THE SYMBOLIC-CULTURAL DIMENSION OF THE DIGITAL TRANSFORMATION IN HE. A COMPARATIVE ANALYSIS

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ABSTRACT

European projects lend themselves to facing a comparative analysis through qualitative, quantitative, or mixed methods. Among the various elements that organise the comparison, an important component is the cultural dimension since it organises social actors' practices, often carried out with qualitative methods. However, in line with the literature, this dimension is detectable through text mining methods since it determines the choice and association of the words used to organise communication. This work proposes a text-mining procedure for comparing the documents' symbolic-cultural categories, in line with the theory of translation.

In particular, Emotional Text Mining was used to study the cultural differences in digital development in Higher Education among countries through the analysis of the country partners' report of the Erasmus+ Project ECOLHE (Empower Competences for on life Learning in Higher Education[1]) to identify the symbolic-cultural categories and the representations of digital development. Results have important implications for identifying digital culture development indicators starting from texts, an aspect that could be considered relevant for policymakers in the context of Erasmus+ projects.

Keywords: Digital transformation, Higher Education, Emotional Text Mining, comparative analysis.

1. INTRODUCTION

European projects lend themselves to facing a comparative analysis through qualitative, quantitative, or mixed methods. Among the various elements that organise the comparison, an important element is the cultural dimension since it organises the practices of social actors, which is often carried out with qualitative methods. In the cultural perspective, universities diversify in terms of disciplines, curricula, organization, and epistemological and philosophical traditions, assuming a socializing function in the local social context. In terms of studies, as already emerged in the *Introduction*, there have been attempts to taxonomize and modelize the realities of higher education (Dobbins et.al. 2011), even with the risk of simplifying and reducing the complexity of the phenomenon (Clark 1987). Environmental factors and institutional and local traditions, as well as national cultures (Valimaa, 1998) affect higher education which therefore take the form of open and constantly evolving system (van Vught 1996). Among the

[1] E-learning in the European Higher Education Area: http://ecolhe.eu/

environmental and contextual factors, not least the digital transformation that has affected the academic system, from all points of view: organisational, didactic, research and development, third mission, etc. Therefore, a *complex organization* cannot fail to consider the cultural dimension, which emerges through its didactic offer, the curriculum, the organization of the disciplinary sectors, adopted considering the supranational and national constraints and the strategic development guidelines pursued at the level of the single university.

Furthermore, the process of translating national and supranational policies into individual specific contexts is never an automatic and linear process (Lendvai, Stubbs 2007; Johnson e Hagstrom 2005). Our work has chosen to address the problem of policy transfer, analysing the language that translates the decision-making process into practices, programs, and tools, based on the *theory of translation* with a focus on the geometric and semiotic dimensions of translation (Callon 1986; Latour 1986, 1987). This complex political and cultural process of transfer and transformation is brought to light through textual analysis, as a methodology capable of revealing the choice and association of words used to organize communication and thus define the horizon of cultural meaning in which the case studies analysed move (e.g., Reinert, 1995; Carli and Paniccia, 2002; Greco, 2016).

This work proposes, a text-mining procedure to compare the symbolic-cultural categories present in the documents that account for the results obtained in the Erasmus+ ECOLHE Project.

The main project objective is to investigate and rebuild the level of development of digital training and learning practices in Higher Education of the five countries involved in the research, under the impetus of European policies that guide all member states towards the construction of a European space for HE and for the digitization of society. The topic under study is currently of great importance for a significant increase in *online* training connected with the restrictive measures aimed at reducing the risk of contagion imposed by the pandemic. The project results, however, have highlighted how the level of national digital transformation affects the ability to cope with the country's training needs. The pandemic has brought to the fore and made urgent the issue of digital development dear to the European Community for more than twenty years.

Currently, all ECOLHE project partners have prepared a national report in English reporting on the results of the analysis of policies and practices of digital development of higher education at national, institutional, and individual levels and their adoption in the learning process. All documents have the same structure and have undergone a qualitative comparative analysis to identify the similarities and differences that characterise the countries. The results of the analysis help to analyse the differences that act at the local level in the process of putting common European guidelines into practice. According to a socio-constructivist approach, these categories also affect communication and the choice and association of words which express the vision of digital innovation that characterizes the individual partner organizations and their interpretation of the phenomena observed, through the lens of their cultural belonging to the countries involved. Consequently, it can be assumed that the national reports produced for the European project by the partner countries are similar in structure, as they are imposed, but differ in the lexical profiles reflecting the cultural structures that have organised the country's digital development.

2. METHODS

To understand whether there are specificities in the symbolic-cultural categories used to look at digital development in higher education, the reports produced by the five partner countries of the European project were subjected to text mining techniques. To this end, the documents were collected in a medium-sized corpus (token = 65,804) with a good lexical wealth (type/token ratio = 0.09; hapax = 41.8%) and explanatory variables were added concerning the country (Finland, Greece, Ireland, Italy, Spain) and the level of analysis to which the texts refer (national, institutional, individual).

To carry out the comparative analysis, it was decided to use Emotional Text Mining (ETM) (Greco, 2016; Greco, Polli, 2020) because this method is based on a socio-constructivist approach that, based on the association of words, identifies the general themes and symbolic-cultural categories of meaning

construction. The ETM is based on an unsupervised procedure that, after selecting terms based on lexical indicators (Greco, 2016), carries out a multivariate analysis that allows to classification of the texts in relation to the co-occurrence of the words.

First, the texts were pre-processed removing the graphs, links, emails, and numbers and modifying all the text to lowercase. Subsequently, three lexical indicators were calculated to evaluate the possibility of statistically processing data: the token, the type-token ratio, and the percentage of hapax (Giuliano and La Rocca, 2010). The corpus was divided into 1,910 chunks of text using T-Lab software (version 2018). We removed the stop words and lemmatised the corpus to select the terms of the medium and low frequency rank up to a threshold of fine occurrences. The lower threshold is defined by the number of documents in the analysis (Greco, 2016).

Then, we performed a cluster analysis with a bisecting *k-means* algorithm based on cosine similarity (Steinbach et al., 2000) on the term-chunk of text matrix, limited to twenty partitions, excluding all the chunks of text that did not have at least two terms co-occurrence. We calculated the intraclass correlation coefficient index and evaluated the dendrogram to choose the optimal solution. The chunks of text classified in each cluster were ordered according to their relevance (score) (Lancia, 2018). Then, we performed a correspondence analysis on the term-cluster matrix (Lebart, Salem, 1994). Finally, we performed a chi-square test on the cluster-country contingency table to assess the reports' topics using the standardised residuals to identify relevant differences (Sharpe, 2015).

To facilitate interpreting the correspondence analysis results, we assigned each term exclusively to the factor with the highest total contribution, filtering out this term from the other factors. In this way, each factor is characterised by specific terms different from the other factors.

Finally, we calculate the chi-square and the standardised residuals on the cluster-country and cluster-level of analysis contingency tables to assess the differences in dealing with digital development between countries (Finland, Ireland, Spain, Italy, and Greece) and levels of analysis (National, Institutional, and Individual).

3. RESULTS

The 659 terms selected classify 96.5% of the context units, and the optimal partition was six clusters (representations of digital development). The correspondence analysis detected five factors (Table 1), and the first three factors explain 73% of inertia (Figure 1).

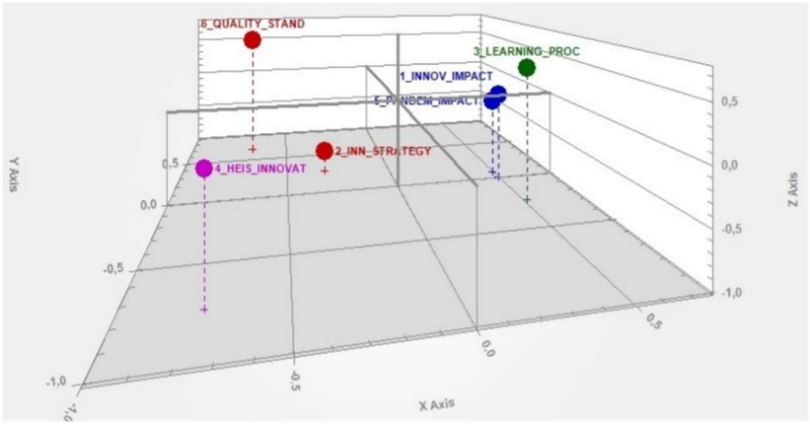

Figure 1 – Actor space (the first three factors explain 73% of inertia)

Table 1 – Correspondence analysis results

Factor	Labels			Eigenvalues	%	Cumul. %
	Factor	Negative Pole	Positive Pole			
1	Actor	Institution	People	0.309	34.7	34.7
2	Level	National	International	0.177	19.9	54.5
3	National	Vision	Standards	0.166	18.6	73.1
4	Digital	Process	Structure	0.128	14.3	87.4
5	HEI's Activity	Pandemic	Normality	0.112	12.6	100.0

The correspondence analysis results identify the principal axes of communication in the reports (Table 2) that is the five symbolic-cultural factors: the *actors* involved in the process (people or institutions); the *level* of analysis (national or international); the main dimensions characterising the *national* level; the vision and the quality standards; the consideration of the issue of *digital* from the point of view of structures or processes; and the pandemic impact on HEIs' activities (HEI: higher education institution).

The reconstruction returned by the analysis of the national reports very effectively summarizes the process of putting European policies into practice (Latour 1986, 1987). A process that inevitably passes through the human or non-human actors (institution and people) who are part of the process and who proceed from one level to another (international/national) by reinterpreting the standards/recommendations declined at the higher level through the local vision. In this complexity, the digital challenge is stretched between the structures that guarantee and bear it and the non-linear process put into practice by universities as organizations.

Table 2 –Terms characterising the factorial space (terms are ordered by absolute contribution percentage)

Factor		*Negative Axe*			*Positive Axe*		
n	*Label*	*Label*	*term*	*a.c. %*	*Label*	*term*	*a.c. %*
1	Actor	Institution	HEIs	1.58	People	student	1.92
			law	1.36		teaching	1.58
			academic	1.08		platform	0.58
			public	1.06		skill	0.50
			education	0.94		practice	0.41
			body	0.84		knowledge	0.37
			institution	0.71		participant	0.34
			unit	0.70		personal	0.33
			Council	0.60		environment	0.26
			report	0.57		method	0.26
2	Level	National	regulation	2.63	International	quality	7.46
			Department	2.24		assurance	5.27

		fund	1.58		system	1.34
		Senate	1.34		European	1.34
		religious	1.16		qualification	1.27
		rector	1.13		standard	1.22
		general	1.06		accreditation	1.17
		affair	0.98		agency	0.97
		assembly	0.85		curriculum	0.88
		ministry	0.80		policy	0.75
3	National	Vision	national	4.08	Standards	evaluation	2.33
			higher_education	3.08		certification	1.91
			strategy	2.47		guidance	0.76
			framework	2.33		external	0.70
			Ireland	1.92		assessment	0.69
			Irish	1.58		internal	0.60
			development	1.34		procedure	0.59
			digital	1.31		training	0.41
			Finnish	1.29		foundation	0.40
			forum	1.17		model	0.40
4	Digital	Process	staff	4.09	Structure	process	4.72
			on-line	2.22		technology	3.62
			learning	2.07		lack	2.67
			focus	1.00		digital_innovat	2.11
			need	1.00		resource	1.95
			professional	0.80		tool	1.79
			lesson	0.76		time	1.66
			face-to-face	0.52		threat	1.56
			challenge	0.51		opportunity	1.42
			asynchronous	0.48		work	1.37
5	HEI's Activity	Pandemic	pandemic	1.55	Normality	teacher	6.75
			teach	1.41		tutor	5.37
			importance	0.91		question	2.35
			lecture	0.70		researcher	1.80
			blended	0.70		didactic	1.37
			move	0.57		online	1.34
			design	0.51		course	1.21

experience	0.51	group	1.13
engage	0.47	test	1.13
self-training	0.37	technical	1.08

The six digital development topics (clusters) are in the sensemaking space (factorial space): the impact of innovation, the digital innovation strategy at the national level, the learning process, the digital innovation of HEIs, the impact of the pandemic and quality standards (Figure 1 and Table 3).

Table 3 – Summary of the interpretation of the ETM results (the percentage of inertia explained is indicated between brackets under the factor, and the value of the coordinate of the cluster's centroid is reported under the factorial axis label)[2]

Cluster	CU%	Topic	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
			34.7%	19.9%	18.6%	14.3%	12.6%
			Actor	Level	National	Digital	HEI's Activity
1	24.1	Digital Innovation Impact	People			Structure	
			0,50	0,00	0,00	0,58	-0,07
2	14.0	Digital Innovation	Institution	International	Vision		Normality
		Strategy	-0,32	0,25	-0,77	-0,06	0,33
3	12.9	Digital Learning	People	National	Standards	Process	Normality
		Process	0,52	-0,26	0,45	-0,33	0,63
4	17.5	HEI's Digital Organization	Institution	National			
			-0,75	-0,76	0,04	0,03	-0,16
5	17.9	Pandemic Impact	People			Process	Pandemic
			0,50	0,07	-0,11	-0,46	-0,46
6	13.6	Quality Standards	Institution	International	Standards		
			-0,68	0,67	0,54	0,01	-0,06

Table 4 – Cluster analysis results

Cluster	Topic	UC%	term	CT in Cl
1	Digital Innovation Impact	24.1%	digital	210
			teaching	130
			technology	129
			process	122
			work	90
			digital_innovation	80

[2] The label of the factorial axes is not reported for a axe's coordinate value > -0.2 and < 0.2.

			tool	76
			resource	75
			Support	68
			practice	59
2	Digital Innovation Strategy	14.0%	national	161
			higher_education	129
			digital	124
			development	81
			framework	77
			European	61
			institution	53
			strategy	49
			policy	46
3	Digital Learning Process	12.9%	student	133
			teacher	117
			teaching	90
			tutor	65
			course	59
			on-line	58
			group	52
			focus	52
			activity	36
4	HEI's Digital Organization	17.5%	university	174
			Research	117
			academic	80
			HEIs	67
			education	65
			law	58
			fund	58
			Department	55
			institution	54
5	Pandemic Impact	17.9%	digital	204
			learning	182
			student	173
			teaching	148

			staff	144
			on-line	86
			need	66
			development	66
			pandemic	40
6	Quality Standards	13.6%	quality	188
			assurance	107
			system	95
			evaluation	71
			education	67
			national	65
			certification	53
			accreditation	32
			standard	32

More in depth, we can describe the six cluster/topics as follow.

The **digital innovation impact** is how digital innovation affects people considering the structure available at university and the way people deal with this kind of technology in terms of practices, supports and resources occurred. The digital innovation impact is read through strengths, weaknesses, opportunities, and risks which transform work, teaching and organsational processes. The availability of good infrastructure, technical and pedagogical support and a widespread culture of sharing are drivers of digital innovation. The lack of time, teachers 'digital skills and the recognition of the value of work in a digital environment represent the main obstacles to digital innovation in Higher Education, as also emerged during the teaching training carried out within the project (IO2-IO3)

Cluster 1 (Digital Innovation Impact): Strength and weakness, opportunity and threat in implementation of the digital_innovation in higher_education SWOT-analysis Table 4 SWOT: Pedagogical and Technical Support Strengths Monetary and time resourcing Good LMS (Canvas) Competency Vision Weaknesses Lack of time resources No possibility to specialize Lack of the time for self-development Opportunities Level up the quality of the (score= 1058,3567)

Cluster 1 (Digital Innovation Impact): Teachers and Tutors Strengths Good availability of digital tools Good availability of internal training Dedicated technical support for the teachers Strong sharing culture for the best practices Increased working flexibility Increased learning flexibility Weaknesses Lack of time resources Lack of teaching competency in digital environment Creative work is not valued Balance between virtual (score = 785.89)

Cluster 1 (Digital Innovation Impact): Lack of time resources, Lack of teaching competency in digital environment Lack of the time for self-development Creative work is not valued Balance between virtual, blended and classroom teaching is unclear Resistance for change Some students lack self-management skills Increased need for leadership (score= 459.03)

The second topic is the **digital innovation strategies** that focus mostly on meso level where operate public and collective institutions, accreditations systems, technology providers etc. This is how the country looks at digital development in terms of national policies, strategies, and European frameworks, including a long-term vision on digital innovation in the higher education system.

Cluster 2 (Digital Innovation Strategy): In this strategy, it outlines that its work informs and is informed by, "a range of national policies, strategies and frameworks including the long-term vision set out by the National Strategy for higher education to 2030, the related objectives outlined in the current and future Action Plans for Education and higher education System Performance Frameworks, (score= 1228,4771)

The third topic highlighted is the **digital learning process.** This mostly focuses on people interaction. The focus is on how students, teachers, and tutors deal with the process of learning and teaching online in normal activity of course. In this specific cluster, the main topic is the concrete teaching-learning experience of the main *human actors* involved: teachers, students, tutors, and supporting staff. Digital transformation builds new roles in learning and teaching, bringing out central themes such as the learning design, strengths, and weaknesses for students in using new digital opportunities.

Cluster 3 (Digital Learning Support): Finally, the technical tutor is a technical help desk who intervenes when the students have technical problems with the platform: "the technical tutor is invoked when the technical things are not within reach of the tutor of the course of study; therefore the student has, in his reserved area, a button, where we can say he can invoke the help of the technical tutor . . (score= 1459,0572)

The fourth cluster focus on the theme of the **HE institution digital organization**. The main issue is how the academic bodies translate the national policies on digitalisation/digital transformation of education in the specific local university context (e.g., departments organisation, research, funding programs, etc.). It is the space in which Academic Bodies act their mico-policies to run the complex organization in facing both the digital revolution determined by the market and the European constraints and indications that determine the room of action for the HEA.

Cluster 4 (HEI's Digital Innovation): "*The Senate of the University, consisting of representatives of the entire academic community, is the highest policy-making collective body of the University setting the overall policies. The Rector convenes the Senate, chairs its meetings, sets the agenda, and represents the University at the highest level. The Rector's Council is the highest executive body*." (score= 539,1489)

The fifth topic emerges regards **the pandemic's impact on the teaching-learning experience** (e.g., difficulties encountered, future opportunities, students' needs, etc.). The Covid-19 pandemic represented a watershed; it marked a before and after even in academic institutions, especially in the traditional ones where digital innovation was not yet fully integrated into the teaching-learning processes. In a very short time, HEIs address the need to move lessons online and manage and coordinate teaching and administrative activities remotely. The pandemic has turned the spotlight on digitisation as a cross-cutting issue, bringing to the attention of the system the need to revise the rules of teaching delivery modes (on-site, online, blended) to increase the digital competences of staff and students, to rethink spaces and times of teaching and learning, with a specific focus on the adaptation, implementation, and management of digital infrastructures.

Cluster 5 (Pandemic Impact): "*... programmes will return to face-to-face, and some perhaps will be considered to remain as blended. A key opportunity is the exposure of staff to digital teaching and learning. It has provided an opportunity for gathering ACE staff and student feedback on the experience of online learning with a view to the potential of creating more blended learning programmes"* (score= 1278.703).

The last topic is the **International Quality Standards** adopted at the national level and the quality assurance process built by academic institutions at the local level. The presence of these factors/topics confirms the role digitally enhanced learning and teaching has assumed in recent years in the quality assurance processes of universities, as also emerged in the results of a survey realised in the DIGI-HE project (Gaebel et al. 2021). Based on this research, from 2014 to 2020, the academic institutions that declare that they include digitally enhanced learning and teaching in quality processes go from 29% to 51%. It is, therefore, not surprising that the issue of quality is central to the national reports analysed as regards digital transformation policies at the national and local levels.

Cluster 6 (Quality Standards): "*The Quality Assurance Unit (MODIP) is the responsible body in every HEI for the coordination and support of quality assurance processes. in particular, MODIP is responsible for the development, organisation, operation and continuous improvement of the institution's internal quality assurance system*." (score= 4832.327)

The project reports of the partner countries differ significantly in the presence, or absence, of specific topics (clusters) ($\chi 2$, df= 20, p>0.01), as well as the level of analysis ($\chi 2$, df= 10, p>0.01) (table 5).

Table 5 – Standardized cluster association residues by analysis level and country in descending order of DESI (values between -1.96 and 1.96 have not been reported)

	Level of analysis			*Country*				
Cluster	*National*	*Institutions*	*Indiv*	*Finland*	*Ireland*	*Spain*	*Italy*	*Greece*
Digital Innovation Impact	-8,0	-4,7	**10,8**		-3,9	**7,1**		
Digital Innovation Strategy	**8,2**	-2,5	-5,9	**6,3**	**4,4**	-3,7		-4,5
Digital Learning process	-5,5		**4,3**		-5,6		**6,6**	-2,5
Digital HEIs Organization	**6,5**	**3,6**	-8,6	-3,1	-4,7	-3,4		**8,5**
Impact of the Pandemic	-4,2		**3,6**	-2,1	**13,2**		-4,3	-4,1
Quality Standards	**5,3**	**2,8**	-7,0		-3,6			4,4

The topics of the digital innovation impact, the digital learning process and the impact of the pandemic characterise the analysis at the *individual level.* This is the level where people, as human actors, they find themselves alone, with their personal strategies and resources to face the changes taking place. So, the issues of impact, learning and pandemic acquire a relevant space in their discourse; while the topic of quality standards and digital innovation of HEIs distinguish the level of *national* and *institutional* bringing to light the key issues that feed the space of discourse at these two levels (national and implementation) co-interested and participating in the innovation process that accompanies the university in its digital challenge.

Lastly, the *digital innovation strategy*, on the other hand, is specific only to the analysis at the national level to point out the relevance of having the *vision* to promote the digital development of a country, starting to the European framework offered from the official documents prepared by the EU. It is very interesting to examine how the common European digital framework takes shape at national level following the translation process. The *digital innovation strategy* characterises the countries with the highest *Digital Economy and Society Index* (DESI), such as Finland and Ireland (EC, 2021). The Finnish case study confirms this perspective, focusing on the independence and discipline self-management skills of students and teachers, as key elements for succeeding in the digitalisation of HEIs, rather than the development of a national strategy, already evidently implemented by the specific academic contexts. Also, in Ireland, the *Department of Further and Higher Education, Research, Innovation and Science* respects the autonomous nature of HEIs, assuming a non-directive but enabling role encouraging departments and institutions to be aware of existing policies but to have agency in how they are implemented in the various academic contexts. In Ireland, from interviews with policy makers also emerges that the European standards for QA in higher education in digital innovation have not necessarily been integrated into the Irish national system because "*there were enough frameworks in place that meet the needs without adding more*".

The *digital innovation of HEIs* is an important topic for Greece, which has the lowest DESI. Comparing with other countries as Finland, Ireland, and Spain the topic is absent, probably, because the country has reached a satisfactory level of development but assumes relevance for a country that has yet to promote its digital development fully. For this, the *digital innovation strategy* remains a central topic in the Greek national agenda as confirmed by the policy makers interviewed. The main issues that drive the digital innovation strategy in Greece are specifically the development of:

- a digital teaching and learning policy that clearly and relevantly reflects the support for high quality education.

- the digital skills of the academic community (e.g., a clear policy for social media use in the university, promoting new teaching methods which empower students' digital skills and abilities as well as their flexibility of thinking and creating a new team structure consisting of both teaching and administrative staff).
- functional and viable digitalization solutions.

It should also be emphasized that in some countries such as Spain and Greece, the focus is on establishing a coherent legislative framework on higher education while in other countries the strategies seem to focus more on economic investments rather than the legislative one[3]

Spanish case study is characterised by the attention to the issue of the *digital innovation impact* probably because, unlike the other countries involved, the Spanish one is an online university. The main topic emerged are *learning and teaching* and the **I***CT resources and infrastructure.* As the case study, shows, the eLearn Center drives the evolution of UOC educational model through innovations in learning. The e-Learn Center translates in an institutional way those innovative experiences emerging from the research and adopted by a teacher or a group of professors. It represents a specific circuit through which a professor proposes the new digital product, service or process and a commission carries out a feasibility study to analyse if integrate it into curricula and courses. In the case of students, a HUB, Hubbik, promotes entrepreneurship, open innovation, support for knowledge transfer of results, and cooperation between the entire UOC community, with the aim to create added value for higher education and for society.

Finally, the case studies of countries with a below-average DESI seem to pay more attention to *digital learning processes*, in the case of Italy, and to the *digital innovation of HEIs* and *quality standards*, in the case of Greece. Two topics that, if considered as a whole, suggest the need to create the conditions for a digital development of the country that starts from the academy, the highest point of scientific knowledge at the national level, establishing reference points such as quality standards, to guide the process and to monitor it.

The greek case study is a concrete example of an ongoing process of alignment with quality standards. The introduction of digital innovation and the formal process of assessment are not yet finished. The evaluation of the promotion of educational innovation processes by the quality control system is expected in the coming months.

Also, in Italy the most relevant elements to be developed in the digital governance framework are adaptation to supranational guidelines and the design of system actions for the research and construction of the inter-institutional alliances necessary to overcome the fragmentation of the system. The main keywords that can be distinguished from the current perspective are vision, emergency, overcoming the presence-distance dichotomy, digitalisation, integration and European guidelines and dictates. At the national level the possible desired actions are therefore a reorganisation of the national governance processes and systems, to design of integrated and coordinated actions, and promote regulatory tools & plans, economic tools and accompaniment strategies. The Italian case studies also looks at the concrete teaching-learning experience of the main actors involved interpreted the innovation in teaching, from a transversal perspective that include a redefinition of educational and organisational processes from a digital perspective focusing on the creation of digital content and platforms for their use through personal devices; the definition of a sustainable integrated teaching mode and the review of the quality assessment process in the light of a digital university in the post Covid era.

4. CONCLUSION

The impact of digital transformation in higher education institution and its translation into concrete practices starting from supranational and national policies is a complex phenomenon which involves

[3] In Spain, for example, during the data collection, the Ministry of Universities was working on a new university law: the Organic Law of the University System, and relevant changes were expected

the *mobilization* of *human* and *non-human resources* and prompted us to consider as noted by Latour (1987), the transformation of meaning that takes place during the movement of the object in question.

Starting from the theory of translation developed by Latour and Law, we have tried to explore the interrelationship between discourse and action (Newton 1996), using text mining to identify differences in lexical profiles in the national reports produced by the six academic institutions involved. The interest in identifying these profiles stems from their connection with the cultural structures that organise the action of social actors and, consequently, to understand how digital development is conceptualised and expressed at the national level. We can think that the researchers who drafted the documents, in addition to being experts in this field, are also the expression of the culture of digitisation in their country. Although the documents have been drafted by digital development experts committed to promoting its implementation at the national level, their way of dealing with the issue differs according to the level of socio-economic development (DESI).

As highlighted in the literature (e.g., Grasso et al., 2016), the symbolic-cultural dimensions characterizing a person originate from three factors: the personal experience, which is unique, specific and individual; the one related to one's professional role, an expression of the belonging to a social group with a specific training and work experience, and the one related to the cultural context, learned along the socialisation process and recursively built within daily practices. In this sense, the results have important implications for the possibility to identify the development of digital culture indicators starting from texts, an aspect that could be relevant for *policymakers* to define future policies and understand how individual contexts have translated, transformed and negotiated existing ones.

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ANNEXES

Annex 1: The Factorial Space

Factor 1				Factor 2			
Actor				Level			
Neg Pole		Pos Pole		Neg Pole		Pos Pole	
Intitution		People		National		International	
term	a.c.%	term	a.c.%	term	a.c.%	term	a.c.%
HEIs	1.58	student	1.92	regulation	2.63	quality	7.46
law	1.36	teaching	1.58	Department	2.24	assurance	5.27
academic	1.08	platform	0.58	fund	1.58	system	1.34
public	1.06	skill	0.50	Senate	1.34	European	1.34
education	0.94	practice	0.41	religious	1.16	qualification	1.27
body	0.84	knowledge	0.37	rector	1.13	standard	1.22
institution	0.71	participant	0.34	A	1.11	accreditation	1.17
unit	0.70	personal	0.33	general	1.06	agency	0.97
Council	0.60	environment	0.26	Athens	0.99	ANVUR	0.93
report	0.57	method	0.26	affair	0.98	vocational	0.92
HEI	0.52	UOC	0.26	assembly	0.85	curriculum	0.88
authority	0.51	traditional	0.24	Research	0.81	policy	0.75
Patras	0.48	important	0.23	ministry	0.80	lifelong	0.70
criterion	0.40	distance	0.21	university	0.78	develop	0.54
establish	0.39	adapt	0.21	faculty	0.75	counsel	0.47
international	0.37	material	0.20	total	0.71	citizen	0.41
operation	0.35	classroom	0.20	Minister	0.70	market	0.40
responsible	0.32	flexibility	0.19	Provision	0.63	publish	0.40
indicator	0.30	space	0.18	budget	0.57	Europe	0.40
board	0.30	application	0.17	undergraduate	0.53	Labor	0.38
organisation	0.30	zoom	0.17	governing	0.51	guideline	0.35
Schools	0.30	laboratory	0.17	finance	0.50	ECOLHE	0.30
state	0.29	progress	0.16	expenditure	0.48	Action	0.23
Italian	0.28	seminar	0.16	code	0.46	blockchain	0.22
hellenic	0.25	hand	0.16	degree	0.46	continuous	0.20
establishment	0.25	ways	0.15	division	0.45	relevant	0.18
administration	0.25	pedagogical	0.12	private	0.44	cooperation	0.18
Greece	0.23	able_to	0.12	freedom	0.42	badge	0.18
Greek	0.22	reach	0.12	class	0.41	Italy	0.18

institute	0.22	effective	0.11	annual	0.40	regional	0.18
Grant	0.21	content	0.11	billion	0.38	reference	0.17
reform	0.19	canvas	0.11	science	0.36	country	0.16
efficiency	0.16	acquisition	0.10	examination	0.35	level	0.15
EU	0.16	engagement	0.10	decree	0.34	promotion	0.13
R&D	0.14	start	0.09	School	0.34	Link	0.13
consist	0.13	face	0.09	structure	0.34	demand	0.13
second	0.12	software	0.09	award	0.31	continue	0.12
Catalonia	0.11	lecturer	0.09	allocate	0.31	e-learning	0.11
institutional	0.10	know	0.09	Program	0.30	play	0.11
implement	0.10	methodology	0.08	committee	0.29	upgrade	0.08
association	0.09	significant	0.08	number	0.28	mobility	0.08
regulate	0.08	ability	0.08	postgraduate	0.27	strengthen	0.07
commission	0.08	mean	0.08	measure	0.26	global	0.07
credit	0.08	large	0.08	article	0.24	guide	0.05
spanish	0.07	consider	0.07	requirement	0.24	connect	0.03
submit	0.07	campus	0.07	summarize	0.24	expect	0.02
component	0.07	pedagogy	0.06	table	0.24	observe	0.02
purpose	0.06	entire	0.05	professor	0.24		
central	0.06	agree	0.05	engineer	0.23		
publication	0.05	interest	0.05	representative	0.23		
high	0.05	wide	0.05	decision	0.22		
age	0.04	strong	0.04	definition	0.21		
Right	0.04	participate	0.04	discipline	0.21		
review	0.04	user	0.04	legal	0.21		
define	0.04	view	0.04	collective	0.20		
expert	0.01	reflect	0.04	performance	0.20		
		situation	0.03	responsibility	0.20		
		expand	0.03	correspond	0.19		
		channel	0.03	Master	0.18		
		look	0.03	basic	0.18		
		useful	0.03	according_to	0.17		
		practical	0.03	year	0.15		
		cultural	0.02	basis	0.14		
		connection	0.01	financial	0.14		
				task	0.13		
				member	0.12		

choose	0.10
period	0.10
Call	0.09
respect	0.08
average	0.08
refer	0.08
special	0.06
concern	0.06
carry_out	0.06
exercise	0.05
finally,	0.05
manager	0.05
currently	0.05
generate	0.05
receive	0.04
social	0.03
reason	0.02
goal	0.02

Factor 3 National				Factor 4 Digital			
Neg Pole Vision		Pos Pole Standards		Neg Pole Process		Pos Pole Structure	
term	a.c.%	term	a.c.%	term	a.c.%	term	a.c.%
national	4.08	evaluation	2.33	staff	4.09	process	4.72
higher_educatio	3.08	certification	1.91	on-line	2.22	technology	3.62
strategy	2.47	guidance	0.76	learning	2.07	lack	2.67
framework	2.33	external	0.70	focus	1.00	digital_innovat	2.11
Ireland	1.92	assessment	0.69	need	1.00	resource	1.95
irish	1.58	internal	0.60	professional	0.80	tool	1.79
development	1.34	procedure	0.59	lesson	0.76	time	1.66
digital	1.31	training	0.41	face-to-face	0.52	threat	1.56
Finnish	1.29	foundation	0.40	challenge	0.51	opportunity	1.42
forum	1.17	modip	0.40	offer	0.49	weakness	1.38
key	1.17	activity	0.38	asynchronous	0.48	work	1.37
Union	1.14	function	0.33	finding	0.44	strength	1.14

digitalisation	1.10	monitor	0.32	data	0.44	communication	1.09
Finland	0.84	Centre	0.32	competence	0.36	availability	1.03
government	0.83	production	0.31	programme	0.36	transfer	0.77
project	0.82	register	0.30	theme	0.34	constraint	0.77
legislative	0.81	center	0.29	prepare	0.34	management	0.74
vision	0.81	service	0.28	category	0.33	innovation	0.69
Plan	0.75	evaluate	0.27	synchronous	0.32	company	0.62
Digivision	0.56	employment	0.26	profile	0.32	stakeholder	0.56
legislation	0.56	rule	0.24	respond	0.32	digitalization	0.55
initiative	0.49	attention	0.23	learner	0.29	Internet	0.55
launch	0.48	improving	0.23	target	0.29	personnel	0.51
transformation	0.41	share	0.22	produce	0.28	cognitive	0.48
Bologna	0.39	information	0.21	video	0.28	innovative	0.47
analysis	0.38	month	0.20	career	0.24	bureaucracy	0.47
strategic	0.38	catalan	0.19	e-Campus	0.24	good	0.46
culture	0.37	team	0.17	base	0.24	organization	0.46
implementation	0.36	organize	0.16	point	0.22	colleague	0.46
capacity	0.35	Subject	0.15	e-class	0.15	problem	0.44
effort	0.33	account	0.15	response	0.15	facilitate	0.44
introduction	0.33	particular	0.14	inform	0.15	infrastructure	0.43
agreement	0.32	difficulty	0.14	hour	0.14	adoption	0.40
sector	0.32	control	0.11	impact	0.14	limit	0.40
local	0.29	principal	0.11	understand	0.14	risk	0.40
core	0.28	transparency	0.10	flexible	0.14	equipment	0.39
HEA	0.25	complete	0.10	survey	0.14	change	0.35
outline	0.24	ongoing	0.10	deliver	0.12	working	0.35
lead	0.23	individual	0.09	range	0.11	increase	0.34
field	0.23	office	0.08	autonomy	0.11	improve	0.34
conduct	0.21	computer	0.07	ensure	0.11	modify	0.33
aim	0.21	independent	0.07	build	0.09	ICT	0.32
job	0.20	required	0.05	principle	0.09	society	0.31
joint	0.20	sense	0.05	compare	0.07	positive	0.30
priority	0.19	health	0.05	for_example	0.07	apply	0.29
area	0.19	creation	0.04	mention	0.07	signature	0.29
sections	0.18	organisational	0.03	qualitative	0.05	mission	0.27
investment	0.17	perform	0.03	open	0.05	major	0.27
current	0.17	presence	0.01			transform	0.27

position	0.16
cycle	0.15
help	0.15
enhancement	0.14
Spain	0.13
proposal	0.13
describe	0.10
college	0.10
record	0.09
regard	0.09
gap	0.08
abroad	0.08
million	0.08
place	0.08
confirm	0.07
Levels	0.07
economic	0.05
conclusion	0.04
meet	0.04
building	0.03
commitment	0.02

technological	0.26
third	0.26
issue	0.25
improvement	0.25
solution	0.25
swot	0.25
easy	0.25
effects	0.24
organizational	0.23
efficient	0.23
Best	0.22
possibility	0.21
force	0.21
communicate	0.21
solve	0.21
exist	0.20
dissemination	0.20
integrate	0.19
integration	0.18
meeting	0.18
relationship	0.18
drive	0.18
critical	0.17
collaborative	0.17
enable	0.15
electronic	0.15
cost	0.15
context	0.14
business	0.14
opinion	0.14
network	0.12
governance	0.12
growth	0.12
think	0.12
cloud	0.12
teaching-learni	0.11
factor	0.11

represent	0.10
scientific	0.09
leadership	0.09
direct	0.08
life	0.07
CRUI	0.07
introduce	0.06
adopt	0.05
Laurea	0.05
promote	0.04
emergency	0.04
document	0.03
benefit	0.03
human	0.03

Factor 5

HEI's Activity

Neg Pole Pandemic		Pos Pole Normality	
term	a.c.%	term	a.c.%
pandemic	1.550	teacher	6.75
teach	1.410	tutor	5.37
Ace	1.280	question	2.35
importance	0.910	researcher	1.80
lecture	0.700	didactic	1.37
blended	0.700	on_line	1.34
UCC	0.610	course	1.21
move	0.570	group	1.13
design	0.510	test	1.13
experience	0.510	technical	1.08
adult	0.500	case	1.05
engage	0.470	result	0.75
self-training	0.370	coordinator	0.74
bring	0.360	disciplinary	0.72
people	0.360	interaction	0.71
remote	0.350	contact	0.65
enhance	0.330	objective	0.59

literacy	0.320	virtual	0.56
access	0.320	exam	0.54
example	0.310	answer	0.53
address	0.300	characteristic	0.50
peer	0.290	administrative	0.46
community	0.290	specific	0.46
happen	0.280	identify	0.44
notice	0.280	main	0.40
big	0.280	sign	0.37
create	0.280	model	0.36
delivery	0.270	study	0.35
future	0.270	interview	0.34
extensive	0.260	emerge	0.32
graduate	0.260	different	0.31
modern	0.250	role	0.29
highlight	0.220	perspective	0.28
approach	0.220	Figure	0.26
Support	0.220	propose	0.24
value	0.200	write	0.23
territory	0.190	maturity	0.21
discussion	0.190	hold	0.21
offering	0.190	dimension	0.19
acquire	0.180	encourage	0.19
language	0.170	difficult	0.19
director	0.170	participation	0.18
attend	0.160	constant	0.18
essential	0.160	determine	0.18
Covid-19	0.160	topic	0.18
competency	0.160	path	0.17
effectively	0.150	close	0.17
potential	0.150	respondent	0.17
aspect	0.150	final	0.16
advantage	0.130	set	0.15
complex	0.120	involved	0.15
complexity	0.120	request	0.15
recognition	0.120	necessary	0.14
great	0.120	transition	0.14
device	0.110	ask	0.14

recent	0.110	manage	0.13
element	0.110	idea	0.12
world	0.090	collaboration	0.11
person	0.080	involve	0.11
appropriate	0.070	common	0.10
security	0.070	dedicate	0.10
Care	0.070	obtain	0.10
form	0.070	require	0.08
remain	0.060	initial	0.08
free	0.060	allow	0.07
employee	0.060	achieve	0.06
update	0.040	active	0.06
low	0.030	clear	0.06
recognize	0.030	condition	0.06
		economy	0.05
		outcome	0.04
		educational	0.03

ANNEX 2

Cluster analysis results

Cluster 1		Cluster 2		Cluster 3	
Digital Innovation Impact		Digital Innovation Strategy		Digital Learning Process	
term	CT in Cl	term	CT in Cl	term	CT in Cl
digital	210	national	161	student	133
teaching	130	higher_education	129	teacher	117
technology	129	digital	124	teaching	90
process	122	development	81	tutor	65
work	90	framework	77	course	59
digital_innovation	80	European	61	on-line	58
tool	76	education	56	group	52
resource	75	institution	53	focus	52
Support	68	strategy	49	staff	45
practice	59	policy	46	researcher	37
time	57	Plan	43	activity	36
lack	50	project	42	training	34
innovation	49	study	41	need	33
opportunity	48	Ireland	38	question	32
change	42	main	35	skill	28
ICT	42	implementation	31	technical	26
communication	40	key	29	administrative	25
platform	39	irish	28	role	21
good	38	area	26	result	21
pandemic	38	forum	25	virtual	18
management	36	report	25	good	18
weakness	34	programme	25	different	17
strength	34	government	23	specific	17
increase	33	international	23	case	17
threat	28	aim	23	lesson	16
working	27	Finnish	22	model	16
infrastructure	26	digitalisation	22	objective	16
transformation	25	vision	22	didactic	15
knowledge	24	analysis	22	offer	15
innovative	23	case	22	professor	14
issue	23	field	22	share	14

improve	22	strategic	21	test	13
share	22	transformation	21	interaction	13
network	22	develop	21	exam	13
organizational	21	action	19	perspective	13
organization	21	Finland	18	coordinator	12
transfer	20	initiative	18	video	12
problem	20	identify	17	material	12
improvement	20	sector	17	UOC	12
environment	20	interview	16	on_line	11
digitalization	18	culture	16	disciplinary	11
technological	18	Union	15	emerge	11
perspective	18	legislative	15	faculty	11
personal	17	ECOLHE	15	center	11
integrate	17	integration	15	problem	10
participant	17	institute	14	pedagogical	10
integration	17	introduction	14	collaboration	10
important	17	agreement	13	classroom	9
place	17	society	13	require	9
personnel	16	guideline	13	team	9
virtual	16	ministry	13	characteristic	8
context	16	legislation	12	subject	8
availability	15	Europe	12	category	8
Internet	15	cooperation	12	adapt	8
colleague	15	local	11	organize	8
company	15	current	11	traditional	8
meeting	15	Levels	11	meeting	8
society	15	Digivision	10	contact	7
apply	15	effort	10	produce	7
team	15	lead	10	answer	7
stakeholder	14	participation	10	difficult	7
enable	14	set	10	ask	7
progress	14	regard	10	difficulty	7
bureaucracy	13	launch	9	content	7
solution	13	Figure	9	encourage	7
possibility	13	blockchain	9	production	7
relationship	13	country	9	task	7
UOC	13	capacity	9	function	7

help	13	Bologna	8	flexibility	7
value	13	conduct	8	hour	6
limit	12	reform	8	month	6
facilitate	12	publish	8	constant	6
critical	12	enhancement	8	hold	6
third	12	HEA	7	laboratory	6
constraint	11	maturity	7	transition	6
Best	11	outline	7	prepare	6
adoption	11	second	7	representative	6
equipment	10	dimension	7	manage	6
cognitive	10	promotion	7	respondent	5
easy	10	proposal	7	topic	5
risk	10	core	6	close	5
positive	10	cycle	6	synchronous	5
force	10	priority	6	register	5
seminar	10	joint	6	computer	5
collaborative	10	citizen	6	ways	5
big	10	sections	6	easy	5
ability	10	reference	6	hand	5
exist	10	Spain	5	participate	5
methodology	10	abroad	5	principal	4
flexibility	10	describe	5	request	4
transform	9	inform	5	sign	4
major	9	job	5	write	4
laboratory	9	college	5	choose	4
swot	9	association	5	common	4
software	9	R&D	5	correspond	4
idea	9			determine	4
signature	8			involved	4
communicate	8				
solve	8				
modify	8				
drive	8				
efficient	8				
ways	8				
advantage	8				
path	8				

think	7
factor	7
person	7
dissemination	7
hand	7
opinion	7
teaching-learning	7
cloud	6
complex	6
effects	6
growth	6

Cluster 4		Cluster 5		Cluster 6	
HEI's Digital Innovation		Pandemic Impact		Quality Standards	
term	CT in Cl	term	CT in Cl	term	CT in Cl
university	174	digital	204	quality	188
Research	117	learning	182	assurance	107
academic	80	student	173	system	95
HEIs	67	teaching	148	evaluation	71
education	65	staff	144	education	67
law	58	on-line	86	national	65
fund	58	need	66	certification	53
Department	55	development	66	training	45
institution	54	Support	59	service	44
study	51	skill	56	academic	36
public	50	training	52	European	34
regulation	46	professional	50	accreditation	32
body	40	experience	48	standard	32
ministry	30	pandemic	40	unit	32
rector	29	focus	39	policy	32
A	28	teach	37	qualification	30
evaluation	28	practice	36	internal	30
Provision	27	access	30	procedure	27
procedure	26	UCC	28	level	25
general	25	design	27	agency	24
programme	25	offer	27	external	24

report	24	data	26	guidance	24
minister	23	challenge	23	curriculum	24
council	23	approach	22	HEIs	24
private	23	Ace	21	vocational	23
degree	23	people	21	report	23
Senate	22	competence	21	HEI	22
program	22	knowledge	21	develop	22
affair	21	blended	19	ANVUR	21
structure	21	base	19	foundation	21
HEI	21	lecture	18	assessment	21
Patras	20	capacity	18	information	21
state	20	enhance	18	management	20
internal	20	future	17	Centre	19
authority	19	method	17	lifelong	19
Schools	19	sector	17	establish	19
number	19	key	17	guideline	16
religious	18	important	16	international	16
faculty	18	environment	16	administration	16
organisation	18	importance	15	criterion	14
mission	18	face-to-face	15	improvement	14
science	17	target	15	organization	14
administration	17	competency	15	counsel	13
School	16	lesson	15	monitor	13
responsible	16	distance	15	continuous	13
unit	16	personal	14	modip	12
strategic	16	participant	14	publish	12
Athens	14	example	13	market	12
operation	14	space	13	relevant	12
establish	14	highlight	13	implement	12
scientific	14	e-Campus	13	Labor	11
board	13	theme	12	function	11
committee	13	finding	12	Italian	11
measure	13	bring	12	operation	11
responsibility	13	value	12	evaluate	10
according_to	13	effective	12	Greece	10
investment	13	move	11	individual	10
assembly	12	literacy	11	EU	9

total	12	respond	11	attention	9
finance	12	adult	11	country	9
decision	12	remote	11	employment	8
class	12	aspect	11	citizen	8
criterion	12	engage	10	Italy	8
annual	11	self-training	10	indicator	8
budget	11	address	10	Europe	8
establishment	11	asynchronous	9	particular	8
financial	11	profile	9	office	8
member	11	peer	9	institute	8
undergraduate	10	territory	9	catalan	7
Greek	10	notice	9	efficiency	7
legal	10	learner	9	upgrade	7
performance	10	acquire	9	principle	7
examination	10	prepare	9	recognition	7
evaluate	10	big	9	adult	7
agreement	10	badge	9	production	7
code	9	traditional	9	regional	6
division	9	delivery	8	improving	6
expenditure	9	happen	8	credit	6
freedom	9	discussion	8	register	6
governing	9	career	8	rule	6
allocate	9	flexible	8	electronic	6
billion	9	category	8	play	6
decree	9	survey	8	purpose	6
Grant	9	e-class	7	strengthen	6
postgraduate	9	extensive	7	promotion	6
indicator	9	response	7	hellenic	5
representative	9	engagement	7	economy	5
institutional	9	synchronous	7	independent	5
award	8	range	7	link	5
article	8	understand	7	control	5
director	8	offering	7	ongoing	4
account	8	face	7	regulate	4
discipline	8	seminar	7		
position	8	attend	6		
hellenic	7	device	6		

requirement	7	effectively	6
R&D	7	modern	6
summarize	7	essential	6
basic	7	language	5
table	7	build	5
transparency	7	compare	5
conduct	7	complexity	5
basis	7	recent	5
collective	6		
consist	6		
correspond	6		
engineer	6		
joint	6		
component	6		
control	6		
cost	6		
HEA	6		
rule	6		
second	6		
special	6		
definition	5		
submit	5		
Catalonia	5		
master	5		
average	5		
association	5		
currently	5		
efficiency	5		
_PAESE_5GR	185		
_CAP_06	87		
_CAP_02	66		
_CAP_05	54		
_CAP_04	33		
allocation	8		
approval	8		
B	7		
EUR	7		

secretariat	7
urgent	7
statute	6
entity	6
source	6
Vice	6
Vice-Rectors	5
decree-law	5
election	5
portal	5
supervise	5
art	5
regular	5
draft	5
effectiveness	5
Grants	5
matter	5
arrangement	4
directorate	4
ELKE	4
fee	4
ratification	4
appointment	4
charge	4
civil	4
distinct	4
distribution	4
dean	4
executive	4
ICREA	4
selection	4
upatras	4
competitiveness	4
doctoral	4
financing	4
gr	4
MUR	4

primary	4
Vice-Rector	4
website	4
check	4
distribute	4
in_public	4
president	4
internationalization	4
official	4
preparation	4
PhD	4
advisory	3
covering	3
Economics	3
GDP	3
incentive	3
PNRR	3
rank	3
activate	3
announcement	3
audit	3
competent	3
constitution	3
containment	3
decide	3
decision_making	3
derive	3
didactics	3
draw	3
epidemiological	3
FINEEC	3
income	3
obligation	3
ordinary	3
phone	3
post	3
servant	3

amount	3
chart	3
constitute	3
coordinating	3
enrol	3
head	3
recovery	3
respective	3
spend	3
approve	3
employ	3
instruction	3
set_up	3
small	3