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Digital Transformation's Applications on Higher Education Learning

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MSc in Management of Services and Technology

Supervisor:  
Henrique O'Neill, Associate Professor,  
ISCTE-IUL

September, 2021

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Department of Marketing, Strategy and Operations

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## **Abstract**

BACKGROUND – Higher Education Institutions (HEI) have mainly used technology to incrementally innovate their sector, in lieu of disrupting HEI programming altogether (Jackson, 2019). However, Navaridas-Nalda et al. (2020) identify the need to digitally transform education as a “core concern” and an “educational priority”.

AIM – To discover how HEI can take advantage of Digital Transformation to enhance students’ learning outcomes.

METHODOLOGY – Design Science Research (DSR) with focus groups. A Literature review was conducted and through it, a conceptual framework of digital transformation in HEI was created, which was then subjected to validation through two focus groups.

RESULTS / FINDINGS – Reflections from the focus groups and a proposal of the final iteration of the framework are presented. ISCTE-IUL is used as a case study for an application of the framework.

CONCLUSION / SIGNIFICANCE – HEI must create a digital culture that directs it toward the investigation of newer ways of providing student-oriented solutions. To offer valuable and disruptive educational experiences, HEI will have to modernize teaching, assessment and certification. Digital transformation has brought new elements that can bolster teaching, such as digital platforms and contents and innovative educational methodologies and the use of these resources can enable more customized, self-regulated, collaborative and stimulating learning (Benavides et al., 2020). This dissertation’s significance rests upon the conceptual framework it presents.

ORIGINALITY / VALUE – Kerroum et al. (2020) have identified that digital transformation hasn’t been used to create a framework that can be adopted by a traditional HEI. This dissertation addresses this opportunity.

## **Keywords**

Design Science Research; Digital Learning; Digital Transformation; Digital Transformation Framework; Focus Groups; Higher Education

## **JEL Classification Codes**

I21; Y40



## **Resumo**

CONTEXTO – As Instituições de Ensino Superior (IES) têm usado a tecnologia principalmente para inovar incrementalmente o seu setor, em vez de transformar a programação da IES por completo (Jackson, 2019). No entanto, Navaridas-Nalda et al. (2020) identificam a necessidade de transformação digital da educação como uma “preocupação central” e uma “prioridade educacional”.

OBJETIVO – Descobrir como uma IES pode tirar proveito da Transformação Digital para aprimorar os resultados de aprendizagem dos alunos.

METODOLOGIA – Design Science Research (DSR) com focus groups. Foi realizada uma revisão da literatura e, através dela, foi criado um modelo conceptual de transformação digital em IES, que foi submetido a validação através de dois focus groups.

RESULTADOS – São apresentadas reflexões dos focus groups e uma proposta da iteração final do modelo. O ISCTE-IUL é utilizado como estudo de caso para uma aplicação do framework.

CONCLUSÕES – Uma IES deve criar uma cultura digital que a direcione para a investigação de novas formas de fornecer soluções voltadas para o aluno. Para oferecer experiências educacionais valiosas e disruptivas, as IES terão que modernizar o ensino, a avaliação e a certificação. A transformação digital trouxe novos elementos que podem impulsionar o ensino, como plataformas e conteúdos digitais e metodologias educacionais inovadoras e a utilização desses recursos pode permitir uma aprendizagem mais personalizada, responsável, colaborativa e estimulante (Benavides et al., 2020).

ORIGINALIDADE / VALOR – Kerroum et al. (2020) identificaram que a transformação digital não foi usada para criar um modelo que possa ser adotado por uma IES tradicional. Esta dissertação aborda essa oportunidade.

## **Palavras-chave**

Design Science Research; Aprendizagem Digital; Transformação Digital; Modelo de Transformação Digital; Focus Groups; Ensino Superior

## **Códigos de Classificação JEL**

I21; Y40





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## **1 Introduction**

The application of approaches of digital transformation to HEI is a looming field that has awakened interest in the recent past (Benavides et al., 2020). The Digital Revolution and Industry 4.0 have and will continue to disrupt how students communicate, search for and acquire information (AI and Machine Learning, IoT, AR and VR, Robotics, Chatbots and Virtual Assistants, Blockchain and so on...) (Jensen, 2019). Therefore, digital transformation has become a prevalent subject for HEI and is being integrated in the strategic plans most European HEI are committing to (Benavides et al., 2020) and other organizations that wish to improve their long-term success and viability (Jackson, 2019). livari et al. (2020) and Navaridas-Nalda et al. (2020) identify the need to digitally transform education as a “core concern” and an “educational priority”.

Kerroum et al. (2020) have identified, however, that digital transformation hasn't been used to create a framework that can be adopted by a traditional HEI and even if it was used that way, it wouldn't be an adapted framework, due to the difference in challenges each HEI faces. HEI have instead mainly used technology to incrementally innovate their sector, in lieu of disrupting HEI programming altogether (Jackson, 2019). The most popular solution seems to be a middle ground, where HEI digitalize some elements of their model, while also creating new digital models (Navitas Ventures, 2017). There are many new education models, such as bootcamps, 'learn now-pay later', MOOCs, nanodegrees, and so on, but while these have struggled in diverse ways, they keep evolving and becoming more recognized and viable learning options (Navitas Ventures, 2017). Volungevičienė et al. (2020) refer to digitally improved educational experiences as essential for better learning outcomes, employment opportunities, social integration and general quality of life. If HEI are to persevere, they must continuously redevelop and re-evaluate themselves and explore and make use of the myriad opportunities and potential that digital transformation provides, a process that must include the entirety of the HEI (Šereš et al., 2018). Many HEI are developing digital strategies in response to the switch towards using new technology, however, they need the vision, ability and commitment to implement them successfully (Benavides et al., 2020).

### **1.1 Research Problem, Questions, Aim and Objectives**

The problem this dissertation addresses is the need for HEI to adapt to a continuously changing learning environment (Volungevičienė et al., 2020). This dissertation aims to contribute to the existing body of knowledge by producing results regarding the ways digital transformation can affect the HEI and the learning experience of students, through the creation of a framework of digital transformation and its application in a specific HEI. Because, while digital transformation in education has been extensively researched (Navaridas-Nalda et al.,

2020), examination of their implications on higher education is lacking (Jackson, 2019). Hence, the following questions must be answered:

- How can HEI digitally transform?
- How can digital transformation enhance the learning process?

To answer these questions, the research objectives have been selected:

- 1) To uncover the key trends, success factors and barriers in digital transformation of HEI;
- 2) To study the benefits of digital learning;
- 3) To create a framework of digital transformation;
- 4) To evaluate the framework.

## 2 Literature Review

### 2.1 Digital Transformation in HEI

The Enterprisers Project defines digital transformation as “the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers. It is also a cultural change that demands that companies continuously challenge the norm, experiment, and become comfortable with failure”. Šereš et al. (2018) state that “digital transformation of higher education is about more than just technology”. There must be a digital culture that is understood and approved by the entirety of the HEI and the HEI should strive to use newer ways of working, so that it can provide student-oriented solutions and services in a world of ever-evolving technology, competition, behaviors and needs.

The main drivers of digital transformation (in the public sector) are budget pressures, customer demands, governmental directives and the digital maturity of the other companies, in that order (Deloitte Digital, 2015). Competitors are also a main source of pressure to digitally transform (MIT Center for Digital Business and Capgemini Consulting, 2011). Jackson (2019) makes the case that digital disruption might force higher education to de-institutionalize, reformulate, or both, thus higher education can't survive on institutionalized form alone, it will have to find mechanisms to absorb information (internal and external) and adjust to external demands. A report by Digital Clarity Group (2016) stress the importance of updating HEI analytics and big data tools to acquire better information and turn it into “powerful business decisions” that create value, as they affirm that future competitive advantages of HEI will be dictated by their ability to harness and utilize internal and external information. Companies must also staunchly advocate for transformation in higher education that comes not just from academic accreditation authorities, but also from an outside-in perspective (where the process of curriculum creation begins by analyzing the effects of digital transformation on an entire industry reformulation and using the mindset of industry experts in the creation of learning communities around a certain subject matter) (Jackson, 2019).

Šereš et al. (2018) identified six blocks that constitute the digital transformation of a company:

- Choosing the digital strategy for the company and the way to implement innovation;
- Organized and quickly adaptable collaborative processes;
- Full business processes automation;
- Exhaustive investigation of customers' decision making;
- IT-supported business processes;
- Quality data and use of data science and analytics for decision making based on the organizational goals and strategy.

Focusing on education though, Benavides et al. (2020) have reviewed several HEI dimensions and how they have been impacted by digital transformation and found that digital transformation has brought to the teaching dimension:

- Digital Platforms and Contents for Teaching and Learning;
- Innovative Educational Methodologies;
- Digital Literacy and Skills;
- Teaching Administration Process.

Utilization of digital educational resources is viewed as a creator of new roles for teachers and students and of more adjustable, autonomous, collaborative and stimulating forms of learning (Benavides et al., 2020). HEI can use technology to overhaul the classroom-centric model for individual courses and reinvent courses (Norris and Lefrere, 2011). These processes are scalable and some HEI are also applying them at the departmental and institutional level, consistently eliminating costs without reducing quality (Norris and Lefrere, 2011).

Norris and Lefrere (2011) present the keys to creating sustainable online learning models that can help re-invent business practices, production function (teams of specialists create courses and learning content) and business models (quality and high-value online support services):

- Modernize teaching, learning, assessment and certification;
- Focus on value (in the public sector, customers don't have a high level of involvement in value co-creation of digital services – Deloitte Digital, 2015);
- Change the utilization and roles of faculty, alumni and peer learning;
- Exhaustively look for new revenue streams, so as to not raise tuition, reducing overhead costs (i.e. new buildings, parking lots, dorms), etc...
- Enabling faster achievement of learning objectives and reducing the total cost of achieving them.

UK and US HEI are aspiring to provide an experience rather than publish content (Digital Clarity Group, 2016). A feasibility study on assessment of higher education learning outcomes from OECD (2012) stated that a shift (especially in European HEI) is happening where HEI are substituting their input-based notions (number of classes taken, student workload, etc...) for student learning outcomes. This demands outcomes assessment standardization (preferably national or international) for calculating educational effectiveness of the HEI. Focusing on dependable and conclusive outcomes and learning experiences attuned to the needs of students can yield lower production/delivery costs per student, with the viable class size in mind, so that HEI can achieve economies of scale, without forgoing the engagement quality



and outcomes (Norris and Lefrere, 2011). At the same time, institutions so minded can charge extra for the value they provide to students (linked courses taken sequentially, accelerated time to course conclusion, lack of family/work barriers, premium online services, etc...).

Due to the continuous pressure for quality assessment and financial stability, many HEI have turned their attention to learning analytics for ways to improve student progression, retention, satisfaction, drop-out rates and learning outcomes, as well as learning experience, teaching quality and innovation, and institutional performance (Tsai et al., 2020). Other reasons to use learning analytics (measuring, collecting, analyzing and reporting data about students and their situations, in order to understand and optimize learning and learning environments) include gaining insight into learning behaviors, processes and strategies, informing curriculum design and learning support, customizing learning systems and resources and cultivating self-regulated learning competencies with data-driven, on-time feedback (Tsai et al., 2020).

Norris and Lefrere (2011) refer that through innovations, like amplifying the use of Open Educational Resources (content that's available for free and with an open license that is beneficial for teaching, learning, assessing and researching) and refining online learning, HEI can provide quick, fluid, adaptable and economical options, competing on the following dimensions:

- Enjoyment – create more cooperative, effective, responsible and engaged learning and support experiences;
- Outcomes – high value programs, provable skills and employability success;
- Price – lower tuitions and fees;
- Time – decrease time to achieve competence objectives, certificates and degrees.

However, HEI are struggling to accompany today's needs for creating, publishing, and managing expanding quantities of content. This could be solved by resorting to technology implementation solutions providers to create a content infrastructure within a HEI, but they are very underused. Their role has to be rethought, as they can become real partners in a HEI digital transformation and deliver present and future value (Digital Clarity Group, 2016).

Open Online Learning can be defined as a specific set of characteristics endemic to open distance learning, such as open and flexible online learning, course accessibility, student collaboration as essential to personal development, student support and course content, creating new open learning practices, knowledge and content and sharing learning outcomes with and among students, teachers and society (Volungevičienė et al., 2020). Open Online Learning merges technology-enhanced learning solutions, by nature, through digital learning environments, media and resources. Due to open online learning's advantage of using technology for delivery over distance and time, it should strive to lead the educational sector

on curriculum design that meets the changing learning needs of students. Open Online Learning also promotes active learning, participation and co-creation of knowledge and experience. There aren't many national open learning initiatives (Jensen, 2019), but open learning practices can be offered and accepted by HEI for credit, if they involve accredited institutions (Norris and Lefrere, 2011). MIT, for example, created the MIT OpenCourseWare where instructors can create and publish and keep full control of the design of their content (Jackson, 2019). HEI can also certify experiences provided by other institutions; the evolution of non-institutional learning is a significant factor of improvement in e-learning methods, models and practices (Norris and Lefrere, 2011). Other methods like the flipped classroom (blended learning method where students study the content at home and do a practical application/problem-solving of it in class) also have a positive effect on student performance (Strelan et al., 2020). Some main digital transformation opportunities in HEI include (Jensen, 2019):

- Creation and utilization of more OER;
- More accessibility (via distance learning, for example);
- Enhanced access to scientific knowledge;
- Enhanced research via international collaboration and new networks;
- Improved information governance;
- New learning pedagogies that improve learning outcomes and student experience.

While traditional, degree-based learning provides what is called “knowledge paths” (these include paths that result in graduate unemployment), the world is slowly preferring learning that fills specific knowledge gaps (including gaps that lead to employment opportunities) (Norris and Lefrere, 2011). Krishnamurthy (2020) has identified five trends that will revolutionize how HEI educate:

- 1) The algorithm as the teacher – Instead of learning from a teacher, students will learn from an algorithm. An AI-enabled algorithm will supply personalized learning experiences;
- 2) University as a Service (UaaS) – Learn what you need, when you need. Customized, life-long education will become the norm, with the needs of lifelong learners being met by HEI with smaller units and programs curriculums, developed together with industry (Volungevičienė et al., 2020);
- 3) University as assessors – Students will seek colleges to gain objective credentials based on powerful assessment of learning.
- 4) Learning Customization = Accessibility – Students will be able to use multiple pathways to learn the same. Through assessment data, HEI will be able to diagnose learning needs and provide a customized experience.

- 5) Problem solving through ethical inquiry – The influence of AI and automation will keep increasing; Consequently, students will need to become more capable at evaluating AI algorithms on the basis of their efficacy and also ethical foundations.

In the digital economy, there is a growing need for new highly specialized human capital with digital and communication skills and HEI should incorporate digital technologies into their didactic activities, facilitating students' acquisition of said skills, in order to promote skilled labor and innovation (Kerroum et al., 2020). However, HEI haven't adapted to this new reality (Jackson, 2019). Therefore, HEI have a responsibility to deploy digitalization strategies that will be able to promote and deliver ICT (Information Communication Technology) skills, allowing students to use technology in an adaptable, flexible and innovative manner. Teaching students these skills, is empowering and preparing them for the unavoidable changes brought about by digital transformation, changes that will influence the entirety of societal and professional life (Bond et al., 2018).

According to Benavides et al. (2020), researchers have asserted that it is the university teacher's perspective that technical and pedagogical guidance is to be encouraged. They also claim that from a managerial level, many HEI have put technology to use, in order to give flexibility and just-in-time learning and training, so as to better the internal processes of course delivery and quality of education.

Because the purpose of a HEI is to educate, the primary agents in the digital transformation processes of the HEI have to be the students and teachers (Benavides et al., 2020). Students are the ones that have motivated HEI the most to contemplate their digital transition. Students now wish to be able to study without time and space constraints, to that end, HEI should arrange digital learning options (digital pedagogical content for example), flexible curriculums, tailored learning/experiences, and so on... Students also want to develop practical capabilities required in the digital world and expect an array of digital services offered by the HEI, that improve collaboration, communication and value co-creation of all stakeholders (Benavides et al., 2020). After graduation, they hope that HEI will keep helping them in the creation of competencies.

When it comes to the teacher, they have to be/become pedagogically competent users of educational technology (Bond et al., 2018), innovate their teaching, research and work processes and educate the students on the offered digital services, to improve teaching productivity, collaboration, communication and value co-creation of all the stakeholders.

Because using digital media in an educational context does not guarantee higher levels of student engagement and/or achievement, digital transformation demands the identification of the companies' strategic assets (MIT Center for Digital Business and Capgemini Consulting, 2011) and a digital strategy (spanning years), meaning that leadership quality is vital for the

digital transformation to be successful (Navitas Ventures, 2017) and also a digital transformation framework where the main agents and stakeholders are identified and in agreement on solutions and value and can have an active role in molding the university (Benavides et al., 2020; Digital Clarity Group, 2016). Mainardes, et al. (2013) conducted a study by the name of “Identifying stakeholders in a Portuguese university: a case study”, where they identified the following list:

Table 2.1: List of public universities’ stakeholders (ordered from most important to least) (Mainardes, et al., 2013)

1	Students
2	Teaching staff and/or researchers
3	Employers
4	Research and development partner companies
5	National government / ministries / accreditation bodies
6	Municipality hosting the university (local public authorities)
7	Non-teaching staff
8	Other universities and/or higher education institutions (public or private)
9	The university’s surrounding local community (population, company, services)
10	Secondary level schools
11	Student families
12	Research and development actors (incubators, technological parks, patent agencies, research centres, external researchers)
13	Portuguese society in general
14	Senior university management (rectory team, general council, CRUP)
15	Professional orders
16	Private financiers (business angels, risk capital firms, investors)
17	Business/commercial associations
18	Ex-students
19	Scientific communities and their publications and output
20	European Union
21	International students

A survey by Deloitte Digital (2015), found that 71% of companies with a consistent and clear digital strategy find that digital transformation is bettering their ability to react to opportunities and threats, in opposition to 45% of enterprises without a digital strategy. For a digital strategy to succeed, one has to guarantee that the HEI has the resources for its application (Benavides et al., 2020). Picking the most adequate technology isn’t enough to succeed in deploying and adopting solutions, the right people, with the right competencies, are also crucial, especially with the emergence of customer experience management (Digital Clarity Report, 2016). Digital transformation is a team effort that puts the person in the center

of the development process, transformation and its result on society. Meaning that, digital transformation must be a holistic change of the HEI (Benavides et al., 2020), that affects several areas of it: business models and processes, organizational structure, information systems, products and services, the staff, customer and supplier relationship management (CRM & SRM) and so on... (Šereš et al., 2018).

A real-life example of digital transformation of education comes from Instituto Superior Técnico (IST), which has realized that current technological evolution and quick social changes have created new challenges for education (engineering, in particular). These factors combined with a declining population in Portugal, the financial crisis and the higher competitiveness of prestigious international universities have caused IST to act and create a new pedagogical model called Técnico 2122 (CAMEPP IST, 2019).

Their research concluded that the key characteristics and relevant aspects of teaching in prestigious HEI were the following:

- Solid academic foundation in Engineering Sciences;
- Project-Based Learning, Research-Based Learning, Problem-Based Learning, Client-Based Learning, Hands-on;
- Flexible learning pathways;
- Inclusion of Humanities in Engineering;
- Integration of soft skills in curricular units;
- Multidisciplinary integrated projects;
- Planning the academic year in order to improve greater focus and continuous learning;
- Internationalization;
- Entrepreneurship and Innovation training programs – Business & Academia;
- Good teaching, study and living conditions for the academic community;
- Diversity of diplomas;
- General Engineering Science course (1st study cycle) taught in English.

This model seeks to:

Table 2.2: Técnico 2122's Goals

ELIMINATE	INCREASE
<ul style="list-style-type: none"> <li>• Restrictions to Flexibility and Curricular Mobility;</li> <li>• Restrictions to the Autonomy of Courses' Coordination and Scientific Commissions;</li> <li>• Obstacles to interdepartmental Collaboration in Academic Supply.</li> </ul>	<ul style="list-style-type: none"> <li>• Academic Success Rate;</li> <li>• Flexibility and Curricular Mobility;</li> <li>• Active and autonomous Learning;</li> <li>• Connection between Business and Academia;</li> <li>• International Appeal;</li> <li>• Student's Responsibility for their Learning.</li> </ul>
REDUCE	CREATE
<ul style="list-style-type: none"> <li>• Exam Evaluations;</li> <li>• Teaching Hours of Teachers;</li> <li>• Weekly Contact Hours.</li> </ul>	<ul style="list-style-type: none"> <li>• HASS (Humanities, Arts and Social Sciences) Education Opportunities;</li> <li>• Personal Development Opportunities;</li> <li>• New Experimental Education Philosophy;</li> <li>• Opportunities in Innovation and Entrepreneurship Education.</li> </ul>

This pedagogical model will start its implementation in the curricular year of 2021/2022.

## 2.2 Digital Learning

Digital learning is a very broad subject that encompasses many sub-types of learning, but it can be defined as any style of learning that effectively utilizes technology to provide knowledge to their students. Digital learning and teaching's foundations are the accessibility and utilization of this content, including online information resources (Shalev-Shwartz, 2012). Interactions in these environments can be synchronous or asynchronous, between student and teacher, among students and between students and the learning content. High quality interactions will create a solid learning environment. Adequate technology and educational strategies should be chosen considering the needs of the student. Choudhury and Pattnaik (2020) explain that the biggest drivers of digital learning are: One, the user's acceptance of technology, two, the user's personal and environmental factors and three, the intention of the learner.

According to Norris and Lefrere (2011), big advantages of digital learning innovations are the overall cost-reduction to students and HEI (transportation and opportunity costs, facility costs, and so on...) and scalability. Flexibility, ease of learning customization and no socioeconomic barriers are also key benefits of digital learning and faster training, more control over the learning process and no socioeconomic barriers are described as major factors in attracting students to digital platforms (Choudhury and Pattnaik, 2020; Jensen, 2019).

Some disadvantages are students' skepticism and distaste of distance learning and blurred barrier between work and home/family life. Initial costs, lack of effective evaluation methods and lack of knowledge of students' non-verbal language (that is essential for a teacher to understand how a student's progress is evolving) are also disadvantages for the

HEI and the teachers. Additionally, digital learning, especially online learning, can simultaneously be highly interactive and isolating, since there are intrinsic challenges in developing adhesiveness, resulting in low interaction between students (Choudhury and Pattnaik, 2020).

To solve this problem, communication technologies are critical in distance learning, since interactions subsist of communication, collaboration and active learning with or without a social component (Marks et al., 2005).

Choudhury and Pattnaik (2020) establish the following roles for teachers and HEI in digital learning:

Table 2.3: Roles of the Teacher, Designer and HEI and their Results

	<b>ROLE</b>	<b>RESULT</b>
<b>TEACHER</b>	Proximity with the students. Motivate and guide them.	Lower anxiety and drop-out rates
<b>DESIGNER</b>	Dubious, due to immense variability.	Unclear
<b>HEI</b>	Guaranteeing availability of up-to-date and easy to use technology to students.	More effective digital learning

### 2.3 Communication Technologies

Wankel (2011) claims that the use of digital technology can potentially improve technical literacy, social interaction and critical reflection and function as a stimulant for the excitement, interaction and sharing of students. Technology enhances the internationalization of higher education, which can expand the debate on transformation and spur its rethinking.

While analyzing communication technologies, one must keep in mind that social media are present in a student's life and can consequently be used as an instrument to improve communications in the teaching context, with peers and with teachers (Kerroum et al., 2020). According to Santos et al. (2019), using social media enhances peer interactions, student-teacher conversations and student involvement. Other findings point to peer interaction and engagement, leading to a notable positive effect on collaborative learning. These results can improve students and institutional leaders' ability to create initiatives to assist, advertise and encourage the application and utilization of social media in a virtual learning environment.

Santos et al. (2019) created a questionnaire and shared it with students of the University of Aveiro that presented these results:

- Usefulness – Communication technologies are perceived as useful/very useful, with email being the most useful;

- Ease to use – Email and instant messaging are the two easiest communication technologies to use;
- Performance – Low feeling of underperformance, when using communication technologies;
- Future Use – Students wish to keep utilizing these technologies, with email having the highest rate. The lower intentions of future utilization are in social networks and collaborative technologies;
- Current Use – Students often or always use publishing and sharing technologies and email. On the opposite end of the spectrum, videoconferencing and social networks are much less used;
- Expectations – Expectations of these technologies are in line with current performance, especially email and instant messaging;
- Satisfaction – High satisfaction with email and instant messaging. Low satisfaction with videoconferencing and social networks.

The most utilized technology by students to converse with teachers is, by far, email. Videoconferencing and social networks are seldom used or at all by more than 30% of students to talk with their teachers. This seems to confirm that email might be replacing face-to-face systems of direct contact with teachers. Students seem to prefer more passive forms of technology (recorded lectures), instead of collaborative and creative ones (blogs) (Santos et al., 2019).

Communication Technologies can also be used to bolster a HEI student research, so it can better understand the needs and desires of students, thus being capable of delivering better experiences and prioritizing tasks and investments (Digital Clarity Group, 2016). Web presence can also be boosted, which is essential in acquiring the best national and international students, since Open Days and Campus visits can be too expensive.

## **2.4 Digital Transformation Barriers and Challenges**

Education has mostly been operated as closed and monopolistic systems that control knowledge and aren't very open to external changes and knowledge influx (Jackson, 2019). This controlling and monopolized logic has been instated by universities and governmental policies and perpetuating it is unsettling, should information and digital transformation's effects not be adjustable for future demands. This will further increase skills gaps, which are already expected to increase in the next five years according to The Future of Jobs Report (2020). This increasing skills gap will make it harder to find a workforce with digital skills, which according to a report by Deloitte Digital (2015) is a massive barrier to digital transformation, creating a loop of increasing difficulty to digitally transform.



Significant challenges of implementing digital learning in a HEI are (Liu et al., 2019):

- Sustained everyday effort by workers to practice the ideas of the implementation;
- Lack of digital literacy;
- Lack of resources, financial and management support;
- Lack strategic direction and bad leadership;
- Cultural resistance to change (with only 26% of public companies finding it “not challenging” – Deloitte Digital, 2015);
- Low student motivation and high drop-out rates;
- Low quality infrastructures;
- Governmental policies;
- Content management;
- Faulty training in curriculum design and platform and development standards;
- Difficulty to stay up-to-date with technological innovations;
- The perceived view that employers may think an online degree is lesser.

Procurement processes also need to be updated and have an agile development process to allow digital transformation to happen, since they're not flexible and are gagged by regulations (Deloitte Digital, 2015).

When it comes to justifying the digital transformation of the business, a report by MIT Center for Digital Business and Capgemini Consulting (2011) several ways to defend investments in digital transformation initiatives, such as:

- Cost savings, improvements or other efficiencies (for example: videoconferencing technologies);
- Low-Risk and Low-Cost Experiments (for example: Mobile apps or mobile marketing);
- Strategic Foundation Investment – Building infrastructure and capabilities to be used somewhere else (for example: shared digital division, collaboration tools, internal knowledge bases);
- Burning Platform / “Bet the Business” – Investments made to respond to very quickly and consistently declining performance, profit, or etc... (for example: airport authority investing massively in digital transformation when a government announces a withdrawal of a high percentage of public funding within 5 years).

To face all these barriers and challenges companies needs to first, establish a vision of their digital future, meaning defining the key assets for their digitally transformed company, recognizing how customer experience, internal operations and business model can be

transformed and study how the work environment can change, so it becomes more collaborative and connected. Second, the company must invest in digital transformation initiatives that fit the vision, meaning understanding if you are extracting all the value off of your ERP and if not, understand how you can change that; finding key investment areas and finding which skills are missing from the digital transformation initiatives. Lastly, the transformation must be led from the top, meaning communicating the vision well and engaging the company on a big scale, choosing processes to realize the vision and strategy, selecting the KPIs and metrics to audit the evolution of the digital transformation and deciding how to do the required adjustments (MIT Center for Digital Business and Capgemini Consulting, 2011).

## **2.5 Digital Transformation Perceptions**

A report by Deloitte Digital (2015) in regard to governmental companies made a survey, in which 82% of responders stated that their organization sees digital technologies as an opportunity, but only 44% of responders say that their company had increased investment in digital initiatives the past year. In another study (Jensen, 2019), 64% of European HEI considered it a high priority. Out of the responders, only 46% said their company had a clear and consistent digital strategy.

When it comes to HEI, a colossal majority of students has confidence that HEI can and will, in the next ten years, be able to provide students with the competencies they need for the labor market (Navitas Ventures, 2017). Bond et al. (2018) found that 39% of students wanted more online opportunities for preparing and following up courses and 31% wished for more online courses replacing classroom courses. To enable this, HEI would have to find ways to support students' digital skills development (Volungevičienė et al., 2020).

Students' priorities, when it comes to digital transformation seem to be, as follows, in descending order (Navitas Ventures, 2017):

- 1) Internship-support innovations and pathways to employment;
- 2) Availability of technology-enabled administrative processes, to streamline applications, enrolment, grades and student services;
- 3) Entirely new learning models like online learning and micro-credentials, also the use of emerging technologies like immersive classrooms, robotics, simulation.

Generally, these priorities were notably consistent between regions.

When it comes to teachers, beginners have been deemed more capable of accompanying quick change(s) than seasoned ones (Bond et al., 2018). Poor digital skills (on the part of students, teachers or both) are recurrently mentioned as an inhibitor to utilizing more educational technology in the classroom, limiting educational technology's uses to emails, multimedia presentations and LMS (Learning Management Systems). Bond et al. (2018)

found, in their study, a point of opposition between students and teachers, which was recorded lectures, with most teachers finding them not useful, whereas most students found them useful. This shows a need to address teacher perceptions on recorded lectures.

Never before have entire learning processes been shifted so suddenly from present to remote learning through the use of digital technologies (Zimmerman, 2020). Due to the COVID-19 pandemic, teachers have had to adapt their courses in a very short amount of time with very little training (Krishnamurthy, 2020). Means et al. (2013) concluded that online students do marginally better than learners in classrooms and blended learning approaches might be fruitful. There are worries among teachers concerning their perceived barriers to student success in online learning, about their image as online teachers, technical support and too much workload and uncontrollable enrollments in online classes (Wingo et al., 2017).

Universities will have to change, as they face strenuous financial issues because of the pandemic. Currently enrollments are unpredictable and can differ a lot based on the subject of study. The higher education sector will have to face multidimensional impacts, because of the pandemic, but we have seen that businesses that are more digitally savvy and transformed have done quite better during this time than the average business (Amazon, Netflix, and so on...). Covid-19 has given HEI an incentive to innovate, but the innovation potential will be restricted by smaller budgets, due to fewer enrollments, changing government subsidies, lower capability to sustain high tuition and lower endowment payouts, due to the market deterioration (Krishnamurthy, 2020).

According to Norris and Lefrere (2011), traditional HEI enable their faculty to put courses online and progressively create a repository of various forms of online, blended and e-learning content. This content is generally pricier to create than traditional content and HEI do not take advantage of technology to wholly transform educators' roles and interactivity (Norris and Lefrere, 2011). Students and teachers use only the most known technologies and features (for example email and basic eLearning features) (Bond et al., 2018) and many HEI linger in the "digitize the traditional, but don't re-invent", which represent an archaic view on teaching that isn't competitively sustainable (Norris and Lefrere, 2011). Du Toit and Verhoef (2018) say that technology functions while considering the person using it and their needs. Technology, used as a one-size-fits-all (as is currently used) misses the students' contexts, which can lead to detrimental consequences for transformation in higher education. This delimiting approach to technology will make a HEI digital transformation disregard the relationship between a student and the object of digital technology and will not explore the transformative potential of technology's utilization in higher education and can become an obstacle for transformation. Hence, a more holistic and embodied understanding of technology is necessary to solve practical problems of the use of digital technology and reap its benefits.

Du Toit and Verhoef (2018) summarize apprehensions regarding digital technology in HEI and of its potential including: cost-effectiveness, access and equality, digital literacy, technological training of educators and the integration of technology into curriculums. Additional challenges comprise an increase in plagiarism, lack of focus/attention by students, unpredictability of the future role of the teachers and the problems for teachers to stay organized and contemporary, while educational needs, software and hardware evolve at a rapid pace.

Unrealistic assumptions and expectations of learning enhancements through technology often exist and are not fulfilled. Kirkwood and Price (2014) came to the realization that many examples exist of expectations that putting technology to use will, by itself, change pedagogical procedures. This does not correspond to reality, but Flavin (2017) offers a roadmap to a solution: "Given the ubiquity of technology usage in higher education, there is a need to understand more fully the technology practices of students and lecturers, with a view to rethinking approaches to technology enhanced learning".

Educating stakeholders on digital transformation and its implications to the HEI will be essential to minimize preconceived notions of it, get stakeholders onboard and to prepare them for the transformation.

### **3 Methodology**

#### **3.1 Introduction**

There is scientific recognition that HEI must digitally transform (Norris & Lefrere, 2011). The COVID-19 pandemic, for example, has made this necessity that much more apparent (Krishnamurthy, 2020). While the body of knowledge on the practical results of digital transformation in higher education is scarce (Jackson, 2019), its theoretical advantages have been widely studied in recent years (Benavides et al., 2020). This transformation will potentially help HEI students create and enhance their digital literacy and critical reflection and improve learning interactions and sharing between them and their teachers (Wankel, 2011). In the long run, it will further globalize higher education and scientific research.

#### **3.2 Research Context**

The primary data this dissertation provides was acquired via two focus groups, one where only students participated and another where only teachers and coordinators participated. Both of them had the same goal: To validate the conceptual framework in its knowledge field and to recommend enhancements to it.

The first focus group's participants' only selection criterion was that only students, currently participating in a digital learning master's, could participate in this focus group. Thus, four students of ISCTE-IUL's MSc in Management of Services and Technology (MMST) were selected.

MMST is a digital learning master's aimed at undergraduates or holders of a 1st cycle degree in any area of knowledge, with proficiency in the English language. According to its website, MMST aims to "develop modern, updated, proactive, accountable and socially responsible managers, specifically focused on business operations". Its program's main focuses are:

- To seek a contemporary attitude that has innovation and operations at the center of competitive advantage creation;
- To be capable of designing, deploying, operating and improving production systems, so as to create quality goods and services in an adaptable and efficient way, in ethical conditions that satisfy social needs.

This master's curricular plan is available in [Appendix C](#).

As for the second focus group, the only selection criterion was that only current or former ISCTE-IUL teachers/coordinators of curricular units/courses in the area of management could participate in this focus group. Teachers/coordinators of ISCTE-IUL were selected. After the participants were selected, they were asked if they were available to participate in the focus

group. Those who said they were available, later received a message asking for their participation and informed consent ([Appendix A](#)). Three people participated in this focus group.

### 3.3 Research Design

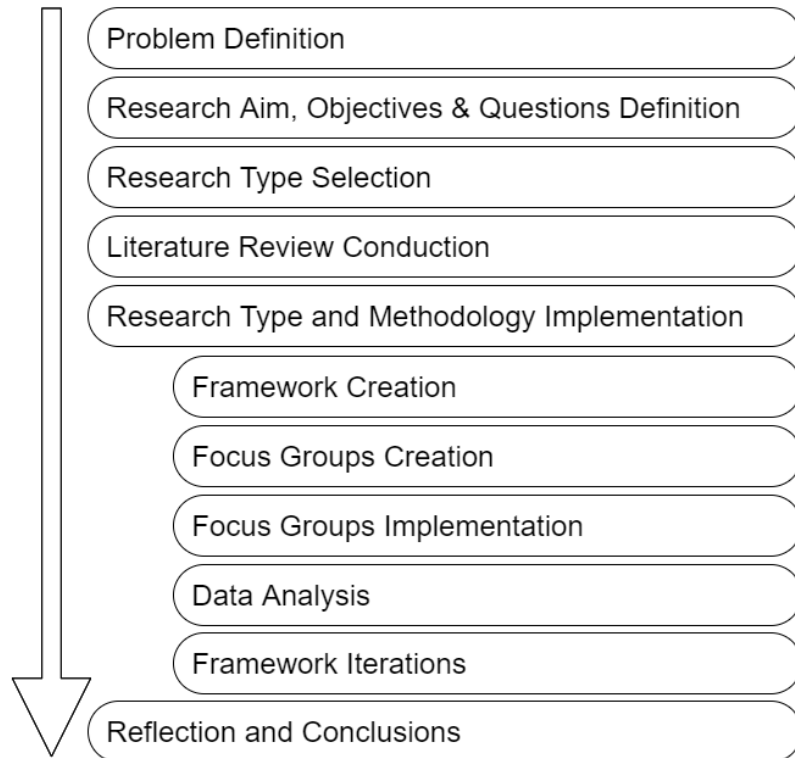


Figure 3.1: Research Methodology Diagram

This research has an exploratory and causal design. This research was of a sequential exploratory nature. It uses qualitative primary data and qualitative and quantitative secondary data. The secondary data was acquired via the literature review. This literature review uncovered the state of the art regarding the research question and was the basis of the conceptual model for digital transformation in a HEI. This conceptual model was then submitted to validation through two focus groups, one with students and another with professors from ISCTE-IUL. The elaboration of the focus group was done with the research questions, aim and objectives in mind, so as to ensure that all the subjects of interest are covered. The conceptual framework was the main topic that was discussed. These focus groups were conducted via online communication tools. The focus groups were recorded (with informed consent), but were and will be kept private and confidential. The focus groups contributed to answering the research questions as well.

This dissertation used the Design Science Research (DSR) methodology with focus groups. Design Science Research focuses on problem solving, through the development and performance of artifacts to improve their performance (Hevner et al., 2004). The main objective

of DSR is to obtain knowledge and understanding of a problem domain through the construction and application of an innovative and specific artefact to the problem domain (Hevner et al., 2004). Henriques and O'Neill (2021) state that this process must be a meticulous one, so as to contribute to the existing body of research.

When it comes to the artifact, it exists to facilitate the understanding of the problem and its reassessment, which will improve the quality of the process (Hevner et al., 2004).

DSR incorporates three cycles: relevance, rigor and design (Hevner, 2007).

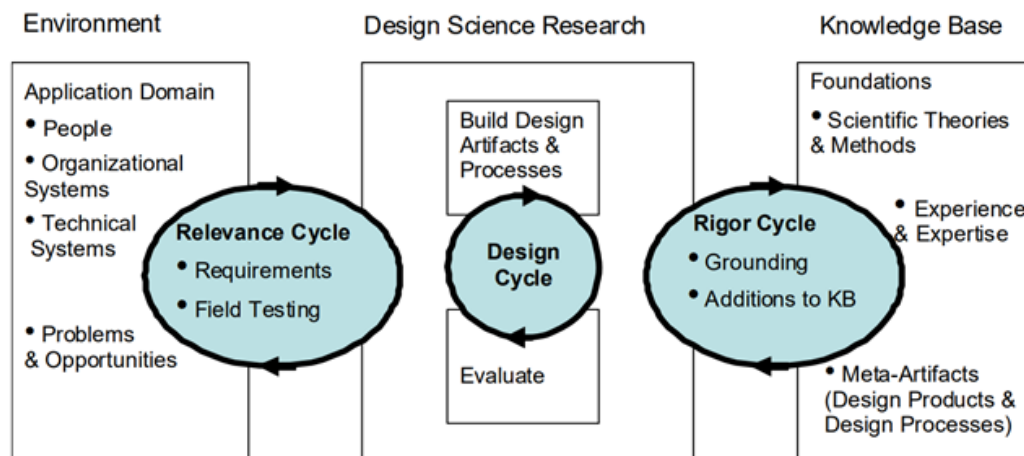


Figure 3.2: Design Science Research Cycles (Hevner, 2007)

Relevance initiates DSR by providing requirements for research and defining acceptance criteria for the final evaluation of results; Rigor provides knowledge prior to the project to guarantee its innovation; Design iterates the main activities of construction and evaluation of the research design artifacts and processes (Hevner, 2007).

As to using focus groups in DSR, this has been recommended before to examine artifacts by recommending improvements to them (exploratory focus groups), or to recognize its merits in the research field in question (confirmatory focus groups) (Tremblay et al., 2010).

Focus groups are seen in knowledge generation, as a useful tool to study innovative ideas. Big advantages from using focus groups include (Henriques & O'Neill, 2021):

- Quick and less-costly attainment of data, compared to separate interviews;
- Direct interaction with the members, which can ease the clarification of responses and the use of follow-up questions;
- Open responses allow richer data from the constituents, allowing the researcher to more easily connect information;
- Constituents can react and build on the answers of other constituents;
- Flexibility of topics, people and research background;
- Very user friendly and effortless to comprehend result.

A focus group is not about creating a group to talk, it is a specific group, its constituents are chosen with certain parameters in mind. Its primary goal is to better know how people think or feel about a certain topic, idea, product/ service, etc... (Henriques & O'Neill, 2021). To allow this, the researcher must create an indulgent environment that nudges participants to exchange ideas and points of view, without over-pressuring them. The researcher must also be less dominating than in interviews, giving the group's members many opportunities to participate how they wish to and must use open-ended questions, so that individuals do not give short responses that quickly stifle the discussion. Afterwards, an examination of focus groups' discussions gives clues as to how a certain topic, idea, product/ service, etc... is viewed by its constituents (Tremblay et al., 2010).

To design focus groups, 7 steps should and were taken (Henriques & O'Neill, 2021; Tremblay et al., 2010):

- 1) Defining the research problem and questions;
- 2) Identifying the parameters that will be used in the construction of the group;
- 3) Creating a questioning guide;
- 4) Recruiting the participants;
- 5) Conducting the focus group;
- 6) Analyze and Interpret Data;
- 7) Reporting the results.

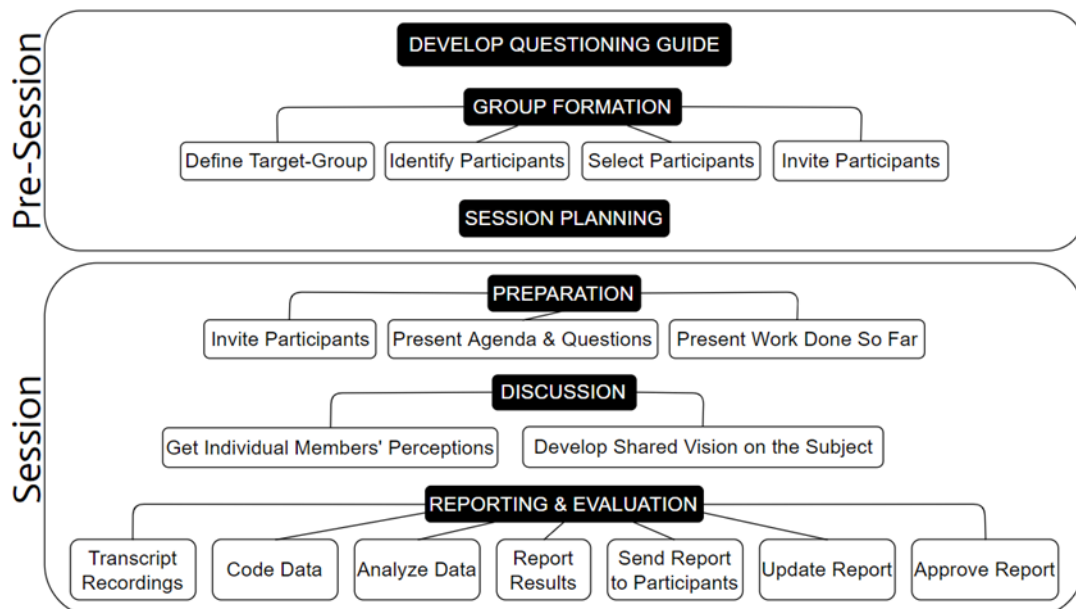


Figure 3.3: Focus Groups Methodology, based on Henriques and O'Neill (2021);

Black Background = Main task

White Background = Secondary Task



To analyze the literature review, research was made following the principles of the book *Systematic Reviews in Educational Research – Methodology, Perspectives and Application* by Zawacki-Richter et al. (2020). The research was conducted on B-On using the words “Digital Transformation” AND “Higher Education”. The criteria for inclusion and exclusion were as follows:

- The articles/reports were written in English;
- All articles were peer-reviewed;
- Articles/reports’ titles didn’t repeat topics (except, the ones in the title of this dissertation);
- Only articles/reports’ information that mentioned information relevant to the learning processes of higher education was extracted;
- Subjects used to shorten the list of remaining articles/reports were – higher education, educational technology, information technology, information and communication technologies, universities and colleges, decision making.

Articles that explored different aspects of digital transformation and their application and results in HEI were searched. Afterwards, the following questions were asked:

- Are all research questions answered adequately?
- Does this paper help me understand what determines digital transformation’s success or failure in a HEI?

To do this dissertation the following sources were used: Eight reports, thirteen articles from Q1 journals, two from Q2 journals, one from a Q4 journal, two articles from journals with an unassigned quartile, four articles whose journals were not in the Scimago Journal & Country Rank database, one conference paper, two books and three websites.

### **3.4 Data Collection, Treatment and Analysis**

All data was collected by reading the articles, reports, papers, books and websites, except what was collected via the focus groups. The articles were summarized and those summaries were read and rewritten along with the data from the focus groups into their proper position on the dissertation, leaving out any information that was deemed unnecessary to add. As for the data collected from the focus groups, it was coded into categories, which were created taking the literature review into account. The information was later read to obtain a general idea of the adapted information, information that was then coded to develop, classify, summarize and

describe aspects that were addressed in the dissertation. The findings were subsequently interpreted and validated.

## 4 Conceptual Frameworks

The conceptual framework that is about to be presented was subjected to two focus groups (first to students and then to teachers and coordinators), in order to improve and validate it. From this effort, a final artifact that was used as the proposition of this dissertation, emerged.

### 4.1 Characterization and Conception

#### 4.1.1 Prior to the Focus Groups

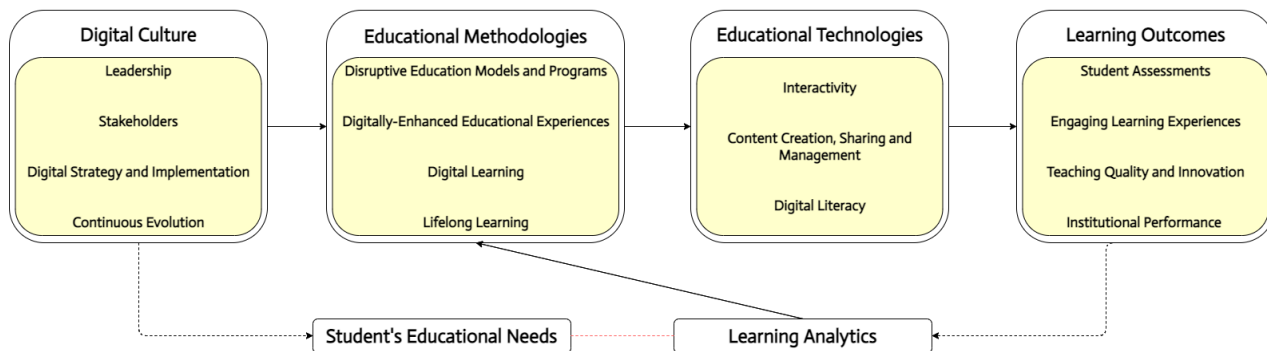


Figure 4.1: Strategic framework for the digital transformation of HEI. (Pre-Focus Groups)

The artifact displayed above presents a proposition for a strategic framework that HEI can use, in order to provide and continuously improve the learning process of students from HEI, through digital transformation.

This framework was created through the information obtained by the literature review. This framework represents the following path:

The digital transformation process starts by creating a Digital Culture, since the very same culture will define the digital transformation path the HEI will take. Following this decision, HEI must understand what Educational Methodologies are best suited to students and what they are learning. After selecting the appropriate methodologies, HEI must figure out what Educational Technologies maximize the methodologies' potential. The conjugation of these factors will lead to improved Learning Outcomes. Students' Educational Needs is, in this model, connected to the Digital Culture, because HEI must focus primarily on the students and put them first, for this reason, HEI must understand their educational needs, in order to improve teaching quality and its value. These needs will be uncovered via Learning Analytics, which analyzes the Learning Outcomes, in order to understand if Students' Educational Needs are being sated and to understand if changes need to be made to the Educational Methodologies and how HEI can improve in general.

With the primary sections of the framework now analyzed, the explanation of the secondary sections, according to the literature review, is now presented.

Table 4.1: Digital Culture's Secondary Sections

	<b>Digital Culture</b>
Leadership	Leadership has a key role in the success or failure of the digital transformation of any HEI (MIT Center for Digital Business and Capgemini Consulting, 2011; Navitas Ventures, 2017). It is responsible for the company's strategic direction and allocation of resources (Benavides et al., 2020; MIT Center for Digital Business and Capgemini Consulting, 2011).
Stakeholders	For digital transformation to be successful, there must be a digital transformation framework that defines the main agents and stakeholders. The digital culture of the HEI must be understood and approved by the entirety of the stakeholders (Digital Clarity Group, 2016).
Digital Strategy and Implementation	Digital Transformation requires planning and implementing a long-term digital strategy and the identification of the companies' strategic assets (MIT Center for Digital Business and Capgemini Consulting, 2011).
Continuous Evolution	Whichever culture is created, it must outline and clearly stress that digital transformation is a continuous and never-ending process of evolving and adapting to the latest technologies and their potential effects on the learning and teaching experience (The Enterprisers Project, 2016).

Table 4.2: Educational Methodologies' Secondary Sections

	<b>Educational Methodologies</b>
Disruptive Education Models and Programs	HEI can use technology to overhaul the classroom-centric model for individual courses and reinvent courses (Norris and Lefrere, 2011). There are many new education models, such as bootcamps, 'learn now-pay later', MOOCs, nanodegrees, and so on... But while these have struggled in many ways, they keep evolving and becoming more recognized and viable learning options (Navitas Ventures, 2017).
Digitally Enhanced Educational Experiences	Volungevičienė et al. (2020) stresses that digitally improved educational experiences are essential for better learning outcomes, employment opportunities, social integration and general quality of life.
Digital Learning	Digital Learning provides flexibility, ease of learning customization, faster training, more control over the learning process, all of which can help improve learning outcomes (Choudhury and Pattnaik, 2020; Jensen, 2019).
Lifelong Learning	Volungevičienė et al. (2020) predict that customized, lifelong education will become the norm, with the needs of lifelong learners being met by HEI with smaller units and curriculums, developed together with industry. People will be able to learn what they need, when they need it. This perspective has HEI transforming their business model into a University as a Service (UaaS) type of model (Krishnamurthy, 2020).

Table 4.3: Educational Technologies' Secondary Sections

Educational Technologies	
Interactivity	<p>Types of Interaction (Chakraborty &amp; Muyia Nafukho, 2014):</p> <ul style="list-style-type: none"> <li>• Student – Student interactions;</li> <li>• Student – Faculty interactions;</li> <li>• Student – Technology interactions;</li> <li>• Student – Content interactions.</li> </ul> <p>Interactivity has many effects on education (Marks et al., 2005), specifically:</p> <ul style="list-style-type: none"> <li>• Enabling multiple types of communication and participation;</li> <li>• Enabling the sharing of different perspectives;</li> <li>• Enabling the creation of learning communities;</li> <li>• Enabling student control;</li> <li>• Promoting adaptation of educational programs based on student input;</li> <li>• Promoting meaningful learning.</li> </ul>
Content Creation, Sharing and Management	<p>Digital contents should be created by teams of specialists (Norris and Lefrere, 2011). HEI are struggling to keep up with today's needs for creating, publishing, and managing expanding quantities of content, which could be solved by resorting to technology implementation solutions providers to create a content infrastructure within a HEI (Digital Clarity Group, 2016).</p>
Digital Literacy	<p>Students and teachers need to have digital literacy to reap the benefits of educational technologies (Liu et al., 2019).</p>

Table 4.4: Learning Outcomes' Secondary Sections

	Learning Outcomes
Student Assessments	Modernizing student assessment methods and certification and enabling faster achievement of learning objectives are keys to creating sustainable online learning models (Norris and Lefrere, 2011). Through assessment data, HEI will be able to diagnose learning needs and provide customized experiences (Krishnamurthy, 2020).
Engaging Learning Experiences	Engaging educational experiences are essential for better learning outcomes, employment opportunities, social integration and general quality of life (Volungevičienė et al., 2020).
Teaching Quality and Innovation	HEI must perfect their use of the additions to the teaching and learning process, created by digital transformation (digital platforms and contents, innovative educational methodologies; digital literacy and skills; teaching process) to enhance learning outcomes (Benavides et al., 2020). HEI must continuously redevelop and re-evaluate themselves and explore and use the opportunities that digital transformation provides (Šereš et al., 2018).
Institutional Performance	Institutional performance refers to the quality of the services provided by the HEI (not just academic ones). It is the end goal of any HEI.

#### 4.1.2 Post the 1st Focus Group (Students' Focus Group)

This focus group's only selection criterion was that only students, currently participating in a digital learning master's, could participate in this focus group. Therefore, students of ISCTE-IUL's MSc in Management of Services and Technology (MMST) were selected. For more information on this master's, please check the [Research Context](#) section of the dissertation.

After the participants were selected, they were asked if they were available to participate in the focus group. Those who said they were available, later received a message asking for their participation and informed consent ([Appendix A](#)). Four people participated in this focus group.

In the focus group, students were asked to discuss the artifact presented in [figure 4.1](#) and to discuss the current state of higher education.

Pertaining to the artifact, the participants agreed with the existing subsections and think they fully cover the main sections of the artifact. They suggested changes to the model, why and whether they were accepted or rejected is explained below:

*Digital Culture:*

- Change “Digital Culture” to “Organizational Culture”  
**Rejected** – This dissertation focuses on the digital transformation of HEI
- Add “Relationship between Academia and Corporations” subsection;  
**Rejected** – It is part of the “Stakeholders” subsection

*Educational Methodologies:*

- Add “Theory VS Practice” subsection  
**Accepted** – Merged into a new subsection “Authentic Learning”
- Add “Practical/Real-world Learning” subsection  
**Accepted** – Merged into a new subsection “Authentic Learning”

*Educational Technologies:*

- Add “Relationship with External Partners” subsection (to advise HEI to use external partners to integrate/develop/implement the technology part of HEI and increase their technological diversification)  
**Rejected** – It is part of the “Stakeholders” subsection
- Add “Interaction with Technology by Stakeholders” subsection  
**Rejected** – Part of the “Digital Literacy” subsection
- Change order of “Educational Methodologies” and “Educational Technologies” sections.  
**Partially Accepted** – A cycle arrow was put between the two sections

*Learning Outcomes:*

- Add “Teacher Assessments” subsection  
**Accepted** – “Student Assessments” changed to “Learning Assessments”

*Students’ Educational Needs:*

- Change “Students’ Educational Needs” to “Students’/Teachers’ Educational Needs”  
**Accepted** – “Students’ Educational Needs” changed to “Educational Needs”



*Learning Analytics:*

- Add “Feedback” subsection  
**Rejected** – Implicit part of this section
- Unite “Students’ Educational Needs” and “Learning Analytics” sections  
**Rejected** – Students’ Educational Needs is an education prerequisite, while Learning Analytics is a control mechanism to guarantee that the needs and the learning outcomes are being sated.

Regarding, the current state of higher education, the participants expressed their dismay over their opinion that current education is too theoretical, they believe it should be more practical and based on real life, which led to adding a new secondary section, called Authentic Learning, to a primary section, Educational Methodologies, of the artifact.

Table 4.5: Authentic Learning’s Definition

	<b>Educational Methodologies</b>
<b>Authentic Learning</b>	Authentic learning aims to link what students learn in school to the real-world. Students are more prone to being interested in their learning, if it resembles real-life, gives them useful skills and tackles relevant topics to life outside of school ("Authentic Learning Definition", 2013).

It was suggested, in the focus group, that the creation of a curricular unit called Internship would put students more in contact with the real world and would allow them to have a more comprehensive idea of the value of their course. At the same time, this would foster relations between students and companies and relations between HEI and companies.

The participants believe that technology could make learning more engaging and practical and digital learning could provide more “real-world teaching” through digital tools (e.g., business simulation software). They stated that HEI should educate students on software used in the real world, such as Sales Cloud, Power BI, etc... Two participants gave the example of a curricular unit called Project Management, where they believe it should be mandatory to use project management software that companies use (e.g., JIRA). One student loosely suggested that HEI should use AI and other tools to better assess each student's strengths and challenges and make an overall more personalized, in-depth assessment of students.

According to the participants, the current classroom environment at ISCTE-IUL feels outdated and old and doesn’t encourage the student to engage with technology. Teachers were also seen as not well-versed in technology, as they don’t use much of its tools and tend

to use technology in basic, superficial ways. This is especially jarring when it happens in curricular units such as innovation and technology management, where according to the participants, the teachers only used basic and non-innovative technological tools (Microsoft PowerPoint) to help teach classes. The participants stated that most teachers were born long before the internet was made mainstream (early 1990s), so they may experience additional difficulties than ones born during or slightly before the 1990s. One of the participants justified this with an example from someone they know who is a HEI teacher.

That participant said that teachers have technology training almost every month, but don't apply this knowledge in class. They take this training because it's mandatory, they listen to the speaker and never pick it up again. It happens to the teachers the same thing that happens to the students, the speaker can be very interested in a technology, but the speaker can't get the message across in a way that engages teachers, so they don't show much interest in the technology being sold to them. Unengaging sessions lead to the disinterest of teachers in a technology and, as a result, lead to the lack of implementation of technologies in the classroom. Lack of means/conditions to apply what they learn and the combination of several other factors, also lead to non-implementation of technology in class. For that reason, HEI must strive to provide the necessary conditions for teachers to perform their craft in more modern and appealing ways, and this does not happen, according to the participants. They believe that ISCTE-IUL itself could be much more technological and offer more innovative tools for both students and teachers. At the same time, there may be a lot of technology available at HEI, but if no one uses it or implements it in class, it's worthless. This was associated to the effort involved in learning something new and adapting and changing old ways and also to the lack of knowledge and acceptance of the improvement that these technologies would bring to students.

Another issue the participants complained about was the lack of coherence and alignment of the norms and guidelines for the use of technology at ISCTE-IUL and HEI, in general, with some teachers sending content to Fénix (ISCTE-IUL's main LMS), others sending by mail, others sending to Blackboard (ISCTE-IUL's secondary LMS), etc... In line with this complaint, participants also expressed their dissatisfaction with the fact that ISCTE-IUL uses two LMS software, Fénix and Blackboard. They believe that having two platforms that enable similar functions and availability of resources is a waste of resources. HEI end up not maximizing the software's utility and these platforms end up competing with each other by dividing and confusing students and teachers on which software to use. The participants' also think that Fénix looks like "1990s software" that isn't user-friendly or interactive. HEI leadership should opt for one and make that platform as appealing as possible, according to the participants.

The current pandemic caused by the SARS-CoV-2 virus, led to basic distance learning classes being implemented in most HEI in Portugal. Opinions on these classes were mixed.

Some participants believed these classes should either be the norm for theoretical classes or even eliminate theoretical classes, with students reading/viewing/hearing the theoretical content by themselves, posting questions on class forums or via mail. This would supposedly make students more autonomous and responsible for their learning and would increase enthusiasm for the curricular unit.

However, other participants disputed these claims, saying that some students need to be at school to feel more encouraged to study. The move to a more online learning model could lead to many students stray from their learning activities, since they don't have these self-regulation skills.

All participants agreed, though, that distance learning probably isn't recommended for practical learning.

Regarding students' and teachers' current roles in the learning process, the participants see them, as follows:

Table 4.6: Teachers' and Students' Roles according to Students

<b>TEACHERS</b>	<b>STUDENTS</b>
Recite the Learning Content	Listen to the Learning Content's Narration
Present Exercises	Perform Exercises
Answer Questions	Study the Learning Content (that will be forgotten after the exams)
Assign and Grade Group and Individual Assignments	Complete Group and Individual Assignments
Making and Grading Exams	Take Exams

As for assessment/evaluation methods, participants find that assessment methods are too focused on memorizing information. One participant provided an example of a curricular unit, where the assessment process consisted of going through a product creation process from start to finish and reporting that process in a report (group assessment) and reviewing the literature on a topic (of the student's choice) related to the curricular unit (individual assessment). There was no exam to do, meaning, instead of a (usually) short intensive memorization period in order to prepare for an exam, students read the learning content throughout the length of the curricular unit, researching and working on their own initiative (with deadlines to meet, though). According to them, this was much more interesting and dynamic and it translated to a perception of more acquired knowledge. This continuous knowledge acquisition process can lead to the introduction of more technologically-advanced student performance assessment tools in the future.

Students also suggested that feedback evaluation be done by an external and disinterested entity, which HEI already do, so HEI should do a better job of informing students that this already is the case. Students also referred that these questionnaires should have an aspect of evaluation, modernization and updating of teaching practices.

The updated artifact is presented below.

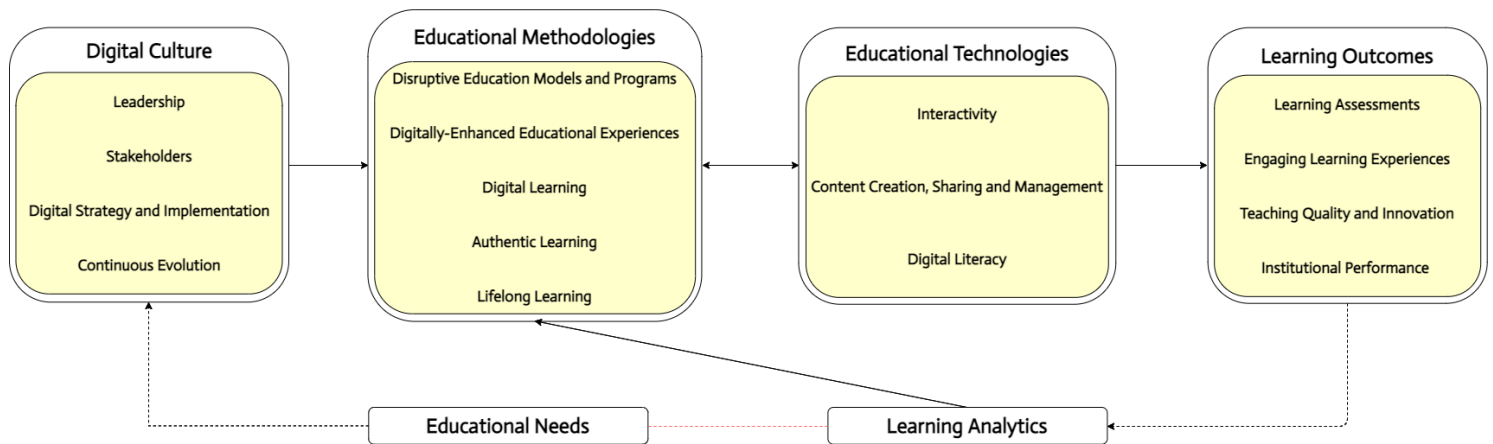


Figure 4.2: Strategic framework for the digital transformation of HEI. (Post-Students' Focus Groups)

For the focus groups' main steps, agenda and questioning guide, please check [Appendix B](#).

#### 4.1.3 Post to the 2<sup>nd</sup> Focus Group (Teachers' and Coordinators' Focus Group)

This focus group's only selection criterion was that only current or former ISCTE-IUL teachers/coordinators of curricular units/courses in the area of management could participate in this focus group. Teachers/coordinators of ISCTE-IUL were selected. After the participants were selected, they were asked if they were available to participate in the focus group. Those who said they were available, later received a message asking for their participation and informed consent ([Appendix A](#)). Three people participated in this focus group.

In the focus group, teachers were asked to discuss the current state of higher education and to discuss the artifact presented in [figure 4.2](#).

Pertaining to the artifact, the participants agreed with the existing subsections and think they cover the main sections of the artifact well. The participants suggested changes to the model, why and whether they were accepted or rejected is explained below:

##### *Digital Culture:*

- Put "Continuous Evolution" across the entire model

**Rejected** – Since "Digital Culture" will affect the entirety of the digital transformation of a HEI, this notion is implied.

- Replace “Stakeholders” with “Stakeholder Engagement” because it is important that they are motivated to make these changes.

**Rejected** – Implicit part of the “Stakeholders” subsection.

- Put "Digital Strategy and Implementation" as a primary section or in-between “Digital Culture” and “Educational Methodologies”

**Rejected** – "Digital Strategy and Implementation" and “Digital Culture” are too bonded to separate.

*Educational Methodologies:*

- Put “Lifelong Learning” across the entire model

**Rejected** – Not applicable, as this framework is about digital transformation and improving learning processes of HEI, not about post-college life.

- Add “Teaching Strategy” subsection, regarding what we want for the curricular units, how to organize them, their goals, etc...)

**Accepted** – Named “Flexibility”, to highlight the relevance of adapting learning methodologies to these issues.

*Educational Technologies:*

- Change order of “Educational Methodologies” and “Educational Technologies” sections

**Accepted** – Both students and teachers believe that this new order is more realistic, with the previous one seen as more idealistic.

*Educational Needs & Learning Analytics:*

- Unite “Educational Needs” and “Learning Analytics” sections

**Rejected** – Students’ Educational Needs is an education prerequisite, while Learning Analytics is a control mechanism to guarantee that the needs and the learning outcomes are being sated.

Table 4.7: Flexibility’s Definition

	<b>Educational Methodologies</b>
<b>Flexibility</b>	Educational methodologies must be chosen and adapted according to the curricular units’ goals, educational needs, class size, etc...

Also, the subsection “Digital Learning” was absorbed into the subsection “Digitally Enhanced Educational Experiences” and the external environment of a HEI was added to the framework to further highlight the interaction with the external environment.

Regarding, the current state of higher education, the participants find that the average student show little curiosity and desire to learn and lack a culture of self-regulated learning (Self-regulation is the ability to monitor and manage your behaviors, so as to produce positive learning results).

Regarding the students’ suggestion of using real-world software (SAP, SPSS, etc...) in classes, the teachers state that they have used these types of software, but when the students have access to the PC (and now the smartphone, as well), they tend to spend most of the time browsing the internet and/or zapping social networks. This makes it more difficult to keep students focused on the class.

Therefore and because these tools are continually evolving and being replaced by others, some teachers believe that improving students’ digital literacy on company-used software is not a priority. They propose this type of training to be provided by the companies themselves, or by professional education and polytechnic institutions.

Teachers suggest that teaching methodologies should be more active and participatory and less expository, so that students spend less time passively sitting and listening to the teacher and more time actively co-creating knowledge. This can contribute to a more autonomous, accountable/responsible and proactive learning culture, the culture of self-regulated learning.

Another way to engage students, according to the participants, is through more engaging learning content. This content should be searched for by teachers, students and content creation teams.

However, teachers highlight the difficulty of selling these ideas to higher ups, subordinates and colleagues, in general. A real-life example of this was that one of the participants suggested flipped classroom, so students would only have practical classes. Decision makers saw this as teachers being lazy, even though preparing this type of classes will take much more work than the usual expository classes, where the teacher simply recites the learning content and students apathetically listen to it. Also, according to this participant, several teachers (including younger teachers) did not wish to change, even though the curricular unit was not producing good results, for fear of change and/or inertia.

Participants also found it essential to adapt teaching methodologies to the subject and number and type of students in question (this will also require a lot of work from teachers).

The updated artifact is presented below:

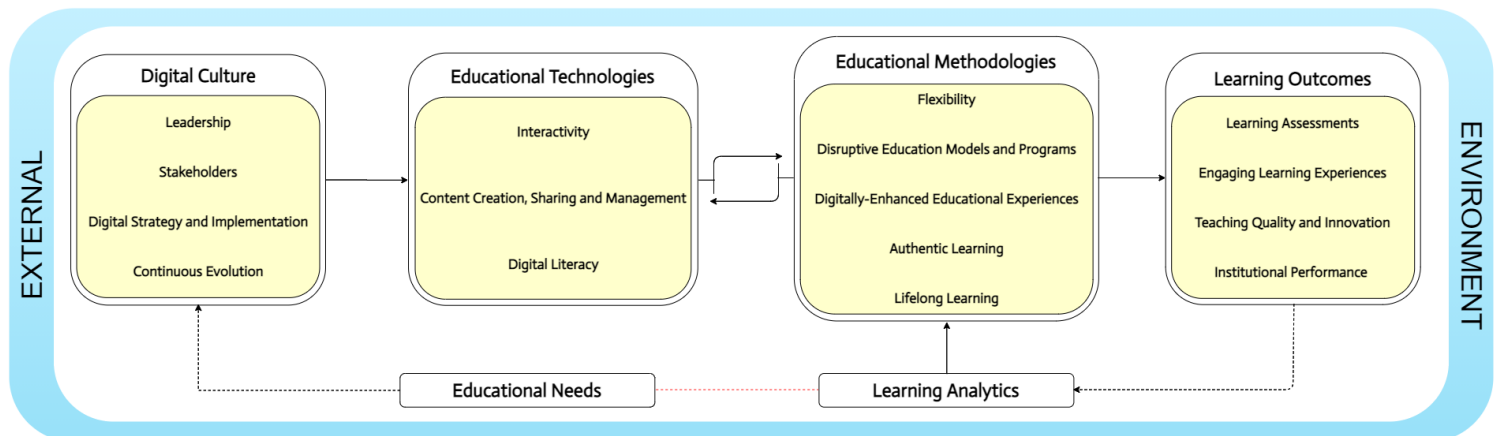


Figure 4.3: Strategic framework for the digital transformation of HEI. (Post-Teachers' Focus Groups)

For the focus groups' main steps, agenda and questioning guide, please check [Appendix B](#).

## 5 Results and Discussion

### 5.1 Reflections from the Focus Groups

Students and teachers believe that learning should be more active and participatory and less expository, so that students spend less time passively sitting and listening to the teacher and more time actively co-creating knowledge. This would make students more autonomous and responsible for their learning. However, while students believe this should be done through the use of new technologies, teachers believe this should be done through the use of more active and participatory methodologies. One student suggested using the flipped classroom model, so that theoretical classes, either are done online or don't exist (supposing the students would study the learning content on their own and occasionally asking questions to the teachers on class forums or via mail) and teachers can focus more on the practical classes, especially because it is necessary to adapt learning methodologies to the curricular unit, the size of the class, etc..., which requires a lot of effort from teachers. This, while not applicable to all scientific knowledge areas, presents a balanced view of integration of technologies and methodologies. One teacher suggested educating teachers on these methodologies, however a real-life example from a student provides the insight that teachers have technology training almost every month, but don't apply this knowledge in class. This is attributed to the idea that teachers take this training because it's mandatory, they passively listen to the speaker and

leave. Unengaging sessions lead to the disinterest of teachers in a technology and, therefore, lead to the lack of implementation of technologies in the classroom and the same would happen in similar sessions regarding learning methodologies.

Students believe HEI should educate students on software used in the real world and they seem to be keen on using software used by companies (Excel, Google Analytics, etc...), as a way of driving learning towards a more “real-world learning” perspective. However, they think teachers don’t use much technology in class. But when presented with this view, teachers rebutted it stating that, whenever they tried to use these types of software in class, students would spend most of the time browsing the internet and/or zapping social networks. This likely stems from what the teachers mention regarding students’ mentality on learning, where they believe that the average student shows little curiosity and desire to learn and lack a culture of self-regulated learning.

When it comes to learning content, students agree that it should be created by specialized content creation teams and teachers suggest that not just these teams, but also teachers and students should look for the best learning contents.

Both students and teachers agree that, on the framework, the educational technologies section should come before the educational methodologies, as this is more realistic, since technology providers create the technology and the world (in this case, HEI and companies) adapts to it. It would be ideal, if HEI could focus on creating the most effective methodologies possible and ask technology providers to create technology that maximizes said methodologies, but it isn’t likely to happen. This idea was accepted into the framework, however an idea that wasn’t accepted was one that both sides agreed to as well. They stated that the sections of learning analytics and educational needs should be united/merged into one. This idea wasn’t accepted, because Educational Needs are an education prerequisite, while Learning Analytics is a control mechanism to guarantee that the needs and the learning outcomes are being sated. Hence, it was seen as preferable to keep the two sections separate.



## 5.2 Proposal of the Final Framework

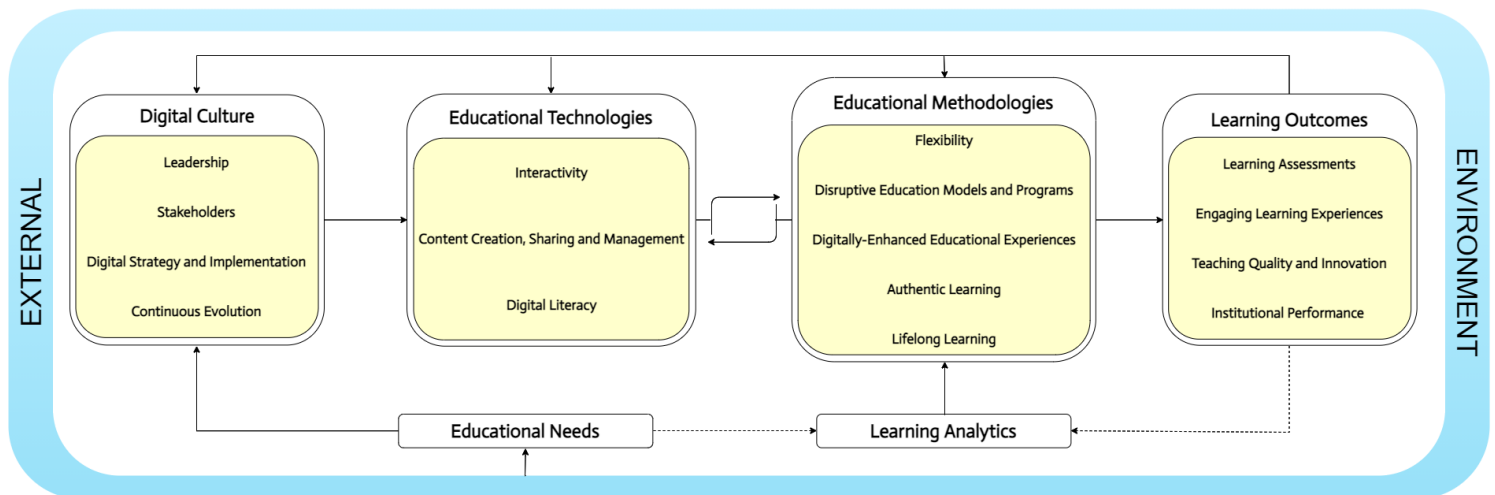


Figure 5.1: Strategic framework for the digital transformation of HEI. (Final Version)

The artifact displayed above presents the final version of the proposition for a strategic framework that HEI can use, in order to provide and continuously improve the learning process of students from HEI, through digital transformation.

Changes were made to it, regarding the previous iteration of the framework ([figure 4.3](#)). Arrows were added, from the Learning Outcomes section to the Digital Culture, Educational Technologies and Methodologies sections, to additionally stress the cyclical and never-ending nature of this process. An arrow tip was added to the arrow that conveys the relationship between the Educational Needs and the Learning Analytics sections, in order to showcase the flow of information from one section to the other (normal arrows convey causal relationships, among other things, whereas dotted arrows only indicate a flow of information).

As for the proposition itself, the digital transformation process starts by creating a Digital Culture, since the very same culture will define the digital transformation path the HEI will take. Top management (Leadership) is in charge of creating this Digital Culture and of creating and implementing a Digital Strategy, while accounting for the reality conveyed to it by its internal environment's (teaching and research units, departments, coordinators, academic services, etc...) and external environment's (ministry of education, economic/social environment, etc...) Stakeholders. All stakeholders must understand and follow this Digital Strategy, while keeping in mind the never-ending nature of this endeavor (Continuous Evolution).

HEI must understand what Educational Methodologies are best suited to the students and what they are learning (Flexibility), in order to select the most appropriate ones. In doing this, conjugated with the Educational Technologies, HEI will be able to provide Disruptive Education Models and Programs, Digitally Enhanced Educational Experiences, Authentic Learning and Lifelong Learning to their students.

However, before selecting the methodologies, HEI must figure out what Educational Technologies they have access to and can use maximize the methodologies' potentials. HEI must educate students and teachers on these technologies (Digital Literacy), so they can make the most out of these technologies (Interactivity).

The conjugation of these factors will lead to improved Learning Outcomes. Educational Needs are, in this artifact, connected to the Digital Culture, because HEI must focus primarily on the students and put them first, as a result, HEI must understand their educational needs, in order to improve teaching quality and its value. These needs will be uncovered via Learning Analytics, which also analyzes the Learning Outcomes, in order to understand if Educational Needs are being sated and to understand if changes need to be made to the Educational Methodologies and how HEI can improve in general.

### **5.3 CASE STUDY: ISCTE-IUL through the Framework's Eyes**

#### **5.3.1 Introduction**

This case study aims to apply this framework to ISCTE-IUL, in order to assess the artifact's applicability in a real-life context. ISCTE-IUL was chosen, because this dissertation was done for the purpose of obtaining a master's degree in one of their master's courses. ISCTE-IUL is a Portuguese HEI, that mainly aims to study labor and social dynamics in a rapidly changing world. According to ISCTE-IUL (<https://www.iscte-iul.pt/conteudos/iscte/about-us/541/about-iscte>), its mission is "to create and convey scientific knowledge; train highly skilled professionals, mainly at postgraduate level, in management, economics, sociology, public policy, social sciences, humanities, information technologies and architecture, for the sustainable and inclusive development of society; and provide qualified services".

To achieve this, ISCTE-IUL has four schools with academic departments and eight research centers:

Schools:

- ISCTE Business School (IBS);
- ISCTE School of Technology and Architecture (ISTA);
- School of Social Sciences (ECSH);
- School of Sociology and Public Policy (ESPP).

Research Centers:

- Business Research Unit (bru\_iscte);
- Center for International Studies (cei\_iscte);

- Center for Research and Studies in Sociology (cies\_iscte);
- Centre for Research in Anthropology (CRIA);
- Centre for Social Research and Intervention (cis\_iscte);
- Center for Socioeconomic and Territorial Studies (dinamia'cet\_iscte);
- Information Sciences and Technologies and Architecture Research Centre (istar\_iscte);
- Instituto de Telecomunicações.

For more information on ISCTE-IUL, please check their website (<https://www.iscte-iul.pt/>).

### 5.3.2 Case Study

#### *Digital Culture*

##### Leadership:

- Governing Body – Ministry of Science, Technology and Higher Education (MCTES), represented by the Council of Curators;
- Top Management – Dean's Office; Scientific and Pedagogical Councils
- Middle Management – School Deans and Scientific and Pedagogical Committees
- Low Level Management – Academic Departments and Research Centers Directors

##### Stakeholders:

When considering ISCTE-IUL's stakeholders, the key stakeholders are the top five mentioned in [figure 2.1](#):

- Students;
- Teaching Staff;
- Employers;
- Partner Companies;
- Government, ministries and accreditation bodies.

ISCTE-IUL states that they have an insufficient number of full professors and associate professors far below legal requirements and qualification levels in other universities (Requirements – 50 to 70%). In 2020 they have raised the quota from 24% to 40%. ISCTE-IUL also lacks human resources for technical and administrative support for the functioning of the institution and its schools, having a low ratio of technical and administrative staff/professors (per ISCTE-IUL's Strategic and Action Plan for the Quadrennium 2018-2021).

### Digital Strategy and Implementation and Continuous Evolution:

While no documentation stating that ISCTE-IUL has a digital strategy was found and, while there seems to be no digital strategy plan for ISCTE-IUL, ISCTE-IUL states that they have elements that are vital to its digital transformation, such as a campus in excellent conditions, its community's commitment to a culture of quality and strong connections with the business world, the state and society, as a whole. ISCTE-IUL is also investing in data science, with several first and second cycle courses having been launched. ISCTE-IUL also currently participates in a European-funded project, which aims to develop distance courses, in which content creation, synchronous learning and gamification will be key. However, ISCTE-IUL's use of e-learning and b-learning is "moderate". This information came from ISCTE-IUL's Strategic and Action Plan for the 2018-2021 Quadrennium.

### *Educational Technologies*

Digital Literacy levels of students and teachers are enough for the basic nature of used technologies in most courses, however students' digital literacy on software used by companies is lacking. Hence, ISCTE-IUL should triage potential students' applications to understand if they need to be educated on the more widely used software in their knowledge area and, if so, make them mandatory for the students who need it.

While in part this is understandable, since multiple companies use multiple software on multiple areas of business; the more widely used software, such as Excel, should be taught if students are deemed not to be well enough versed in them. However, ISCTE-IUL is also partnering up with a program called UPskill, which aims to educate people on digital technologies. If students and teachers become more well-versed in their schools' LMS and information and communications technologies, they will be able to more effectively and efficiently interact with peers, teachers, content and the technology itself.

As for Content Sharing and Management platforms, as has been previously mentioned, ISCTE-IUL uses two, Fénix and Blackboard. Fénix's User Interface (UI) looks archaic and outdated and as a result, teachers rarely post learning content there, so Fenix ends up being mostly used to store student data and to support academic administrative procedures. A picture of it can be seen below.

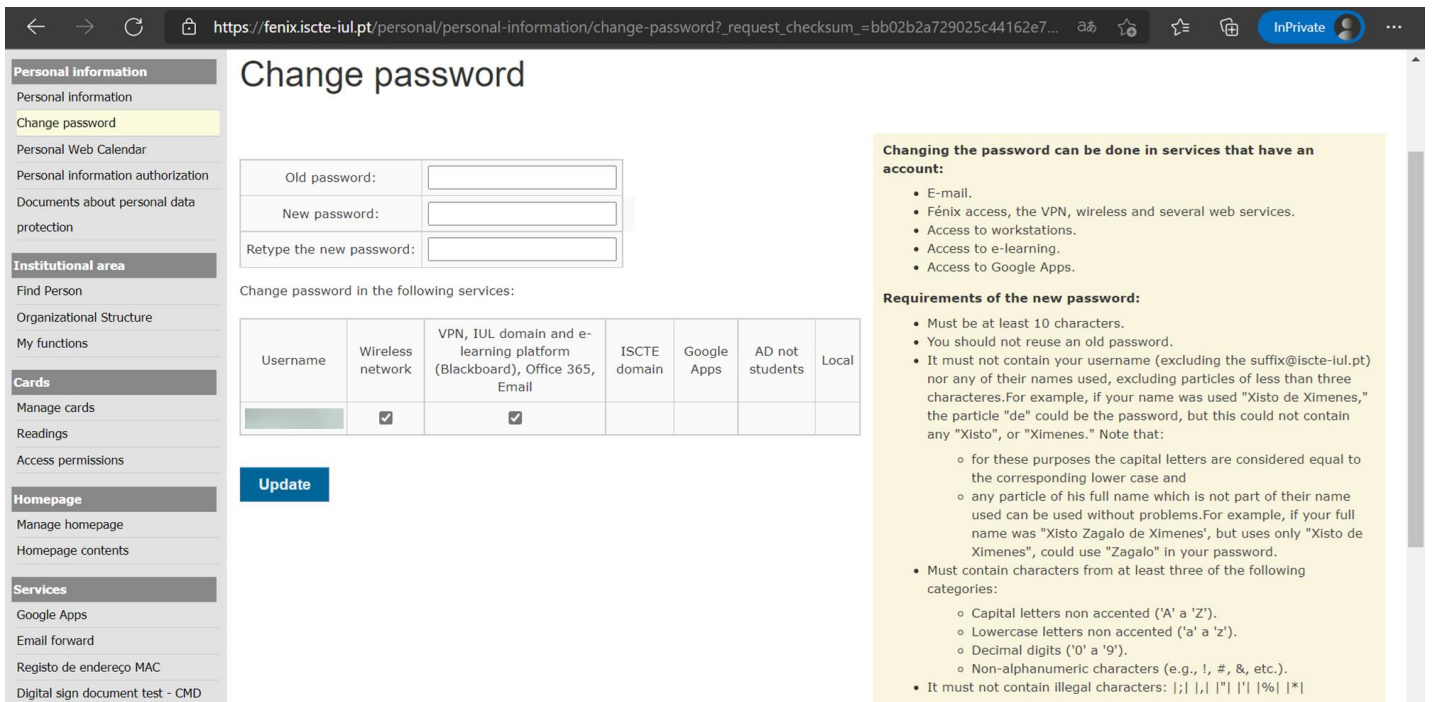


Figure 5.2: ISCTE-IUL Fénix's Change Password UI

So ISCTE-IUL uses a second platform (Blackboard) for eLearning. Blackboard has been recently overhauled, so this new version of Blackboard hasn't been extensively used yet. However, its UI looks more contemporary, especially in comparison to Fenix's. A picture of it can be seen below.

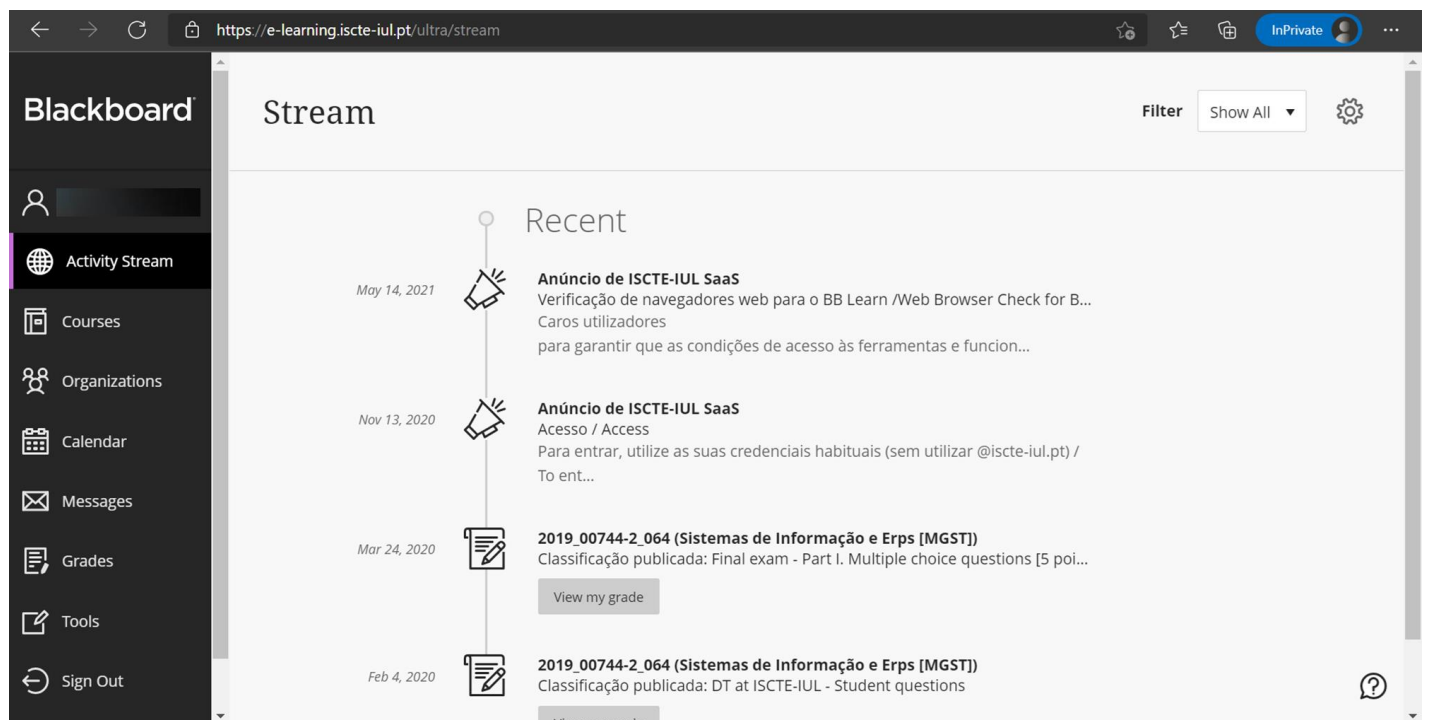


Figure 5.3: ISCTE-IUL Blackboard's Activity Stream UI

### *Educational Methodologies*

As far as Digitally Enhanced Educational Experiences are concerned, ISCTE-IUL only scratches the surface of it. Elementary expositional digital technologies like PDFs and PowerPoint projections are used 99% of the class time, with other software like Excel, SAP, Kahoot!, etc... being scarcely used. Maybe this justifies the very little Flexibility of Educational Methodologies used. This lack of flexibility in learning is vehemently evidenced, when it comes to the classrooms themselves. With a colossal majority of them looking like this:



Figure 5.4: Classroom 1E04 from ISCTE-IUL (per <https://www.iscte-iul.pt/campus/room/1774>)

This arrangement of chairs and desks doesn't foster collaboration between students and promotes passive learning.

When it comes to Authentic Learning, ISCTE-IUL's teachers have trouble connecting what students learn to the real-world. Although ISCTE-IUL does provide programs that should more easily provide Authentic Learning, which will be mentioned below in the Lifelong Learning section.

When it comes to Lifelong Learning, ISCTE-IUL provides a plethora of options:

- Post-Grad & Executive Masters;
- Short-term programs;
- Preparatory Modules;

- Soft Skills Curricular Units;
- Languages Courses.

However, these options are poorly advertised, except Post-Grad & Executive Masters.

According to the Strategic and Action Plan for the 2018-2021 Quadrennium, another issue ISCTE-IUL has mentioned to have difficulties in the past, is the insufficient collaborative work in the development of crossover offers of teaching programs as well as research of a multidisciplinary nature. This issue however was a key issue of the current top management's Strategic and Action Plan (for the 2018-2021 Quadrennium), creating courses such as the master's in Data Science, for example.

### *Learning Outcomes*

The following results are part of ISCTE-IUL's "Results of Pedagogical Monitoring Survey of 1st and 2nd Cycle Students | 1st SEMESTER - 2020/2021":

Table 5.1: Results of Pedagogical Monitoring Survey of 1st and 2nd Cycle Students | 1st SEMESTER - 2020/2021

<b>Satisfaction Indicators (1<sup>st</sup> Cycle)</b>	<b>Satisfaction Indicators (2<sup>nd</sup> Cycle)</b>
Satisfaction with ISCTE-IUL – 92%	Satisfaction with ISCTE-IUL – 87%
Satisfaction with the Course – 91%	Satisfaction with the Course – 89%
Satisfaction with Faculty – 89%	Satisfaction with Faculty – 91%
Satisfaction with the curricular units – 83%	Satisfaction with the curricular units – 87%
<b>Opinion on Curricular Units (1<sup>st</sup> Cycle)</b>	<b>Opinion on Course Units (2<sup>nd</sup> Cycle)</b>
New Knowledge Acquisition – 87%	New Knowledge Acquisition – 86%
Appropriate N. of Contact Hours – 85%	Appropriate N. of Contact Hours – 80%
Appropriate Assessment to the Learning Outcomes – 78%	Appropriate Assessment to the Learning Outcomes – 82%
Proper N. of Hours of Autonomous Work – 78%	Proper N. of Hours of Autonomous Work – 81%
Well-articulated Subjects between Curricular Units – 75%	Well-articulated Subjects between Curricular Units – 79%
Development of Critical Thinking – 74%	Development of Critical Thinking – 83%
<b>Opinion on Faculty (1<sup>st</sup> Cycle)</b>	<b>Opinion on Faculty (2<sup>nd</sup> Cycle)</b>
Properly Clarifies Questions – 85%	Properly Clarifies Questions – 88%



Clearly Explains the Subjects – 84%	Clearly Explains the Subjects – 87%
Stimulates Student Interest in Curricular Units – 76%	Stimulates Student Interest in Curricular Units – 81%
<b>Opinion on ISCTE-IUL (1<sup>st</sup> Cycle)</b>	<b>Opinion on ISCTE-IUL (2<sup>nd</sup> Cycle)</b>
ISCTE-IUL is better than other HEI – 85%	ISCTE-IUL is better than other HEI – 72%
Likely to recommend ISCTE-IUL to a friend/family – 93%	Likely to recommend ISCTE-IUL to a friend/family – 87%

Also, completion rates for dissertations, in the second cycle, and theses, in the third cycle, are below the defined strategic goal (per ISCTE-IUL’s Strategic and Action Plan for the 2018-2021 Quadrennium).

The contrasting results between, these polls with very good results and what was stated in the students’ focus group and is being shared in this case study, leads to three possible conclusions:

- 1) ISCTE-IUL is not asking the right questions or enough questions in their student satisfaction poll (for example questions regarding to the practical component of teaching and learning);
- 2) The focus groups focused too much on negative aspects of ISCTE-IUL;
- 3) All of the above.

*Institutional Performance:*

Table 5.2: ISCTE-IUL’s World and Portuguese Rankings

<b>RANKINGS of 2021 (N. of Participants)</b>	<b>WORLD</b>	<b>PORTUGAL</b>
Times Higher Education (>1600 HEI)	601 <sup>st</sup> -800 <sup>th</sup>	5 <sup>th</sup> -8 <sup>th</sup>
THE University Impact Rankings (Quality Education) (1115 HEI)	201 <sup>st</sup> -300 <sup>th</sup>	5 <sup>th</sup> -7 <sup>th</sup>
Scimago Institutions Ranking (7533 HEI)	715 <sup>th</sup>	13 <sup>th</sup>
Round University Ranking (867 HEI)	574 <sup>th</sup>	7 <sup>th</sup>

While the world rankings’ results of ISCTE-IUL are satisfactory, their national rankings’ results are average, considering the short number of highly reputable HEI in Portugal, meaning that overall higher education in Portugal is above average.

All the recommendations presented in this dissertation can contribute to the rising in both national and world rankings.



The following results are part of ISCTE-IUL's 2018/19 "Active Life Insertion Survey" to undergraduates (where "active life" refers to life as a member of the workforce):

- Employability Rate – 95%
- Graduates satisfied with their professional path – 75%
- Graduates with professional activities suited to a higher level of qualifications – 88%
- Graduates with a permanent or indefinite employment contract – 65%

Professional Status 1 year after Graduation:

- Employed – 45%
- Paid Professional Intern – 10%
- Proceeding with Studies (exclusively) – 36%
- Unemployed – 8%
- Other – 2%

Waiting Time to Obtain the 1st Job/Professional Internship:

- Year of Graduation – 21%
- ≤ 1 Month – 14%
- < 6 Months – 49%
- ≤ 1 Year – 16%

Relationship Between Professional Activity and Degree:

- Activity directly related to the degree area – 52%
- Activity in an area close to the degree area – 30%
- Activity totally different from the degree area – 18%

## **6 Conclusions and Recommendations**

Two questions were posed in this research:

- 1) How can HEI digitally transform?
- 2) How can digital transformation enhance the learning process?

As for the first question, the need for HEI to digitally transform is inescapable and has been recently stressed due to the COVID-19 pandemic. So, HEI must create a digital culture that directs it toward the investigation of newer ways of providing student-oriented solutions and

services. By updating HEI analytics and big data tools, HEI will be able to attain better data and make more informed business decisions that create value for their students. If HEI want to offer valuable and disruptive educational experiences, they'll have to modernize teaching, assessment and certification through not only from academic accreditation authorities, but also from an outside-in perspective.

As for the second question, digital transformation has brought new elements that can bolster teaching, such as digital platforms and contents and innovative educational methodologies. The use of digital educational resources can enable more customized, self-regulated, collaborative and stimulating learning (Benavides et al., 2020). In addition, in the digital economy, companies are increasingly looking for people with digital literacy and communication skills. Therefore, HEI must take this into account in their digital transformation process and have to facilitate students' acquisition of these skills.

In this dissertation, a conceptual framework for digital transformation of HEI was created and tested through two focus groups (one with students, the other with teachers) and was robust enough that iterations of the framework only required minor changes and tweaks to it.

Additionally, from the framework, a case study of ISCTE-IUL was made through its eyes, a case study that was also submitted for validation to the participants of both focus groups.

## **6.1 Theoretical Contributions**

The theoretical contribution this dissertation provides is the [conceptual framework](#) and the case study. Its significance rests upon the proposal of a strategic framework that HEI can use to digital transform and the application of the framework to the reality of ISCTE-IUL as a case study. This dissertation presents a conceptual framework and analyzes a HEI through its eyes, with the intention of presenting recommendations and solutions to the HEI in question.

## **6.2 Recommendations for ISCTE-IUL**

Using digital media, in itself, is not an equivalent to higher levels of student engagement and/or achievement, as such leadership functions, such as the identification of ISCTE-IUL's strategic assets and creation of a long-term digital strategy are vital for the digital transformation to be successful. If there is no will and effort from the leadership to make the digital transformation happen, it will either not happen or will become a failure.

As was stated [previously](#), students' digital literacy on software used by companies is lacking. Therefore, ISCTE-IUL should triage potential students' applications to understand if they need to be educated on the more widely used software in their knowledge area and, if so, make them mandatory for the students who need it.

On the other hand, some teachers believe that improving students' digital literacy on company-used software is not a priority, because these tools are continually evolving and

being replaced by others. This type of training can be provided by the companies themselves, or by professional education and polytechnic institutions. According to these opinions, university education should be more “fundamental”. This does not mean that students cannot explore new tools that are suitable for specific projects, such as for their master's theses. Some teachers argue that students do not have real-world (applied) contact with any tools, even if only for illustrative purposes, such as ERP, ICT, etc...

ISCTE-IUL must make sure it uses updated learning analytics and big data tools, to obtain better information and comprehend their students' and teachers' educational needs, so as to make more informed decisions. And if it wants to offer valuable and disruptive educational experiences, it'll have to modernize teaching, assessment and certification through not only from academic accreditation authorities, but also from an outside-in perspective.

Regarding the [conflict](#) between ISCTE-IUL's LMS (Fénix and Blackboard) and how to solve it, two recommendations are presented:

- Integrate software used for administrative purposes and personal data (Fénix) with class/study support software (Blackboard);
- Harmonize the UI of the administrative software (Fénix) with the class/study support software (Blackboard), so as to put them under the same umbrella, like, for example, the Microsoft Office. Under the Microsoft Office umbrella, there is the Word, PowerPoint, Excel, etc... All these software provide integration mechanisms and the same user interface.

Either way, both options would require a substantial investment and a digital strategy.

In order to provide better educational experiences, ISCTE-IUL is already creating digital educational contents (for example, ISCTE-IUL is creating an online learning platform, which is currently only being used for introductory curricular units of some undergraduate degrees). It should also make use of these digital platforms and contents to experiment with innovative educational methodologies that put the student in a more active role (for example: project-, research-, or problem-based learning, hands-on, flipped classroom, and so on...).

ISCTE-IUL could follow IST's example and provide general courses, such as Management with specializations down the line, such as HR, operations and logistics, marketing, data science, and so forth...

Concerning the problems related to [classroom design](#), solutions to this problem have been referenced in the teachers' focus group, such as round tables or islands (so students are facing each other) and tables and chairs with wheels (so students have more mobility), with teachers playing the role of advisor in these more proactive, collaborative, practical classes. These classes could also be preceded by self-study of the learning content and the classes would be more practical and open to debate (as in the flipped classroom model).

When it comes to Authentic Learning, it has been mentioned beforehand, that ISCTE-IUL's teachers have trouble connecting what students learn to the real-world. A solution to this problem would be to have more simulations of what it is like to work in the real-world, for example, business simulations through software, where groups would be assigned a task of, for example, expanding the business in country X, etc... Also, ISCTE-IUL should increase investment in creation of innovative learning products, services and methodologies, such as what they are apparently already doing with distance learning.

However, a potential concerning reason for why teachers struggle with connecting what students learn to the real-world might be due to the Professionalization of Teaching. Teachers who make a career of being a teacher, generally don't have much contact with or knowledge of the real-world, because they've never worked in it, they have always worked within the HEI, either as teachers or as scientific investigators (scientists).

All these recommendations should contribute to improve the Learning Outcomes of ISCTE-IUL and other public HEI.

### 6.3 Limitations and Suggestions for Future Research

The core limitation of this dissertation comes with the creation of the [artifact](#).

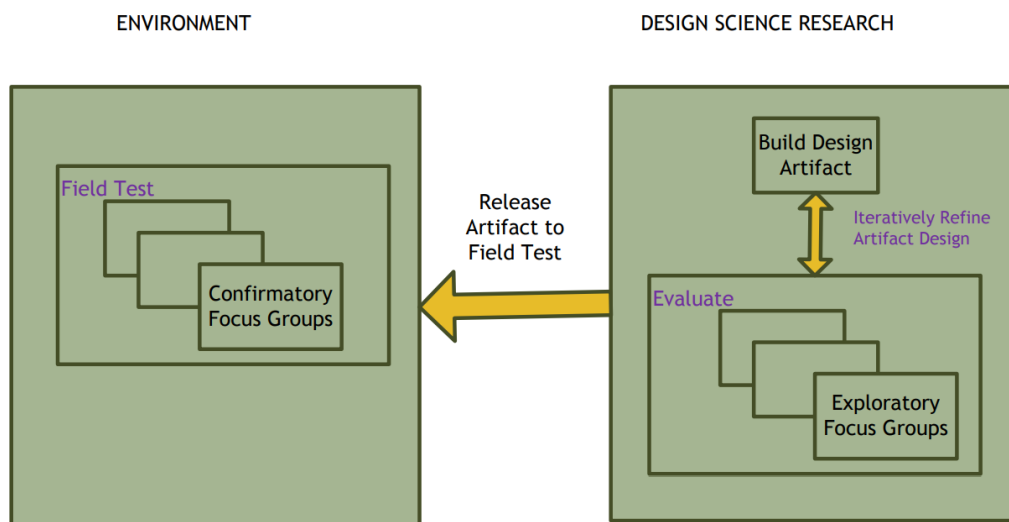


Figure 6.1: Focus Groups in Design Science Research (per Tremblay et al., 2010)

For the creation of the artifact, the DSR part, displayed in the image above, was followed, however the artifact wasn't released to the field test and tested. Hence, a suggestion for future research is to issue the artifact to the environment and assess it.

Researchers can also use the artifact to analyze other HEI and suggest improvements to them. They can also dive deeper into one or more sections or subsections of the framework in

order to get a more detailed understanding of how a HEI is performing in those sections or subsections. Alternatively, they could dive deeper into one of ISCTE-IUL's four schools and analyze it.

Another possible route would be to take the results of the "[Active Life Insertion Survey](#)" and contrast said results with the opinion companies have of their employees who are ISCTE-IUL Alumni.

Finally, and to conclude, ISCTE-IUL can and should use the conceptual framework created and presented in this dissertation, as a base to create their own digital transformation strategy.



## 7 Bibliography

- About ISCTE. iscte University Institute of Lisbon. Retrieved from <https://www.iscte-iul.pt/conteudos/iscte/about-us/541/about-iscte>.
- Authentic Learning Definition*. The Glossary of Education Reform. (2013). Retrieved from <https://www.edglossary.org/authentic-learning/>.
- Benavides, L., Tamayo Arias, J., Arango Serna, M., Branch Bedoya, J., & Burgos, D. (2020). Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Sensors*, 20(11), 1-3; 6-19. <https://doi.org/10.3390/s20113291>
- Bond, M., Marín, V., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2018). Digital transformation in German higher education: student and teacher perceptions and usage of digital media. *International Journal Of Educational Technology In Higher Education*, 15(1), 1-5; 8-17. <https://doi.org/10.1186/s41239-018-0130-1>
- CAMEPP IST. (2019). *Relatório Final* (pp. 16-20; 52; 56-70).
- Chakraborty, M., & Muya Nafukho, F. (2014). Strengthening student engagement: what do students want in online courses?. *European Journal Of Training And Development*, 38(9), 782-802. <https://doi.org/10.1108/ejtd-11-2013-0123>
- Choudhury, S., & Pattnaik, S. (2020). Emerging themes in e-learning: A review from the stakeholders' perspective. *Computers & Education*, 144(January 2020), 1-9. <https://doi.org/10.1016/j.compedu.2019.103657>
- Deloitte Digital. (2015). *The journey to government's digital transformation* (pp. 12-29).
- Digital Clarity Group. (2016). *Digital Transformation in Higher Education. How Content Management Technologies and Practices Are Evolving in the Era of Experience Management* (pp. 4-5; 8-27). Digital Clarity Group. Retrieved from <https://www.digitalclaritygroup.com/wp-content/uploads/2016/04/DCG-Report-HEDT-March2016.pdf>
- du Toit, J., & Verhoef, A. (2018). Embodied digital technology and transformation in higher education. *Transformation In Higher Education*, 3(December 2018), 1-7. <https://doi.org/10.4102/the.v3i0.52>
- Flavin, M. (2017). *Disruptive Technology Enhanced Learning - The Use and Misuse of Digital Technologies in Higher Education* (1st ed., pp. 111-144). Palgrave Macmillan UK.
- Formulating Research Aims and Objectives*. Business Research Methodology. Retrieved from <https://research-methodology.net/research-methodology/research-aims-and-objectives/>.
- Henriques, T., & O'Neill, H. (2021). Design science research with focus groups – a pragmatic meta-model. *International Journal Of Managing Projects In Business, ahead-of-print*(ahead-of-print). <https://doi.org/10.1108/ijmpb-01-2020-0015>
- Hevner, A. (2007). A Three Cycle View of Design Science Research. *Scandinavian Journal Of Information Systems*, 19(2), 87-92.
- Hevner, A., March, S., & Park, J. (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28(1), 75-105.
- Iivari, N., Sharma, S., & Ventä-Olkkonen, L. (2020). Digital transformation of everyday life – How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care?. *International Journal Of Information Management*, 55(December 2020), 1-5. <https://doi.org/10.1016/j.ijinfomgt.2020.102183>
- ISCTE-IUL. (2018). *Plano Estratégico e de Ação para o Quadriénio 2018-2021* (pp. 13-41). ISCTE-IUL. Retrieved from [https://www.iscte-iul.pt/assets/files/2018/07/12/1531388890874\\_ISCTE\\_IULPlanoAcaoQuadrienio2018\\_21.pdf](https://www.iscte-iul.pt/assets/files/2018/07/12/1531388890874_ISCTE_IULPlanoAcaoQuadrienio2018_21.pdf)
- ISCTE-IUL. (2019). *Inquérito de Inserção na Vida Ativa - Principais Resultados* (pp. 1-2). Retrieved from [https://www.iscte-iul.pt/assets/files/2021/04/21/1618996614800\\_Documento\\_S\\_ntese\\_Licenciados\\_2018\\_2019\\_GERAL.pdf](https://www.iscte-iul.pt/assets/files/2021/04/21/1618996614800_Documento_S_ntese_Licenciados_2018_2019_GERAL.pdf)
- ISCTE-IUL. (2021). *Principais Resultados da Monitorização Pedagógica Inquérito aos Estudantes do 1º e 2º Ciclos | 1º Semestre – 2020/2021* (pp. 1-2). Retrieved from <https://www.iscte->

- iul.pt/assets/files/2021/03/31/1617197593536\_Principais\_Resultados\_MP\_\_20\_21\_1Sem\_1e2Ciclos\_VF.pdf
- Jackson, N. (2019). Managing for competency with innovation change in higher education: Examining the pitfalls and pivots of digital transformation. *Business Horizons*, 62(6), 761-771. <https://doi.org/10.1016/j.bushor.2019.08.002>
- Jensen, T. (2019). *HIGHER EDUCATION IN THE DIGITAL ERA The current state of transformation around the world* (pp. 20-53). International Association of Universities. Retrieved from [https://iau-aiu.net/IMG/pdf/technology\\_report\\_2019.pdf](https://iau-aiu.net/IMG/pdf/technology_report_2019.pdf)
- Kerroum, K., Khiat, A., Bahnasse, A., Aoula, E., & Khiat, Y. (2020). The proposal of an agile model for the digital transformation of the University Hassan II of Casablanca 4.0. *Procedia Computer Science*, 175(2020), 404-409. <https://doi.org/10.1016/j.procs.2020.07.057>
- Kirkwood, A., & Price, L. (2013). Technology-enhanced learning and teaching in higher education: what is 'enhanced' and how do we know? A critical literature review. *Learning, Media And Technology*, 39(1), 7-35. <https://doi.org/10.1080/17439884.2013.770404>
- Krishnamurthy, S. (2020). The future of business education: A commentary in the shadow of the Covid-19 pandemic. *Journal Of Business Research*, 117(September 2020), 1-4. <https://doi.org/10.1016/j.jbusres.2020.05.034>
- Liu, M., Zha, S., & He, W. (2019). Digital Transformation Challenges: a Case Study Regarding the MOOC Development and Operations at Higher Education Institutions in China. *Techtrends*, 63(5), 621-629. <https://doi.org/10.1007/s11528-019-00409-y>
- Mainardes, E., Alves, H., & Raposo, M. (2013). Identifying stakeholders in a Portuguese university: a case study. *Revista De Educación*, 362(Septiembre-diciembre 2013), 449-450. <https://doi.org/10.4438/1988-592X-RE-2012-362-167>
- Marks, R., Sibley, S., & Arbaugh, J. (2005). A Structural Equation Model of Predictors for Effective Online Learning. *Journal Of Management Education*, 29(4), 534-540; 549-554. <https://doi.org/10.1177/1052562904271199>
- Master (MSc) in Management of Services and Technology*. ISCTE-IUL. (2021). Retrieved from <https://www.iscte-iul.pt/course/71/master-msc-in-management-of-services-and-technology>.
- MIT Center for Digital Business and Capgemini Consulting. (2011). *Digital Transformation: A Roadmap for Billion-dollar Organizations* (pp. 8-47). Capgemini Consulting. Retrieved from [https://www.capgemini.com/wp-content/uploads/2017/07/Digital\\_Transformation\\_\\_A\\_Road-Map\\_for\\_Billion-Dollar\\_Organizations.pdf](https://www.capgemini.com/wp-content/uploads/2017/07/Digital_Transformation__A_Road-Map_for_Billion-Dollar_Organizations.pdf)
- Modelo de ensino e práticas pedagógicas 21-22 • MEPP | Técnico Lisboa*. Mepp.tecnico.ulisboa.pt. (2021). Retrieved from <https://mepp.tecnico.ulisboa.pt/en/>.
- Navaridas-Nalda, F., Clavel-San Emeterio, M., Fernández-Ortiz, R., & Arias-Oliva, M. (2020). The strategic influence of school principal leadership in the digital transformation of schools. *Computers In Human Behavior*, 112(November 2020), 5-9. <https://doi.org/10.1016/j.chb.2020.106481>
- Navitas Ventures. (2017). *Digital Transformation in Higher Education* (pp. 10-14; 20-22). Retrieved from [https://www.navitasventures.com/wp-content/uploads/2017/08/HE-Digital-Transformation-\\_Navitas\\_Ventures\\_-EN.pdf](https://www.navitasventures.com/wp-content/uploads/2017/08/HE-Digital-Transformation-_Navitas_Ventures_-EN.pdf)
- OECD. (2012). *Assessment of Higher Education Learning Outcomes - Feasibility Study Report* (pp. 35-36).
- Santos, H., Batista, J., & Marques, R. (2019). Digital transformation in higher education: the use of communication technologies by students. *Procedia Computer Science*, 164(2019), 124-129. <https://doi.org/10.1016/j.procs.2019.12.163>
- Šereš, L., Pavličević, V., & Tumbas, P. (2018). Digital Transformation of Higher Education: Competing on Analytics. In *12th International Technology, Education and Development Conference (INTED 2018)* (pp. 9491-9497). Valencia - Spain; International Academy of Technology, Education and Development. <https://doi.org/10.21125/inted.2018.2348>
- Shalev-Shwartz, S. (2011). Online Learning and Online Convex Optimization. *Foundations And Trends® In Machine Learning*, 4(2), 107-194. <https://doi.org/10.1561/22000000018>



- Tremblay, M., Hevner, A., & Berndt, D. (2010). Focus Groups for Artifact Refinement and Evaluation in Design Research. *Communications Of The Association For Information Systems*, 26, 600-612. <https://doi.org/10.17705/1cais.02627>
- Tsai, Y., Rates, D., Moreno-Marcos, P., Muñoz-Merino, P., Jivet, I., & Scheffel, M. et al. (2020). Learning analytics in European higher education—Trends and barriers. *Computers & Education*, 155(October 2020), 2-4; 6-14. <https://doi.org/10.1016/j.compedu.2020.103933>
- Volungevičienė, A., Teresevičienė, M., & Ehlers, U. (2020). When is Open and Online Learning Relevant for Curriculum Change in Higher Education? Digital and Network Society Perspective. *The Electronic Journal Of E-Learning*, 18(1), 88-98. <https://doi.org/10.34190/ejel.20.18.1.007>
- Wankel, C. (2011). *Teaching Arts and Science With the New Social Media* (3rd ed., pp. 3-14). Emerald Group Publishing Ltd.
- What is digital transformation?*. Enterpriseproject.com. (2016). Retrieved from <https://enterpriseproject.com/what-is-digital-transformation>.
- Wingo, N., Ivankova, N., & Moss, J. (2017). Faculty Perceptions about Teaching Online: Exploring the Literature Using the Technology Acceptance Model as an Organizing Framework. *Online Learning*, 21(1), 19-28. <https://doi.org/10.24059/olj.v21i1.761>
- Zawacki-Richter, O., Kerres, M., Bedenlier, S., Bond, M., & Buntins, K. (2020). *Systematic Reviews in Educational Research*. Springer VS.
- Zimmerman, J. (2020). *Coronavirus and the great online-learning experiment: Let's determine what our students actually learn online*. The Chronicle of Higher Education. Retrieved from <https://www.chronicle.com/article/coronavirus-and-the-great-online-learning-experiment/>.



## 8 Appendices

### Appendix A: Informed Consent Text

#### **INFORMED CONSENT**

This focus group is part of the dissertation for the ISCTE-IUL's MSc in Management of Services and Technology named "Digital Transformation's Applications on Higher Education Students' Learning Outcomes". This dissertation and focus group are and will be conducted by the moderator (Miguel Freire) and the focus group's purpose is to improve and validate the conceptual model presented in said dissertation.

The duration of this focus group is estimated to be around 60 minutes.

This focus group is voluntary, meaning you don't have to participate in it, if you don't wish to. The session will be recorded, but will only be viewed by the moderator (Miguel Freire) and the supervisor (Henrique O'Neill). Any results from this session will be used exclusively for this research. You will remain anonymous in the dissertation and the session tape will have been deleted by 31/12/2021.

By participating in this focus group, you are agreeing to the terms stated above.

At the start of the focus group, the moderator will reread this text to the participants, he'll then answer their questions regarding it and will ask for their informed consent on tape.

Again, thank you so much for participating in this focus group.

For any questions, feel free to contact the moderator, Miguel Freire (jmcafreire2@gmail.com).

## Appendix B: Focus Groups' Main Steps, Agenda and Questioning Guide

### 1. MAIN STEPS

#### Preparation

- Create Questioning Guide;
- Invitation of Session Participants – Date, Length, Objectives

#### Focus Group Session Conduction

- Explanation of the Research Problem, Question and Objectives;
- Explanation on Digital Learning;
- Open Discussion on the State of Higher Education;
- Framework Presentation – including how it came to be;
- Presentation of Questions to the Group;
- Individual Responses;
- Group Discussion.

#### Synthesis Document Creation

- Transcription and Interpretation of Results;
- Synthesis Document Production.

### 2. AGENDA – Date: 29/06/2021, 19h Length: 1h 30 min

**Purpose:** To validate the conceptual framework and recommend improvements to it and to recognize its merits in the research field in question (Higher Education).

**Process:** Presentation of Session Objectives and the Framework. Collection of individual and collective perceptions about the state of higher education and the Framework.

**Moderator:** Miguel Freire

**Agenda:** Open Discussion on the State of Higher Education; Framework Presentation and Discussion; Conclusion.

### 3. FOCUS GROUP SESSION QUESTIONING GUIDE:

#### Open Discussion on the State of Higher Education;

#### Focus Group's Questioning Order

##### DISCUSSION:

- 1) Do you understand the framework and the thought process behind it?
- 2) Regarding the "*Digital Culture*" Dimension, would you add and/or remove any subdimensions?
- 3) Regarding the "*Educational Technologies*" Dimension, would you add and/or remove any subdimensions?
- 4) Regarding the "*Educational Methodologies*" Dimension, would you add and/or remove any subdimensions?
- 5) Regarding the "*Learning Outcomes*" Dimension, would you add and/or remove any subdimensions?
- 6) Regarding the "*Student's Educational Needs*" Dimension, would you add any subdimensions?
- 7) Regarding the "*Learning Analytics*" Dimension, would you add any subdimensions?
- 8) Are there dimensions you would add or remove from the framework?
- 9) Would you change the order of certain dimensions in the framework?

##### CONCLUSION:

- 10) Considering the Research Problem & Question, how much does the framework address them (in a scale 1 to 5)?
- 11) Considering the Research Aim, how much does the framework address and contribute to achieving them (in a scale 1 to 5)?
- 12) Do you think the framework is sufficiently strong to characterize digital learning (in a scale of 1 to 5)?
- 13) What merits do you attribute to this Framework?

## Appendix C: MMST's Curricular Plan

### Term 0 - Consolidation Topics (optional)

Since not all degree candidates have the same academic and professional backgrounds, Iscte Business School offers an introductory term called Consolidation Topics. The admissions committee may recommend this introductory term after appraising the applicant's CV. This special preparation will enable students to adapt more easily to the complex issues discussed in their required courses.

### Study plan for 2021/2022

Curricular Courses		Credits
<b>1st Year</b>		▼
Capital Investment Appraisal	Unidades Curriculares Obrigatórias	6.0
Strategy and Corporate Development	Unidades Curriculares Obrigatórias	6.0
Innovation Management	Unidades Curriculares Obrigatórias	6.0
Operations Management	Unidades Curriculares Obrigatórias	6.0
Simulation of Systems and Operations	Unidades Curriculares Obrigatórias	6.0
Supply Chain Management	Unidades Curriculares Obrigatórias	6.0
Operations Management in Service	Unidades Curriculares Obrigatórias	6.0
Technology Management	Unidades Curriculares Obrigatórias	6.0
Optativas > 1º Ano, 2º Semestre		
Optativas > 1º Ano, 2º Semestre		
Optativas > 1º Ano, 2º Semestre		
Optativas > Tpo		
<b>2nd Year</b>		▼
Research Seminar in Management of Services and Technology	Unidades Curriculares Obrigatórias	6.0
Dissertation in Management of Services and Technology	Trabalho Final	54.0
Business Problem in Management of Services and Technology	Trabalho Final	54.0