to ensure a successful transition towards digital transformation, a well-structured roadmap should be devised, encompassing a comprehensive assessment of current processes and a clear articulation of goals. The roadmap should move towards integration and more holistic insights, providing a unified user experience and engaging stakeholders in the overall process.

#### *4.3. Efforts Moving towards Digital Transformation (UNAB)*

Recent efforts towards digital transformation at UNAB can be explained from two approaches. The first approach is related to institutional adjustments to guarantee academic continuity during 2020 and 2021 amid the mandatory lockdown and other government guidelines to navigate the COVID-19 pandemic, and the subsequent strategic commitment towards blended learning. The second approach is related to recent improvements in physical and technological infrastructure.

Under the first approach, several efforts can be highlighted. First of all, there is faculty training and mentorship, which evolved from a technological immersion plan to the measurement and enhancement of digital skills. In 2021, UNAB adopted the digital competence framework promoted by the Ministry of National Education (MEN) and a self-assessment was applied through a tool developed by the Joint Research Center (JRC) of the European Commission, in collaboration with MetaRed Colombia. The results obtained correspond to 459 systematized responses, with an average score of 55.74 out of a maximum of 88. This average score corresponds to the Expert B2 level of the Common European Framework [37].

Based on this initiative, a training plan was launched during the inter-semester period entitled “Digital Competences for 21st Century Teachers”, which included 44 training actions in three different complexity levels (explorer, integrator, and innovator) to cover the following digital competences: technological, pedagogical, communicative, research, and management. In total, 452 people, between teachers and administrative staff, were certified under this plan.

In 2022, a second self-assessment in digital skills was applied, resulting in 477 responses with an average score of 83.4 out of 150. This score corresponds to the Leader C1 level (Common European Framework), demonstrating progress in the mastery of digital and pedagogical skills among UNAB’s faculty. During the inter-semester period, the training plan was called “Quality and Innovation in Different Modalities”, with 66 training actions equivalent to 350 h, covering the same five digital competencies and issuing 956 certificates to teachers and administrative staff.

Another aspect that stands out related to faculty training and mentorship are the efforts towards the recognition of pedagogical innovations, aimed at teachers who had developed such actions with tangible results. In 2022, a total of 142 teachers submitted their documented innovations, which were made visible through videos in CoLab’s platform of the Ministry of Education and in the institutional repository.

The second effort to be highlighted under this approach is the need to explore and implement actions towards student engagement and success in online and hybrid learning environments. Therefore, in 2021, a project was developed in collaboration with a scholar

at Brigham Young University in the USA, to evaluate the level of support provided to students with affective, behavioral, and cognitive engagement in their online and blended learning experiences.

The Academic Communities of Engagement (ACE) framework [17,38] was used as a lens for understanding the types of support that institutions should provide in online and blended learning programs. Using a survey instrument sent to both undergraduate and graduate students ( $n = 1295$ ), a mixed-methods analysis was conducted to better understand how UNAB students feel their institution supports engagement and what barriers they experience. To accomplish this, the following research questions were addressed: (1) How do students feel the institution supports their academic engagement for online and blended learning (including affective, behavioral, and cognitive dimensions)? (2) What are the barriers to student academic engagement for online and blended learning at the institutional level?

The results showed that 31% of students reported that they experienced three or more barriers to their learning, which should be addressed when considering institutional support elements. Particularly, these barriers refer to economic issues that challenge the daily commute to campus, or the inflexibility of academic schedules that makes it hard to combine work and study. The results of the study were published in the Special Issue “Embracing Online Pedagogy: The New Normal for Higher Education”, from the *Education Sciences* journal [21].

During the months of October and November 2022, UNAB was a beneficiary of the Fulbright Specialist program from Fulbright Colombia, in order to have Dr. Charles Graham’s support to follow up on the student engagement research study, work towards blended learning readiness, and help design a Teaching and Learning Center at UNAB. Additionally, more than 150 teachers benefited from Dr. Graham’s training sessions, improving their experience in digital teaching and awareness about the engagement and commitment of students.

The second approach of physical and technological infrastructure improvements can be summed up in the recent adaptation of 111 classrooms with ICT tools for hybrid lessons, in addition to the ongoing maintenance and upgrade of virtual courses and programs delivered through the Canva and Moodle LMSs. Also, six services were digitized to continue supporting students in their access to education. A total of 78.2% of student services are currently digitized, including student elections, enrollment, and credit and financial processes.

Other tasks being digitized cover electronic payroll transmission, electronic invoices, and mass billing. An overall technological renovation of computer labs is underway. These labs are assigned 100% for student use, and such a renovation also implies the upgrading of computers for teachers and administrative staff.

Finally, and resulting from the post-COVID strategic readjustment mentioned above, UNAB has recently started the reorganization of its academic structure. Academic support areas are being strengthened, and two divisions have been formalized: a Teaching and Learning Services office and a Student Success office. Therefore, it is expected that such an organizational framework will play a pivotal role in driving digital transformation, yielding benefits for both students and teachers.

### 5. Case 3: Pontifícia Universidade Católica do Paraná

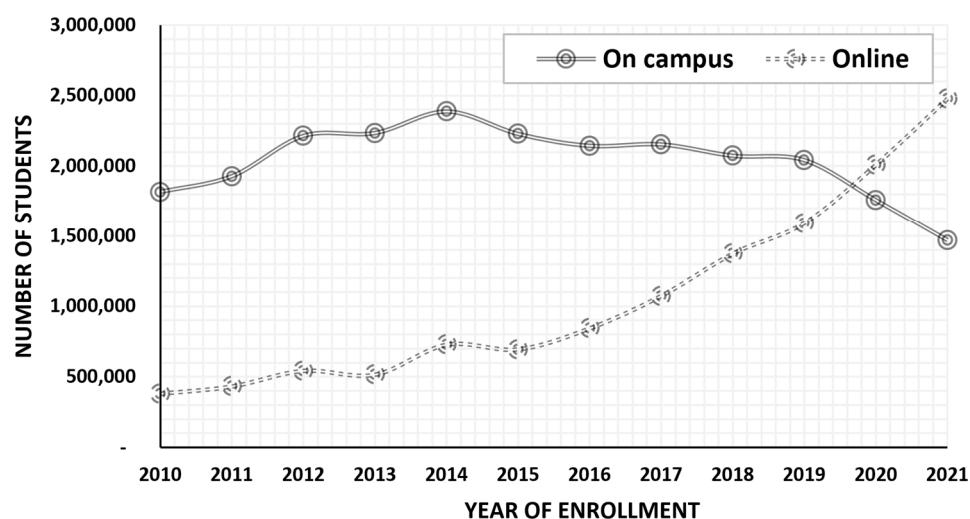
The Pontifical Catholic University of Paraná (PUCPR), established in 1959, enrolls approximately 40,000 students and employs 1500 faculty members across 76 on-campus and online undergraduate programs, as well as 16 postgraduate programs spanning disciplines such as medicine and health sciences, engineering, computer science, law, business, arts, communication, design, architecture, agriculture, veterinary science, and biotechnology. The institution operates across three campuses, situated in the cities of Curitiba, Londrina, and Toledo, all located within the state of Paraná in southern Brazil. Originating within an analog and in-person framework, the university has embarked on its digital transformation

journey in response to the growing prominence of online activities within on-campus programs, alongside a nationwide expansion of online undergraduate and postgraduate education, as expounded upon in the forthcoming sections.

### 5.1. Drivers for Digital Transformation (PUCPR)

The growth of enrollments in distance education for undergraduate and specialization courses, along with the increase in online activities in face-to-face courses, authorized since 2001 by Decree No. 2253 of the Ministry of Education [39], have been the major forces driving the need for digital transformation in PUCPR. The digital transformation has been led by the administration, considering market demands, especially those stemming from students' needs for greater flexibility of time and space and the growth of enrollments in online degree programs, which require educational technologies for their operation. In Brazil, distance education began in 1996 through Law No. 9394 [40], which allowed the establishment of fully online degree programs. Since then, there has been a significant increase in enrollments in online degree programs within the country, offering lower costs and high flexibility for students (Figure 4) [41].

**Comparison of the student enrollment in online and on-campus program from 2010-2021**



**Figure 4.** Increase in online course enrollment compared to on-campus enrollment from 2010 to 2021 [41].

Post-COVID, the demand for digital transformation among students in face-to-face programs increased as they became more familiar with synchronous remote classes and the use of learning management systems (LMSs). Many of the students and professors in face-to-face undergraduate and graduate programs rarely used the LMS, which had been available since 2002. Eureka, developed in partnership with Siemens for online professional training courses, started to be used as an LMS for graduate courses and for face-to-face undergraduate students to take dependency subjects online [42]. Eureka was discontinued in 2015, and the institution began subscribing to commercial LMSs, eliminating the need to maintain a team for software development and support.

Brazilian legislation that regulates the modes of education classifies higher education programs into two categories: face-to-face or online. There is no regulation that includes blended learning. In 2001, the Ministry of Education, through Decree No. 2253 [39], allowed the offering of courses that, either in whole or in part, used a “non-face-to-face” method with a limit of 20% of the total program workload, using integrated information and communication technologies to achieve pedagogical objectives. This opened the possibility

for online activities in face-to-face courses, placing an initial legal demand for the use of tools for organized and didactic online communication between students and teachers.

In 2007, Decree No. 3 from the Ministry of Education established that the measurement of the minimum workload for undergraduate programs should be delineated in hours (60 min) of academic activities and effective student work, rather than in class hours (45 to 50 min), the method previously used in Brazilian higher education institutions [43]. The effect of this resolution on higher education institutions was the need to extend the academic calendar for many of their programs, which reached 40 weeks per year, making several activities carried out between semesters unfeasible, such as teacher training, short-term courses, internships, and research internships. To reduce the annual length of the academic calendar, and considering the regulation described above, PUCPR implemented online activities in face-to-face undergraduate programs in 2014. The effective student work would complement the hours of face-to-face classes, understood as a set of extracurricular complementary activities carried out by students and supervised by teachers through the LMS, within the legal limit of 20% of the program's workload [44].

One cannot overlook the COVID-19 pandemic as one of the drivers of digital transformation in the institution. The fact that professors in face-to-face programs were already using the LMS before the COVID-19 pandemic contributed to the continuity of classes during the period when the institution adopted emergency remote teaching for all of its undergraduate and graduate programs within a week. The institution's Teaching and Learning Center (CrEAre) conducted many training sessions and published pedagogical support materials, especially on techniques for student engagement as well as the assessment of learning in remote classes, the use of the LMS, web conferencing tools (with which professors were less familiar until then), and other educational technologies that contributed to collaboration and student activity during classes. With the possibility of a gradual return to in-person classes in 2021, and due to strict biosafety and social distancing regulations, CrEAre developed a pedagogical support manual and conducted training using blended learning concepts. An adapted Hyflex model was adopted, in which some students attended classes in person, while others had the option to attend classes remotely, either live or recorded.

## 5.2. Challenges and Barriers to Digital Transformation (PUCPR)

The top challenges that PUCPR faces in the process of digital transformation are related to the traditions of transmissive learning, to technology issues, and also to some political challenges. It is observed that teachers still carry with them the tradition of transmissive teaching through which they were trained, and possess limited digital competencies. For instance, teachers encounter challenges in applying the principles of blended learning or communities of inquiry, and in integrating educational technologies into their classes as tools to promote student collaboration or enhance feedback. Students, in turn, who are still largely accustomed to transmissive teaching, aspire to reduce the number of in-person hours in their courses and increase schedule flexibility by incorporating more online activities.

In online undergraduate programs, it has been observed that many students come with an expectation of synchronous remote classes, maintaining direct contact with the instructor, similar to what transpired during the pandemic. However, they become disillusioned upon encountering entirely asynchronous activities. The institution attempted to introduce some in-person classes into online courses, but this effort was hampered by low student participation in these in-person sessions and a lack of integration between the online and in-person course components. Students express a desire for interaction with instructors in asynchronous online environments and struggle with independently organizing their studies [23].

Technologically, there are barriers such as the lack of homogeneity in the quality of campus Wi-Fi signals, which necessitates constant investments and annual monitoring by means of satisfaction questionnaires responded to by students and professors. The

institution also faces challenges in making necessary investments to keep equipment like laptops and tablets updated and in sufficient numbers for all students to use during classes. Few students bring their own devices to classes, and not all have access to computers at home. Several students exclusively use smartphones to access the learning management system (LMS), virtual library, or applications used by professors in the classroom. Each professor procures their own subscription to collaboration, quizzes, or game applications, typically utilizing the free version. Subscribing to applications for the entire university is a matter that requires analysis by the technology department, due to cyber security concerns and investment capacity, as many of these applications are priced in dollars.

During the COVID-19 pandemic, the university loaned equipment to students and professors. The emergency remote-learning situation also highlighted certain issues with the LMS used at the time, which was replaced by a different one in early 2022 for use with in-person programs. Nearly all professors participated in online training sessions for the new LMS. The institution mandates that all professors in in-person courses utilize the LMS to provide the course syllabus, grades, and extracurricular activities.

Politically speaking, due to bureaucratic divisions between in-person and online education based on the percentage of workload in each modality, the use of blended learning as a methodology is hindered. Considering the regulatory definitions of online and in-person learning provided by the Ministry of Education, synchronous remote classes, for instance, do not fit into either category. The legislation that sets limits on in-person and online workloads in programs does not allow hybrid learning to be used as a methodology, as it imposes a bureaucratic barrier. In 2022, prompted by changes stemming from the COVID-19 pandemic, the National Council of Education issued Resolution Proposal No 14 on national guidelines for in-person institutional research and learning driven by information and communication technologies [45]. According to that proposal, blended learning could be adopted as a teaching methodology, dismantling the limitations on in-person and online workloads established in previous legislations. If regulated, the content of the Resolution Proposal would represent a significant advancement for the effective implementation of blended learning in Brazil. However, in 2023, with a change in government, discussions were halted, and the Resolution Proposal was not implemented. There still exists a belief in the country that exclusively in-person higher education holds more quality than any online approach, even if hybrid, which puts the Ministry of Education under constant pressure.

### *5.3. Efforts Moving towards Digital Transformation (PUCPR)*

The institution initially intensified its efforts towards digital transformation with the launch of online degree programs, and subsequently, propelled by the need to adapt to live remote teaching during the COVID-19 pandemic. In order to optimize the development and management of online programs, an area in which the institution lacked experience, a partnership was established with an online program management (OPM) provider. However, challenges emerged as the attrition rates in online programs surpassed those of in-person programs. In response, a study was conducted with the aim of identifying the barriers affecting online student engagement and determining how the institution could provide more effective support [23]. The study, conducted through a questionnaire administered to students enrolled in the institution's online programs, focused on three key categories of perceived barriers within the Academic Communities of Engagement (ACE) framework: Course Environment (CE), Learner Characteristics (LC), and Personal Environment (PE) [17,38].

The investigation highlighted that Course Environment (CE) barriers were perceived as the most significant. These barriers encompassed challenges that could be directly addressed through institutional support. Notable CE barriers included limited opportunities for peer collaboration and discussion, text-heavy and overwhelming course materials, inadequate interaction and feedback from instructors, and confusion regarding the learning management system (LMS) and content organization. The study emphasized the importance of enhancing online and blended teaching skills through policies and professional



development to mitigate these CE barriers. Barriers linked to Learner Characteristics (LC) manifested in struggles with time management, work–life balance, and emotional well-being. Within the realm of Personal Environment (PE), challenges emerged from noisy and unsuitable study spaces, inadequate internet connectivity, and suboptimal computing equipment. Fragile family relationships and limited support from friends and employers also hindered engagement. The study sheds light on the tangible challenges confronted by online university students, emphasizing the role of institutions in ameliorating Course Environment barriers and understanding underlying personal and internal factors influencing engagement.

So, the institution started a faculty development program aimed at fostering the creation of more engaging instructional designs centered around key pedagogical constructs such as communities of inquiry, active learning paradigms, and learning outcomes. Moreover, substantial investments were allocated to the development of a novel learning management system (LMS), characterized by streamlined student navigation and the integration of external tools for evaluative exercises, virtual laboratories, simulators, and 3D content delivery. With the aim of reinforcing the pressing need for interaction expressed by students engaged in online program modalities, an ancillary solution entitled “Talk to Us” has been conceived and implemented adjunct to the learning management system (LMS). Through this tool, students are empowered to direct inquiries to course coordinators, academic tutors, or the administrative support team. The aforementioned solution facilitates the monitoring of request flows and response deadlines, constituting a critical operational framework for the management of online student support, a demographic often susceptible to feelings of isolation and disorientation. Approximately 3000 interactions are logged daily within the platform, encompassed within a total cohort of around 7600 online undergraduate students.

Other digital initiatives are currently underway to enhance the integration and sense of belonging of students in one of the institution’s online undergraduate programs, called Digital Influence Economics: a virtual campus, and a WhatsApp group mediated by the program coordinator and a community manager. The virtual campus was created on the remote team virtual headquarters Gather (Gather Presence Inc., San Francisco, CA), serving as a collaborative space for students and teachers through their avatars. Figure 5 illustrates a section of the virtual campus, showcasing the university entrance and several gathering tables situated within the garden.



Figure 5. Image of the virtual campus built in Gather.

In this virtual campus, synchronous classes are held, but students can access it at any time of the day to study and converse with teachers and peers, as well as access administrative services, the LMS, course coordination, and the community manager. The community manager encourages the class and reminds them about deadlines and activities using the virtual campus and the WhatsApp group, of which the course coordinator also participates, but not the instructors. The program's coordination noted that students prefer to access the virtual campus during scheduled activities with teachers, such as synchronous classes. During these moments, students feel comfortable interacting orally with their avatars, with the majority of them choosing to activate their cameras during their contributions. It is possible that the personal representation of avatars in the virtual campus environment makes interactions feel more natural, thus encouraging student engagement in discussions. However, the spontaneous use of the virtual campus for individual or collaborative study is still in its early stages, even though communication and group formation in this environment closely resemble natural interactions. The majority of spontaneous interactions occur through the WhatsApp group. Differences in schedules among students could explain the lower rate of spontaneous access to the virtual campus and the significant flow of interactions through the WhatsApp group. Indeed, the use of everyday technologies for students, such as WhatsApp, can make interaction with peers and program administrators in the graduate program more natural through this medium.

Specialization programs are benefiting from the remote live learning gained from the COVID-19 pandemic. The model of synchronous classes existed before the pandemic, but afterward, it became the preferred choice of students and the adopted method for most of the institution's specialization courses. Remote synchronous classes facilitate real-time collaboration between students and teachers, reducing the typical sense of distance in asynchronous online education. Synchronous remote classes were not implemented in the in-person undergraduate programs due to the regulatory gray area mentioned earlier.

Regarding in-person education, a significant institutional digital transformation initiative was the establishment, in 2023, of the Extended Reality Center, a complex with 3000 m<sup>2</sup> of physical space for the implementation of immersive learning experiences to enhance experiential learning. Teachers propose projects that are developed by a multidisciplinary team (programmers, game designers, and educators) to be used with virtual or mixed reality devices or in 360-degree projections.

The perception of gaps in the faculty's capacity for the strategic implementation of educational technologies during the pandemic led the institution to develop a mandatory faculty development project in digital competencies, based on the concepts of the Community of Inquiry [19] and the Pedagogy Wheel (the term "Pedagogy" combines the terms "Ipad" and "Pedagogy") [46,47]. This project aimed to stimulate teachers' autonomous learning about the use of educational technologies [48]. Until August 2023, a total of 502 professors completed the training, and according to the European Framework for Digital Competence, DigCompEdu [37], they hold the higher levels of digital technologies (leader and pioneer). The main challenges pointed out by the professors were a limited access to free software or the need for paid licenses and the poor quality of the internet on campus. Most of the faculty mentioned that they already used digital educational tools and they could improve the use of them; others mentioned that they prefer hands-on training and tutorials that teach how to use digital applications and tools. The university is currently enhancing the project to provide support and hands-on training to the faculty members who require it.

## 6. Discussion and Conclusions

The three university narratives described in this paper come from diverse cultures and parts of the world. However, these universities, like many others, are engaged in a process of digital transformation. In all cases, the digital transformation began prior to the global pandemic, but COVID-19 accelerated the urgency of the efforts ostensibly to benefit students, but with obvious additional motives such as student recruitment and economics,

which relate directly to the ability of IHEs to thrive. A few common themes that we draw out of the very different cases include the following:

- The role of local policy in shaping digital transformation;
- The importance of developing human capacity with technology;
- The potential for digital transformation to bring hope.

#### *6.1. Local Policy and Progress*

It was clear from all three cases that local policies and politics have a significant impact on IHE efforts towards digital transformation. For example, PUCPR faced a common global challenge with online/distance learning and traditional on-campus learning functions, essentially residing in “two bureaucratic divisions”. UNAB also experienced “duplicated efforts and difficulties” as it tried to explore the digital systems needed to support online and in-person learners. MUST also experienced policy challenges as it originally tried to create its own LMS, then began using MS Teams for its synchronous functionality, and ultimately is considering tradeoffs to upgrading their LMS.

Local policies governing online and blended learning have also impacted the ability to engage in the digital transformation of the educational system. For example, educational policies in Brazil that categorize learning as online or in-person based on percentages have created barriers for the exploration of new approaches that mix modalities into hybrid or blended classrooms that seek to take advantage of the strengths of multiple modalities [49,50]. Also, pre-COVID policies in Mongolia helped MUST to already have some momentum in their efforts towards digital transformation, allowing them to become regional leaders and tap into global efforts around UNESCO’s Sustainable Development Goal #4 of quality education.

Local policies and governmental rules and regulations are frequently associated with delays in implementing digital transformation [12,51,52]. Lašáková et al. [15] indicated that “too restrictive regulatory practices at the state level, which instill rigid regulations and lengthy decisional processes, considerably limit the implementation of innovations in education”. In summation, digital transformation is strongly influenced by local policies and cannot happen effectively without leaders who have an understanding of the policies and know how to navigate and influence their intricacies.

#### *6.2. Technology and Human Capacity*

A second theme that came through strongly from the three cases is how essential developing human capacity with technology is to successful digital transformation. Providing a digital infrastructure and selecting the right tools and systems played an important role. But that role is dwarfed by the effort that goes into building instructor and student capacity to teach and learn effectively with digital tools. The International Association of Universities (IAU) conducted two key global higher education surveys, one at the beginning of the pandemic and another a year later. The largest share of IHEs (one out of four) indicated that 25% or less of their teachers were experienced with online or distance teaching and learning [7]. Other authors pointed out barriers to digital transformation related to human capacity [11,12,15]. These barriers can be related to a lack of digital literacy, inadequate information and communication technology (ICT) skills, resistance to change, and risk aversion [12].

All three institutional case narratives talked extensively about their efforts to provide professional development to instructors and staff. MUST and UNAB both developed centers that focus on improving teaching and learning. PUCPR and UNAB also engaged in a systematic inquiry to better understand how students were engaging in digital environments and the barriers and institutional supports that would help them to be more successful [21–23]. They all understand that learners deserve more than just access to learning opportunities; they deserve access to quality learning opportunities, and this is highly dependent on the knowledge and digital teaching skills of the instructors.

### 6.3. Digital Transformation and Hope

There are many challenges with trying to meet the higher educational needs in a local community. In Mongolia, MUST's efforts sought to expand opportunities to those in many remote locations as well as "innovate and increase the quality of the educational systems". Likewise, in Colombia, underlying efforts centered around improving student engagement and the goal of reducing barriers, particularly for individuals with difficulties in accessing resources or commuting to campus, such as students with a lower socioeconomic status. In Brazil, the digital transformation efforts at PUCPR were focused on improving the student experience by reducing barriers to learning, particularly for those who needed the flexibility of online courses. In all cases, the underlying feeling was that, while there are many challenges with technology in a complex educational ecosystem, if they is implemented with the students' interests in mind, educational technologies can actually bring hope. Individuals have hope that technology can play a role in overcoming persistent challenges such as limited access to or low-quality higher education. Technologies can also introduce barriers to learning, especially if we do not attend to the persistent issues of equity in education [53–55].

**Author Contributions:** Conceptualization, C.R.G.; methodology, C.R.G.; writing—original draft preparation, C.R.G., G.D., T.P., T.B., A.M., C.B.S. and B.M.C.; writing—review and editing, C.R.G., G.D., T.P., T.B., A.M., C.B.S. and B.M.C.; visualization, G.D., T.P., T.B., C.B.S. and B.M.C. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

- Greenhow, C.; Graham, C.R.; Koehler, M.J. Foundations of online learning: Challenges and opportunities. *Educ. Psychol.* **2022**, *57*, 131–147. [CrossRef]
- Legon, R.; Fredericksen, E.E.; Garrett, R. CHLOE 3: Behind the numbers—The changing landscape of online education, 2019. A Quality Matters & Eduventures Survey of Chief Online Officers Report. 2019. Available online: <https://www.qualitymatters.org/sites/default/files/research-docs-pdfs/CHLOE-3-Report-2019-Behind-the-Numbers.pdf> (accessed on 18 October 2023).
- Graham, C.R. Exploring definitions, models, frameworks, and theory for blended learning research. In *Blended Learning: Research Perspectives*; Picciano, A.G., Dziuban, C.D., Graham, C.R., Moskal, P.D., Eds.; Routledge: New York, NY, USA, 2021; Volume 3, pp. 10–30.
- Becker, S.A.; Cummins, M.; Davis, A.; Freeman, A.; Giesinger Hall, C.; Ananthanarayanan, V. NMC Horizon Report: 2017 Higher Education Edition. Austin, Texas: The New Media Consortium. 2017. Available online: <https://www.learntechlib.org/p/174879/?nl=1> (accessed on 18 October 2023).
- Dziuban, C.; Graham, C.R.; Moskal, P.D.; Norberg, A.; Sicilia, N. Blended learning: The new normal and emerging technologies. *Int. J. Educ. Technol. High. Educ.* **2018**, *15*, 3. [CrossRef]
- Marinoni, G.; van't Land, H.; Jensen, T. The Impact of COVID-19 on Higher Education Around the World: IAU Global Survey Report. 2020. Available online: [https://www.iau-aiu.net/IMG/pdf/iau\\_covid19\\_and\\_he\\_survey\\_report\\_final\\_may\\_2020.pdf](https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf) (accessed on 18 October 2023).
- Jensen, T.; Marinoni, G.; van't Land, H. Higher Education One Year into the COVID-19 Pandemic: Second IAU Global Survey Report. 2022. Available online: [https://www.iau-aiu.net/IMG/pdf/2022\\_iau\\_global\\_survey\\_report.pdf](https://www.iau-aiu.net/IMG/pdf/2022_iau_global_survey_report.pdf) (accessed on 18 October 2023).
- Joosten, T.; Weber, N.; Baker, M.; Schletzbaum, A.; McGuire, A. Planning for a Blended Future: A Research-Driven Guide for Educators. Report Every Learner Everywhere Network. 2021. Available online: <https://www.everylearnereverywhere.org/resources/> (accessed on 18 October 2023).
- Hodges, C.; Moore, S.; Lockee, B.; Trust, T.; Bond, A. The Difference Between Emergency Remote Teaching and Online Learning. EDUCAUSE Review. 2020. Available online: <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning> (accessed on 18 October 2023).
- Moore, S.; Trust, T.; Lockee, B.; Bond, A.; Wednesday, C.H. One Year Later... and Counting: Reflections on Emergency Remote Teaching and Online Learning. EDUCAUSE Review. 2021. Available online: <https://er.educause.edu/articles/2021/11/one-year-later-and-counting-reflections-on-emergency-remote-teaching-and-online-learning> (accessed on 18 October 2023).
- Pettersson, F. Understanding digitalization and educational change in school by means of activity theory and the levels of learning concept. *Educ. Inf. Technol.* **2021**, *26*, 187–204. [CrossRef]



12. Gkrimpizi, T.; Peristeras, V.; Magnisalis, I. Classification of Barriers to Digital Transformation in Higher Education Institutions: Systematic Literature Review. *Educ. Sci.* **2023**, *13*, 746. [\[CrossRef\]](#)
13. Darby, F. *The Post-Pandemic and the Future of Teaching and Learning*; The Chronicle of Higher Education: Washington, DC, USA, 2020; pp. 1–60.
14. Islam, M.S.; Grönlund, A. An international literature review of 1:1 computing in schools. *J. Educ. Change* **2016**, *17*, 191–222. [\[CrossRef\]](#)
15. Lašáková, A.; Bajžíková, L.; Dedze, I. Barriers and drivers of innovation in higher education: Case study-based evidence across ten European universities. *Int. J. Educ. Dev.* **2017**, *55*, 69–79. [\[CrossRef\]](#)
16. Quaicoe, J.S.; Ogunyemi, A.A.; Bauters, M.L. School-Based Digital Innovation Challenges and Way Forward Conversations about Digital Transformation in Education. *Educ. Sci.* **2023**, *13*, 344. [\[CrossRef\]](#)
17. Borup, J.; Graham, C.R.; West, R.E.; Archambault, L.; Spring, K.J. Academic Communities of Engagement: An expansive lens for examining support structures in blended and online learning. *Educ. Technol. Res. Dev.* **2020**, *68*, 807–832. [\[CrossRef\]](#)
18. Garrison, D.; Kanuka, H. Blended learning: Uncovering its transformative potential in higher education. *Internet High. Educ.* **2004**, *7*, 95–105. [\[CrossRef\]](#)
19. Garrison, D.R.; Anderson, T.; Archer, W. Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. *Internet High. Educ.* **2000**, *2*, 87–105. [\[CrossRef\]](#)
20. MDPI. Special Issue “Is Online Technology the Hope in Uncertain Times for Higher Education?”. Available online: [https://www.mdpi.com/journal/education/special\\_issues/T3XIO39D6Z](https://www.mdpi.com/journal/education/special_issues/T3XIO39D6Z) (accessed on 7 November 2023).
21. Tuiloma, S.; Graham, C.R.; Martinez Arias, A.M.; Parra Caicedo, D.M. Providing institutional support for academic engagement in online and blended learning programs. *Educ. Sci.* **2022**, *12*, 641. [\[CrossRef\]](#)
22. Graham, C.R.; Borup, J.; Tuiloma, S.; Arias, A.M.; Caicedo, D.M.P.; Larsen, R. Institutional support for academic engagement in online and blended learning environments: Exploring affective, behavioral, and cognitive dimensions. *Online Learn. J.* **2023**, *27*, 4–40. [\[CrossRef\]](#)
23. Spricigo, C.B.; Camilotti, B.M.; Graham, C.R.; Baptista, R. An exploration of institutional and personal barriers to online academic engagement at a Brazilian university. *Educ. XX1* **2023**, *26*, 17–50. [\[CrossRef\]](#)
24. Tuul, S.; Banzragch, O.; Saizmaa, T. E-learning in Mongolian higher education. *Int. Rev. Res. Open Distrib. Learn.* **2016**, *17*, 181–197. [\[CrossRef\]](#)
25. Li, M.; Han, X.; Cheng, J. *Handbook of Educational Reform through Blended Learning*, 1st ed.; Springer Nature: Singapore, 2024; Chapter 6, ISBN 978-981-99-6269-3. [\[CrossRef\]](#)
26. Altangerel, M.; Banzragch, B.; Sed, S. Current Situation of The Digital Transformation of The Mongolian Education Sector. *Embed. Selforganising Syst.* **2022**, *9*, 4–7. [\[CrossRef\]](#)
27. UNESCO. ICT in Education Policy Review Report Mongolia. 2021. Available online: <https://unesdoc.unesco.org/ark:/48223/pf0000379606> (accessed on 18 October 2023).
28. Mongolia Ministry of Education Mongolia Ministry of Education, Culture Science and Sports. Towards Mongolia’s Long-Term Development Policy Vision 2050: Advancing Education Equity, Efficiency and Outcomes. 2020. Available online: <https://elibrary.worldbank.org/doi/abs/10.1596/34397> (accessed on 18 October 2023).
29. Mongolia Ministry of Education and Science. Education Sector Mid-Term Development Plan 2021–2030. Available online: <http://en.meds.gov.mn/education-sector-mid-term-development-plan> (accessed on 18 October 2023).
30. Hodgkinson-Williams, C.; Arinto, P. *Adoption and Impact of OER in the Global South*. International Development Research Centre & Research on Open Educational Resources; African Minds: Cape Town, South Africa; Ottawa, QC, Canada, 2017; p. 610. [\[CrossRef\]](#)
31. Sukhbaatar, O.; Choimaa, L.; Usagawa, T. Students’ perception and experience of massive open online courses in Mongolia. *Creat. Educ.* **2018**, *9*, 1818–1828. [\[CrossRef\]](#)
32. Steinbeck, H.; Matthiessen, J.; Vladova, G. Student Learning Behaviour in the Digital Age. 2019. Available online: <https://core.ac.uk/download/pdf/301384179.pdf> (accessed on 18 October 2023).
33. Purevsuren, T.; Danaa, G.; Shambaljamts, T.; Dashzeveg, T.; Davaa, A.; Radnaa, N. Implementation of the Online Professional Development Program for Mass University Teachers During COVID-19 Pandemic. In *International Symposium on Computer Science, Computer Engineering and Educational Technology*; TUDPress: Dresden, Germany, 2021; pp. 106–112. Available online: <https://www.tu-chemnitz.de/informatik/ce/files/SS2021.pdf#page=110> (accessed on 18 October 2023).
34. Dendev, B. Open Education. 2019. Available online: <https://online.fliphtml5.com/wvtme/iltr/#p=1> (accessed on 18 October 2023).
35. Reynolds-Cuellar, J.; Stump, G.S.; Bagiati, A. Building a Community for Educational Transformation in Higher Education. In *Proceedings of the 2020 IEEE Frontiers in Education Conference (FIE)*, Uppsala, Sweden, 21–24 October 2020; pp. 1–5. [\[CrossRef\]](#)
36. Danaa, G.; Tsooj, S.H. Digital Teaching and Learning Approaches for Basic Engineering Courses. CLOUD-Connecting Leaders Online for University Digital Transformation. 2021. Available online: [https://en.ichei.org/dist/index.html#/reader?id=1006&qk\\_qishu=2&lang=1](https://en.ichei.org/dist/index.html#/reader?id=1006&qk_qishu=2&lang=1) (accessed on 18 October 2023).
37. Punie, Y.; Redecker, C. (Eds.) *European Framework for the Digital Competence of Educators: DigCompEdu*; Publications Office of the European Union: Luxembourg, 2017; pp. 1–95. [\[CrossRef\]](#)
38. Borup, J.; Graham, C.R.; West, R.E.; Archambault, L.; Shin, J.K. Academic Communities of Engagement (ACE) framework. In *The Open Encyclopedia of Educational Technology*; EdTechnica: Provo, UT, USA, 2023; pp. 93–104. [\[CrossRef\]](#)



39. Portaria nº 2.253/2001. Ministério da Educação. Diário Oficial da União Brasil. Available online: <https://www.jusbrasil.com.br/diarios/6017886/pg-18-secao-1-diario-oficial-da-uniao-dou-de-19-10-2001> (accessed on 18 October 2023).
40. Lei 9394/1996. Diário Oficial da União. Brasil. Available online: [https://www.planalto.gov.br/ccivil\\_03/leis/19394.htm](https://www.planalto.gov.br/ccivil_03/leis/19394.htm) (accessed on 18 October 2023).
41. INEP. Censo da Educação Superior. 2023. Available online: [https://app.powerbi.com/view?r=eyJrIjoiNjUzZjU2YzJjU2YzItY2VlZC00MzcwLTk4OWYtODMzNWYyNzJkM2ZhliwidCI6IjI2ZjczODk3LWM4YWMTNGIxZS05NzhmLWVhNGMwNzc0MzRiZiJ9](https://app.powerbi.com/view?r=eyJrIjoiNjUzZjU2YzItY2VlZC00MzcwLTk4OWYtODMzNWYyNzJkM2ZhliwidCI6IjI2ZjczODk3LWM4YWMTNGIxZS05NzhmLWVhNGMwNzc0MzRiZiJ9) (accessed on 18 October 2023).
42. Gomes, P.; Matos, E.L.M. *Uma Experiência de Virtualização Universitária: O Eureka da PUCPR*; Champagnat: Curitiba, Brasil, 2003; pp. 1–191.
43. Resolução nº 3/2007. Ministério da Educação. Diário Oficial da União Brasil. Available online: [http://portal.mec.gov.br/cne/arquivos/pdf/rces003\\_07.pdf](http://portal.mec.gov.br/cne/arquivos/pdf/rces003_07.pdf) (accessed on 18 October 2023).
44. PUCPR. *Diretrizes de Carga Horária Docente*. Unpublished internal report. 2015.
45. Parecer No 14/2022. Conselho Nacional de Educação. Brasil. Available online: <https://abmes.org.br/arquivos/legislacoes/Parecer-cne-cp-014-2022-07-05.pdf> (accessed on 18 October 2023).
46. Carrington, A. The Pedagogy Wheel: It's not about the Apps, It's about the Pedagogy. Teachthought. Available online: <https://www.teachthought.com/technology/the-pedagogy-wheel/> (accessed on 18 October 2023).
47. PUCPR. A Roda Pedagogy. Não é Sobre Apps, é Sobre Pedagogia. Available online: <https://www.pucpr.br/pedagogy-wheel/> (accessed on 18 October 2023).
48. Legroski, A.C.; Camilotti, B.M.; Zermiani, T.C.; Vaughan, N.V.; Andreoli, F.D. *Competências Digitais Docentes*; PUCPRESS: Curitiba, Brasil, 2023; pp. 1–120, ISBN 978-65-5385-043-9.
49. Garrett, R.; Simunich, B.; Legon, R.; Fredericksen, E. (Eds.) CHLOE 8: Student Demand Moved Higher Ed Towards a Multi-Modal Future 2023. Available online: <https://encoura.org/project/chloe-8/> (accessed on 18 October 2023).
50. Irvine, V. The Landscape of Merging Modalities. *Educ. Rev.* **2020**, *4*, 40–58. Available online: [https://er.educase.edu/-/media/files/articles/2020/10/er20\\_4103.pdf](https://er.educase.edu/-/media/files/articles/2020/10/er20_4103.pdf) (accessed on 18 October 2023).
51. Gomez-Trujillo, A.M.; Gonzalez-Perez, M.A. Digital transformation as a strategy to reach sustainability. *Smart Sustain. Built Environ.* **2021**, *11*, 1137–1162. [CrossRef]
52. Aditya, B.R.; Ferdiana, R.; Kusumawardani, S.S. Barriers to digital transformation in higher education: An interpretive structural modeling approach. *Int. J. Innov. Technol. Manag.* **2021**, *18*, 5. [CrossRef]
53. UNESCO. Global Education Monitoring Report Summary 2023: Technology in Education: A Tool on Whose Terms? Available online: <https://www.unesco.org/gem-report/en> (accessed on 18 October 2023).
54. Ndibalema, P. Constraints of transition to online distance learning in higher education institutions during COVID-19 in developing countries: A systematic review. *E-Learn. Digit. Media* **2022**, *19*, 595–618. [CrossRef]
55. Tate, T.; Warschauer, M. Equity in online learning. *Educ. Psychol.* **2022**, *57*, 192–206. [CrossRef]

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.